THE UNIVERSITY of EDINBURGH
School of Engineering

POLICY AND INNOVATION GROUP

UK OCEAN ENERGY REVIEW

2025

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UK MARINE ENERGY COUNCIL

Supergen Offshore Renewable Energy

Prepared by Kristofer Grattan, Simon Olsson, Donald R. Noble and Henry Jeffrey, Policy and Innovation Group, The University of Edinburgh

Policy and Innovation Group

The Policy and Innovation Group is part of the Institute for Energy Systems (IES), which is one of the seven research institutes within the School of Engineering at the University of Edinburgh. The Policy and Innovation Group combines expertise in offshore energy technology, energy system organisations and institutions, and the wider policy and regulatory landscape. They apply a range of quantitative and qualitative research tools and methods including energy system modelling, future transition scenarios, techno-economic analysis and innovation pathways. This leads to the development of policy guidance reports, energy system roadmaps and economic and energy system analysis for technology developers, public and private investment and government departments.

Find out more about the Policy and Innovation Group at **http://www.policyandinnovationedinburgh.org**

Supergen ORE

The Supergen programme was set up in 2001 by the Engineering and Physical Sciences Research Council (EPSRC) to deliver sustained and coordinated research on sustainable power generation and supply. For phase four of the programme, the Supergen Wind and Supergen Marine Hubs were combined into the Offshore Renewable Energy Hub. The Supergen Offshore Renewable Energy (ORE) Hub builds on the work of the former Hubs, and looks at synergies between offshore wind, wave and tidal technologies as well as building on current research in each area. Led by the University of Plymouth, Supergen ORE provides research leadership to connect stakeholders, inspire innovation and maximise societal value in offshore renewable energy.

Find out more about Supergen ORE at **https://supergen-ore.net/**

Wave Energy Scotland

Wave Energy Scotland (WES) is driving the search for innovative solutions to the technical challenges facing the wave energy sector. Through a competitive procurement programme, they support a range of projects focused on the key systems and sub-systems of Wave Energy Converters. The aim is to produce reliable technology which will result in cost effective wave energy generation. WES was formed in 2014 at the request of the Scottish Government and is a subsidiary of Highlands and Islands Enterprise. The aim of WES is to ensure that Scotland maintains a leading role in the development of marine energy.

Find out more about Wave Energy Scotland at **https://www.waveenergyscotland.co.uk/**

Marine Energy Council

The MEC is the trade association and representative body for the UK's tidal stream and wave energy industries. Established in 2018 the MEC is committed to realising the potential of tidal stream and wave energy, to support a secure, cost-effective transition to net zero, and make the UK attractive to renewable investors. The MEC has played a key role in influencing the external policy environment, whilst proactively defending the interests of tidal stream and wave energy. This includes securing the ringfence for tidal stream in the UK's last renewable auction, identifying and improving investment and R&D opportunities, and working collaboratively with key stakeholders to maintain the UK's leadership in ocean energy.

Find out more about the Marine Energy Council at **https://www.marineenergycouncil.co.uk**

Acknowledgements

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Cover: Areal view of Orbital O2 off Orkney (Credit: Orbital Marine Power)

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MINISTERIAL FOREWORD

This 2025 Review arrives at a key moment, as this government takes decisive action to further the mission of transforming Britain into a clean energy superpower. Recent years have shown that reliance on imported gas leaves families, businesses and communities dangerously exposed to price volatility. Future-proofing our domestic energy supply – in terms of affordability, security and climate impact – is therefore a central priority for this government.

As highlighted in the Clean Power 2030 Action Plan and GB Energy's Strategic Plan no single technology can deliver this transition. Ocean energy – encompassing tidal stream and wave energy – offers the potential to advance homegrown British technology, combining predictability, innovation and the opportunity to position high-value industrial activity in coastal and island communities.

Ocean Energy Progress

Across the UK, from Orkney to Plymouth, research institutions, technology developers and manufacturers are working to turn ocean energy ambition into real socio-economic value. The UK has established itself as the global leader in tidal stream, with the UK now on track to have over 130 MW deployed by 2029. This progress has been hard won, reflecting years of collaboration between government, industry and the research community.

