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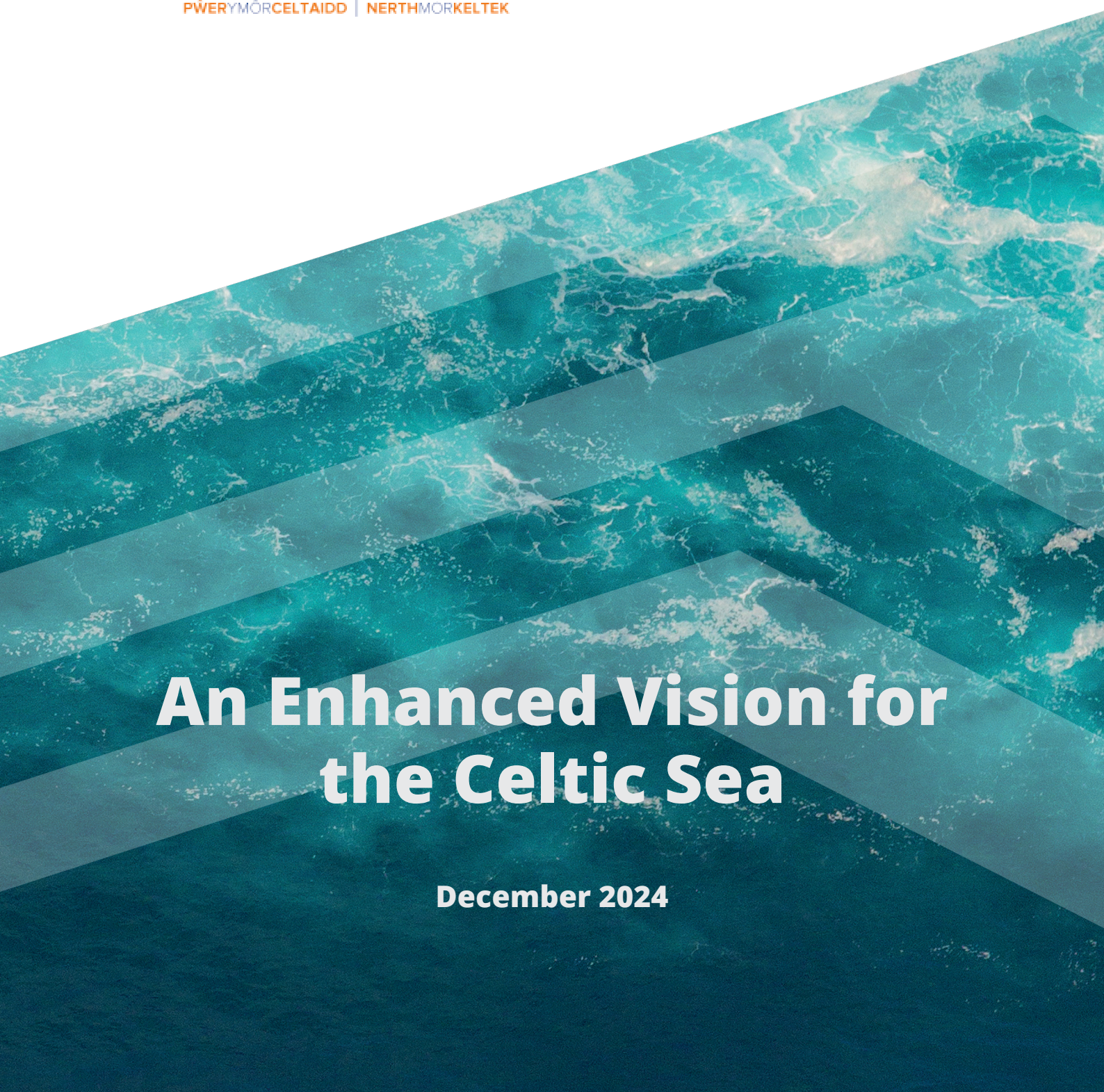

An Enhanced Vision for the Celtic Sea

December 2024

This report has been co-authored by Marine Energy Wales (MEW), Offshore Renewable Energy Catapult (OREC) and Celtic Sea Power (CSP).

MEW, OREC and CSP are spearheading regional activity to prepare for FLOW in the Celtic Sea. The three organisations are founding members of the Celtic Sea Cluster which works to provide a regional voice, drive economic prosperity and champion local supply chain.

Image Credit: Marine Power Systems - PelaFlex technology

Introduction

With the UK Government's ambitious goal to achieve net zero electricity by 2030, the renewable energy sector is gearing up for a significant acceleration. While floating offshore wind (FLOW) in the Celtic Sea will not be mobilised and delivered by 2030, it is poised to play a crucial role in decarbonising heat, industry, and transport beyond this target. This emerging sector holds the promise of economic regeneration and new employment opportunities, offering vital support to coastal communities around the Celtic Sea. Unlocking private sector investment that can scale up and help deliver the supply chain to meet these net zero ambitions is, therefore, of paramount importance.

In 2024, two focal guiding documents were published: The Celtic Sea Blueprint, commissioned by The Crown Estate, and the 2024 Offshore Wind Industrial Growth Plan (IGP), commissioned by RenewableUK, the Offshore Wind Industry Council, The Crown Estate, and The Crown Estate Scotland. These documents offer a comprehensive, top-down perspective on the requirements for FLOW in the Celtic Sea. They also help outline some of the existing and potential capabilities in the region and how these might fit with broader UK and European supply chain capacities as part of a “make or buy” strategy.

In this report, we will more closely examine the Blueprint and IGP from a bottom-up regional perspective. Scrutiny of current capabilities and identifying market gaps within the industry is a vital exercise that should also reflect latest knowledge of ongoing efforts on the ground. As categorised by the IGP, we will explore specific opportunities in “floating platforms and substructures”, the expanding role of “smart environmental services”, and the future of long-term “operations and maintenance”.

Given the significant role of documents such as The Celtic Sea Blueprint and the IGP in informing strategic decision-makers, it is vital that our regional perspective receive due consideration.

Policy and investment decisions will make or break the Celtic Sea opportunity, and whilst regional prosperity can be realised in our enhanced vision for the future, we urge support in making this happen through an outline of key recommendations.

Reflections on the Celtic Sea Blueprint and 2024 Offshore Wind Industrial Growth Plan

The Celtic Sea Blueprint outlines the minimum material, port, and vessel requirements necessary to deliver 4.5GW of FLOW sequentially in the Celtic Sea. It highlights the capacity risks and the extent to which these barriers might be overcome by the market without additional intervention.

It is worth noting that capacity risks outlined by The Celtic Sea Blueprint will be significantly compounded if projects build out in parallel rather than sequentially. Below is a summary of these findings.

Minimum Infrastructure Requirements	Capacity Risk	Intervention Need for Risk Reduction
At least 1 integration port with at least 1.5 ha	High	Medium
An assembly port with 2 assembly lines over a combined minimum of 8 ha for steel platforms or 14 ha for concrete platforms	High	Medium
A marshalling port with at least 16 ha	High	Low
At least 4 wet storage sites	High	Medium
1 to 3 operations and maintenance bases	High	Low

Table 1. Capacity risks for infrastructure requirements highlighted in The Celtic Sea Blueprint.

Minimum Vessel Requirements	Capacity Risk	Intervention Need for Risk Reduction
3 scour protection vessels	Medium	Medium
3 – 6 cable lay vessels	Medium	High
12+ transhipment vessels	Medium	Medium
6 – 12 anchor handlers	Low	Low
3 service operation vehicles	High	Medium
6+ support vessels	Medium	Low

Table 2. Capacity risks for vessel requirements highlighted in The Celtic Sea Blueprint.