That pipeline of projects is being delivered by a cohort of innovative developers translating technical leadership into real-world deployment. In Scotland, Orbital Marine Power and Nova Innovation are actively targeting array-scale deployment through Horizon Europe-funded initiatives such as EURO-TIDES and SEASTAR, helping to move tidal stream technology closer to commercial maturity. Proteus Marine Renewables continues to support the ongoing MeyGen project, providing confidence that tidal stream energy can operate reliably and contribute long-term to the electricity system. At the Morlais demonstration zone off the coast of Ynys Môn, developers, local authorities and delivery partners are working together to create skilled jobs, strengthen local supply chains and support long term economic opportunity in north Wales. The emphasis on local content, community value and environmental stewardship reflects the wider potential of tidal stream to support place based growth while contributing clean, predictable power to the energy system.

The wave energy sector also continues to build momentum, and I want to recognise the important role played by Wave Energy Scotland in sustaining innovation across the sector. In parallel, CorPower Ocean is increasing its presence in UK waters, with plans for a wave energy array deployment at the European Marine Energy Centre, reinforcing the UK's position as the premier location for sector firsts.

The UK's strong research and development foundations also ensure that it benefits from a world-leading innovation ecosystem, underpinned by sustained support for early-stage research through the Supergen ORE Hub. It also has commercialisation routes through the ORE Catapult, and specialist testing and demonstration facilities, such as EMEC and FastBlade. Together, these assets help to accelerate the journey from research to deployment, supporting long-term industrial scale-up.

The Next Chapter

Looking ahead, focus must turn to ensuring that the economic benefits of ocean energy are retained within the UK. This means building domestic supply chain capability and capacity, supporting a fair transition through the provision of skilled jobs, and creating routes for manufacturing, assembly and services to scale alongside deployment. If we get this right, ocean energy can deliver not just clean power, but long-term economic value for UK communities.

That is why the Government is working closely with industry through the Marine Energy Taskforce. The Taskforce is an industry led initiative that brings together developers, supply chain companies, researchers and delivery bodies to identify barriers, align priorities and support long-term growth in the sector. I welcome the constructive role it is playing, and the collaborative approach it embodies as government and industry work together to unlock the UK's ocean energy potential.

Ocean energy supports many of this government's broader aims to support good jobs, strengthen regional economies and deliver clean energy in a way that empowers communities for decades to come. This Review not only shows how far the sector has come, but how much further it can go. I welcome its findings and look forward to working with partners across the UK to ensure that ocean energy continues to advance and contribute meaningfully to the delivery of a resilient, prosperous clean energy future.

Michael Shanks MP
Minister for Energy

1 OVERVIEW

EMEC Scapa Flow wave test site in Orkney (Credit: Colin Keldie/EMEC)

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2025 OVERVIEW

As the UK moves further into a decade defined by the twin imperatives of rapid decarbonisation and economic growth, there has been a mounting impetus at the heart of UK Government to accelerate the transition to a clean, secure, and resilient energy system [1]. Central to this shift is the recognition that the pathway to Net Zero must not only reduce emissions, but also deliver tangible socioeconomic benefits felt across all regions of the UK. Ensuring that communities see and experience the value of the energy transition – through skilled jobs, industrial revitalisation and enhanced energy security – has become a defining feature of the wider Net Zero mission.

Against this backdrop, the year-on-year advances of the UK's ocean energy sector have further demonstrated the opportunities arising from tidal stream and wave energy technologies forming a more meaningful part of the future energy system. Tidal stream is now entering its first phase of commercial deployment. It stands at the cusp of delivering predictable, renewable power at scale, with UK developers leading the global race to achieve large-scale deployment. Wave energy, while earlier in its development pathway, continues to demonstrate progress through sustained innovation, positioning it as a longer-term opportunity within a diverse and flexible clean power mix.