Minimum Component Requirements	Capacity Risk	Intervention Need for Risk Reduction
264 turbines	Medium	Medium
264 floating platforms	High	Medium
41km of dynamic inter-array cables	Medium	Medium
515km of static inter array cables	Low	Medium
326km of export cables	Medium	High
3 – 9 substations	Medium	Medium
1056 Anchors	Low	Low
317km of mooring lines	Medium	Low

Table 3. Capacity risks for component requirements highlighted in the Celtic Sea Blueprint.

As can be seen in table 1, the Blueprint reveals a significant capacity risk for all port infrastructure requirements, necessitating substantial intervention to mitigate these risks. A coherent multi-port approach will be required to fully deliver industrial scale, therefore many ports in the region require extensive infrastructure upgrades.

Existing schemes like FLOWMIS provide a foundation, but can also result in investor fatigue, therefore well thought through, strategic support which addresses “timing risk” is crucial to prepare Celtic Sea ports for sector readiness.

Ports are the vital gateway to supply chain opportunities in floating offshore wind, however they already have a significant customer base to service and need to make large scale infrastructure decisions with a high degree of revenue certainty. This is difficult to achieve when commitments from projects must come so late in the development process, so supporting their readiness for the industry is paramount.

Without adequate port infrastructure in the region, everything else fails. The solution here is not millions of pounds worth of taxpayer funded public investment from UK Government, but certainty of future pipeline. With surety of a sufficient pipeline of successive projects and a commitment from UK Government that it will use all the policy levers at its disposal to ensure that these projects will be built out using UK ports, private investment will crowd in to support port infrastructure improvements.

The market for offshore vessels is global in nature, with capable vessels able to take up charters anywhere in the world. The vessels requirements projected for the FLOW industry (table 2) include a significant number of high bollard pull anchor handlers, specialist cable ships (for export cables) and high-performance offshore vessels capable of mobilising inter-array cable spreads. Apart from specialist cable ships, the global fleet of capable vessels was designed to predominantly serve the Oil and Gas industry. When we factor in the performance requirements, the number of capable anchor handlers (in particular) is severely limited. It should also be noted that very few are designed for low or zero carbon operations.

Image Credit: Port of Milford Haven - Pembroke Port

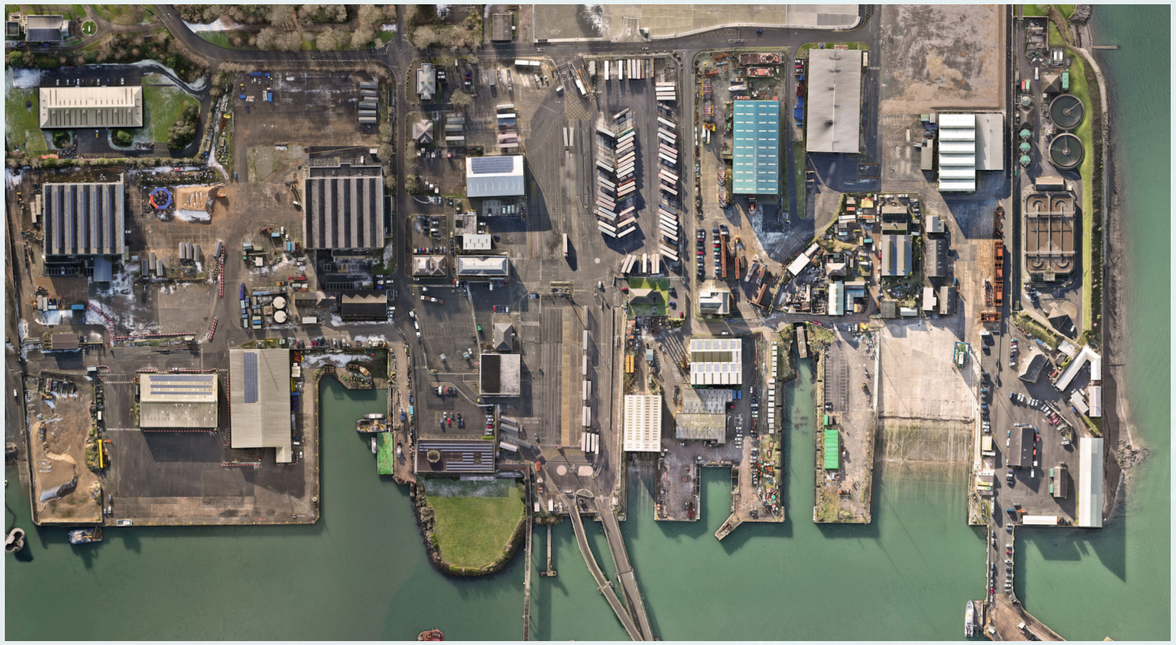

Image Credit: Associated British Ports - Future Port Talbot Project

High demand for cable lay vessels and service operation vessels is a challenge that needs to be addressed to ensure the success of FLOW projects in the Celtic Sea. Specifically, ship owners and their investors must also be assured that there is a sufficiently firm pipeline (i.e. revenue certainty) to invest in new tonnage, particularly given the lead times for new vessels, which in turn is determined by shipyard and steel availability. As is the case with ports, this is difficult when project procurement decisions can only come so late in the development process and therefore must be backed up by UK Government commitments to a certain future pipeline.

Regarding components (table 3), the Blueprint identifies a high-capacity risk for floating platforms due to the lack of an established floating platform supply chain globally. Other components face medium capacity risks, with potential bottlenecks in the current supply chain. However, the UK is well-positioned to potentially deliver critical anchor & mooring services; all aspects of the inter-array connections including cables and connectors and a full suite of operations & maintenance solutions addressing the entire system. This builds on a strong foundation of existing resources. The supply of export cables, however, is heavily dependent on the European market, which is already under high demand pressure.

The capacity risk for floating platforms can also be viewed as a significant opportunity for the region. With no established markets to compete with, the region could be well placed to lead once the pre-requisite port infrastructure improvements are in place. To fully capitalise on this opportunity and establish the Celtic Sea as a global leader in floating platform development, regional test facilities are needed to facilitate design convergence and certification. This will ensure that technological development takes place locally, supporting the parallel development of technical expertise in this area and added value to the economy.

The 2024 Offshore Wind Industrial Growth Plan outlines UK-wide priorities for manufacturing key offshore wind components, emphasising areas where the UK has a competitive advantage. These are defined as materials and services with strong potential for market growth and economic return. The report estimates the total investment required across priority areas (summarised in Table 4 below) and signals which areas are identified as a Celtic Sea regional opportunity.

	UK 2024 – 2035 serviceable market	Global 2024 – 2035 serviceable market	Estimated investment need	Estimated 10 year GVA benefit	Identified by IGP as a Celtic Sea regional opportunity?	Identified by authors as a Celtic Sea regional opportunity?
Advanced Turbine Technology	£46bn	£139bn	£630m - £1,290m	£4.9bn - £8bn	No	No
Industrialised Foundations and Substructures	£47bn	£209bn	£220m - £420m	£6.3bn - £12.1bn	Yes	Yes
Future Electrical Systems & Cables	£19bn	£77bn	£240m - £480m	£1.7bn - £3.4bn	No	No
Smart Environmental Services	£0.5bn	£0.5bn	£20m - £40m	£0.2bn - £0.5bn	No	Yes
Next Generation Installation, Operations and Maintenance	£71bn	£211bn	£120m - £260m	£1bn - £2bn	No	Yes

Table 4. Market size of priority manufacturing areas for UK offshore wind supply chain as outlined by the 2024 Offshore Wind Industrial Growth Plan

While the IGP presents a compelling case for UK-wide supply chain growth, there is a clear need to be more ambitious about the role of regional clusters, particularly the Celtic Sea Cluster, in delivering key IGP components. The report highlights the industrialised manufacture of foundations and substructures as the most significant economic opportunity, identifying the Celtic Sea as a prime location for floating platforms and substructures. However, it overlooks the potential of the Celtic Sea region in other areas such as smart environmental services and next-generation operations and maintenance (O&M), which are critical to the success of FLOW projects.

Proactive regional engagement is essential to lay the groundwork for developers and to ensure the socio-economic benefits of the green energy transition are fully realised. Clusters such as the Celtic Sea Cluster offer unparalleled insight into local capabilities and aspirations, which can complement and enhance broader strategies. The distinctive geography and expertise within the region present a unique opportunity to fast-track the development, testing, and certification of innovative technologies directly adjacent to commercial-scale Project Development Areas (PDAs).

With operational offshore test and demonstration sites like Wales' Marine Energy Test Area (META), the Pembrokeshire Demonstration Zone, Fabtest, and Smartsound already in place, alongside a strong legacy of research-driven innovation, the Celtic Sea region is exceptionally well-positioned to deliver tailored solutions that align closely with developers' needs. This regionally attuned approach adds depth and dynamism that centralised frameworks may find challenging to replicate.

Taking a regional approach can address specific challenges more efficiently and ensure a smoother industrial ramp-up for FLOW projects. By recognising and leveraging local expertise, the IGP can be more responsive to the evolving demands of the sector. The Celtic Sea region, with its existing infrastructure and proximity to PDAs, is ideally placed to drive the development of smart environmental services and Operations & Maintenance (O&M), areas that remain underrepresented in the current plan. This cluster-led model would not only increase the UK's competitiveness globally but also ensure that economic and social benefits are maximised for local communities.

Ultimately, a more decentralised approach that invests in regional capabilities and supports innovation at the local level will be key to achieving the plan's ambitious targets. By embracing the potential of the Celtic Sea as a leading hub for foundations and substructures, smart environmental services, and next generation O&M, the UK can secure long-term success and sustainability in offshore wind.

Image Credit: META - Warrior Way Test Site

Enhancing the Celtic Sea Region's Role in Key Areas

Foundations and Substructures: The manufacture of floating foundations and associated substructures presents a significant opportunity for the Celtic Sea region. With no established global supply chain, this market gap can be effectively filled with strategic investment. The Celtic Sea region is well-positioned to service the growing domestic market as the FLOW pipeline develops, and to capture a share of the Irish, French, and other nearby European markets, leveraging its strategic geographic location and its existing offshore renewables cluster, supported by regional universities with world-leading offshore renewable Research & Development (R&D) capabilities.

Although no platforms have been built in the region to date, the existing supply chain has the capacity to coalesce around foundation design convergence and scale up to meet the production rate demands of the industry, whether that be concrete or steel. The region also boasts strong capabilities that can be applied across the critical component supply chains (like moorings and anchors). This includes manufacturing, engineering, marine operations and sub-sea specialists.

The Celtic Sea Region already has a strong foundation upon which a regionally anchored sustainable industry servicing the FLOW market can be built. This includes a long-established steel industry, with major players such as Tata Steel and Celsa Steel, and extensive fabrication and engineering expertise in the energy and marine sectors. With respect to the development of production-ready concrete foundations, there is already significant experience in the region developed around the delivery of Hinkley point, including marine applications, port interfaces and integrated supply chains.

Swansea is home to Marine Power Systems, the UK's leading floating platform developer, whilst Hayle in Cornwall is the home of TwinHub, the only fully consented project with a Contract for Difference in England and Wales. Many of the regions' companies are already delivering critical services into FLOW projects elsewhere in Europe, developing significant corporate knowledge. Additionally, the Marine Energy Test Area (META), Wales' national test centre for marine energy, has been instrumental in testing innovative components and subsystems for FLOW. The Pembroke Dock Marine Project has developed critical infrastructure, positioning it to support demonstration activities effectively. The Pembrokeshire Demonstration Zone, a designated site for supporting innovative offshore renewable energy technology in conditions which are representative of the majority of FLOW resource areas around the world, can play a crucial role in this effort.

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It is recognised that technology convergence is an essential requirement in reducing costs, developing fit for purpose infrastructure and optimising construction, installation and maintenance processes. For the UK to become global market leaders, it is imperative that such developments should gain early traction in our waters. To this end, opportunities for demonstrating floating platforms (and associated system components) are essential and must be used to satisfy potential customers, investors and insurers. By anchoring such opportunities in the Celtic Sea region there will also be an enhanced possibility of technology being developed that better aligns with regional capabilities.

Utilising the region's capabilities to develop the solutions required for its own indigenous projects represents a meaningful contribution to the objectives of the Industry Growth Plan. Moreover, given the lack of legacy offshore oil & gas or fixed wind industry and impoverished nature of the region, this represents significant and genuine UK additionality which will be hard to replicate elsewhere.

Smart Environmental Services: While the current UK economic value of smart environmental services may be lower compared to other sectors, there is significant export potential, and the Celtic Sea region already boasts a world-class base of R&D capabilities in this area. The region's unique environmental conditions make it an ideal testing ground for smart services, including innovative monitoring, analysis, and mitigation techniques. These strengths, driven by a collaborative ecosystem of universities, research institutions, and industry, are positioning the region as a global leader in environmental innovation with world-leading offshore renewable R&D capabilities.

Since its official opening in 2022, the Marine Energy Test Area (META) has facilitated cutting-edge R&D and extensive testing of new smart environmental services. These include a range of technologies designed to monitor, analyse, and mitigate the environmental impact of offshore renewable energy projects. Such services are crucial for generating high-quality data, which informs decision-making for regulatory authorities—reducing consenting risks, safeguarding marine ecosystems, and supporting the expansion of renewable energy.

If the existing commercial capability in smart environmental services is upscaled, the Celtic Sea region can leverage these R&D advancements to offer globally competitive solutions. This will not only benefit local developments but also create exciting export opportunities for new UK technologies.

Local universities and research institutions such as Bangor, Plymouth, and Swansea play a pivotal role in driving the early-stage R&D of these technologies. Their contributions, alongside innovation programmes like ORE Catapult's ACORD project, provide the foundation for future growth. The region's R&D strengths are critical to scaling these capabilities, and with greater clarity on data standards, parameters of interest, and survey areas in the Celtic Sea, local innovation can be further accelerated. This requires a strategic approach to regional characterisation by stakeholders such as the Crown Estate, regulatory bodies, and developers, ensuring that the region continues to lead in environmental service innovation.

Next-Generation Installation, Operations and Maintenance (O&M): Next Generation Operations and Maintenance (O&M) is highlighted as the largest serviceable market in the IGP, representing significant long-term expenditure that must be captured within the region. From installation through to decommissioning, the O&M of turbines, foundations, moorings, cables, and offshore substations in the Celtic Sea will create the longest-term employment opportunities, ensuring sustained economic benefits.

Image Credit: Sarens - SGC-250, the Sarens Giant Crane nicknamed ‘Big Carl’ by the Port of Ghent

The region already boasts a wealth of transferable skills, with companies experienced in the operations and maintenance of energy sectors like oil, gas, and nuclear, as well as wave, tidal, and floating offshore wind (FLOW) technologies. Leveraging this existing expertise, along with targeted investment, can establish the region as a world-leading hub for O&M.

Ports like Milford Haven, Falmouth, and Newlyn are well-positioned for future project developments, with established and planned infrastructure. Milford Haven, the UK’s largest energy port, alongside Falmouth’s ship repair facilities and Newlyn’s position as England’s largest fishing port, are key assets. Strategic enhancements such as expanded maintenance yards, safe anchorages, and advanced training facilities will further support the region’s capability to serve the offshore wind sector.

However, the creation of thousands of jobs in FLOW should not be taken for granted. The key lies in a strategic approach to workforce development. While shiny new training centres may seem attractive, lessons from Hinkley Point C highlight that investment in deep, sustained partnerships between further education institutions and industry is far more impactful. It's not just about building centres; it's about retaining lecturers, expanding apprenticeships, and ensuring vocational courses meet the evolving demands of O&M.

A prime example of this is the Energy Transition Skills Hub, a partnership between Pembrokeshire College and Shell. The first of its kind in the UK, this initiative underscores the importance of industry collaboration in driving forward the skills needed for the offshore wind sector. It is these types of partnerships that can help bridge the skills gap and future-proof the workforce.

Additionally, collaboration between training providers in the Celtic Sea region is already showing significant progress. For instance, Destination Renewables—a training program initially launched in Pembrokeshire—has now expanded to Cornwall after two successful years. This joint effort between regions demonstrates that training providers are not operating in silos but are actively working together to prepare the workforce for the opportunities on the horizon.

The region already has a strong baseline in technical and marine competencies. Identifying transferable skills and mapping them to specialised O&M career paths will be crucial. Further education institutions must play a central role in this process by offering top-up training programs and aligning their curricula with industry needs. Without this, the region risks missing out on the full potential of these long-term opportunities.
Previous projects like Hinkley Point C have shown that early investment in skills can elevate both local aspirations and the confidence of the supply chain in a skilled, local workforce. By fostering deep collaboration between education and industry, we can build a sustainable and highly skilled O&M workforce that meets the needs of the future offshore wind industry.

Recommendations

The Celtic Sea region stands at the threshold of a transformative opportunity in the realm of FLOW. With the right investments and strategic initiatives, the region can not only meet the UK's net zero ambitions but also spearhead innovation, economic growth, and sustainable development. The analysis of the Celtic Sea Blueprint and the IGP underscores the immense potential for manufacturing foundations and substructures, advancing smart environmental services, and establishing next-generation operations and maintenance (O&M) hubs.

In order to support the Celtic Sea region in securing a sustainable and prosperous future, driving the UK's renewable energy agenda and delivering lasting economic and social benefits to its coastal communities, we put forward the following set of recommendations. Together these strategic recommendations will support private investment into the region that can unlock the region’s full potential, fostering innovation, resilience, and sustainable growth for generations to come.

1. Ensure clarity and certainty of a future project pipeline to unlock private investment in essential port infrastructure and supply chain scale-up. By providing a firm commitment to successive projects and utilising policy levers to prioritise UK ports, the UK Government can enable the necessary infrastructure improvements and investments for FLOW success in the Celtic Sea.

2. Prioritise regional clusters, like the Celtic Sea Cluster, for key IGP delivery to better align with the specific needs of local developers, investors, and stakeholders. Leveraging these clusters’ unique capabilities will enhance the UK’s global competitiveness and ensure long-term success in the offshore wind sector.

3. Enable regional testing and R&D for floating platforms and substructures to harness the Celtic Sea's unique attributes. By supporting the use of local innovation centres and test sites, the UK Government can ensure that the region's strengths in developing, validating, and certifying new technologies are fully utilised, bolstering both regional capability and the broader national supply chain for floating offshore wind.

4. Establish clear data standards and parameters of interest to enhance the development of smart environmental services in the Celtic Sea. A strategic and collaborative approach involving the Crown Estate, regulatory bodies, and local stakeholders is essential to create a framework that supports effective R&D and testing. This clarity will not only bolster local innovation but also position the region as a leader in environmental monitoring and mitigation technologies.

5. Encourage and enable effective industry-education partnerships to ensure the successful development of a skilled workforce for Next Generation Operations and Maintenance (O&M) in the Celtic Sea. Strategic collaborations between further education institutions and industry stakeholders should focus on developing tailored training programmes, expanding apprenticeships and ensuring curricula meet evolving market demands. This proactive approach will bridge the skills gap, enhance local capabilities and secure the region’s position as a leader in the offshore wind sector.

References & Further Reading

- Celtic Sea Blueprint
- 2024 Offshore Wind Industrial Growth Plan
- The Missing Middle: Building Cornwall's Floating Offshore Wind Industry
- Floating Offshore Wind Centre of Excellence Strategic Infrastructure and Supply Chain Development Summary Report
- Benefits of Floating Offshore Wind to Wales and the South West: Supply Chain Report

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