Taken together, the commercialisation and eventual export of these homegrown technologies offer a pathway to secure substantial economic value. By situating their long-term development, manufacture and deployment here in the UK, they offer a potential route to reinvigorate UK industrial competitiveness and boost our national energy security. Finally, the development of these clean energy technologies and their underpinning supply chain will help to answer the growing need for a stronger and more decisive UK response to the ongoing climate crisis.

Throughout 2025, the UK has consolidated its position as a global leader in the development and deployment of ocean energy technologies. Continued support through the UK's flagship Contracts for Difference (CfD) mechanism in the last four Allocation Rounds means that, for the first time, tidal stream technologies will play a sustained and more meaningful role in the national energy system, with more than 120 MW now contracted for deployment by 2029 [2]. The UK's internationally recognised expertise in wave energy – built through decades of targeted innovation programmes – has also enabled the sector to position itself as a global hub for testing, validation, and early-stage technology development. At the same time, the UK continues to work closely with European partners through a range of collaborative R&D and demonstration projects, helping accelerate innovation and drive technological breakthroughs across both tidal stream and wave energy.

However, as the sector matures, it must continue to address several persistent challenges. The scale-up of commercial deployment will require a step-change in domestic supply chain capability, ensuring that UK companies can meet growing demand and retain the economic value created by the sector [3]. Sustained innovation remains essential, not only to continue driving down costs, but to ensure that UK developers remain globally competitive. Finally, maximising the socioeconomic contribution of the sector will require coordinated policy action, clear long-term ambition and a commitment to strengthening public confidence in the benefits of emerging technologies.

These challenges are surmountable, and the momentum currently building across the sector suggests that the UK is well-placed to meet them. Ocean energy now offers not only a route to decarbonisation, but a means of strengthening the nation's industrial base and ensuring that the transition to Net Zero is equitable and enduring [4].

Tidal Stream Energy Highlights

- The UK government's Contracts for Difference (CfD) scheme has undergone significant restructuring. Auctions will now comprise two separate allocation rounds: AR7 for offshore wind and AR7a for non-offshore wind technologies. AR7a includes two technology pots, with Pot 2 covering both tidal stream and wave. Unlike previous rounds, Pot 2 does not include any ring-fenced funding for specific technologies. AR7a results are expected February 2026.
- Proteus Marine Renewables have partnered with SKF to deliver advanced technology for MeyGen, the world's largest tidal stream array operated by Ampeak Energy in the Pentland Firth. SKF recently set a new world record for tidal turbine performance, with its 1.5 MW systems operating continuously for over six years without unplanned maintenance.
- In May 2025, the Welsh Government completed a £2 million equity investment in tidal energy firm Inyanga Marine Energy Group, reinforcing the Welsh Government's commitment to making Wales a world centre of emerging tidal technologies.
- Orbital Marine Power have secured licences to deploy up to three O2-X devices at the Canadian Fundy Ocean Research Centre for Energy. In addition, Orbital Marine Power has also secured a multi-million-pound investment from PXN Ventures, a leading venture-focused investment firm, to advance its commercial projects.

Wave Energy Highlights

- Mocean Energy has continued to advance its prototype device, the Blue X, which has achieved over 13 months of reliable offshore operation. Delivered alongside a Tier 1 integrator and several oil and gas operators, this world-first pilot advanced turn-key, off-grid, "always-on" renewable power solutions.
- Scotland, through Wave Energy Scotland, continued to play a leading role in international collaboration efforts by delivering the EuropeWave device development programme in partnership with the European Commission, Ente Vasco de la Energía (EVE), and Ocean Energy Europe.
- Swedish wave energy developer CorPower Ocean have been selected to lead the €30 million Horizon Europe POWER-Farm Project, alongside UK partners European Marine Energy Centre (EMEC) and The University of Edinburgh. Testing undertaken at EMEC will focus on addressing the competitiveness and bankability of wave farms, unlocking potential for large-scale testing and deployment at EMEC.
- OceanEnergy, through the EU-funded WEDUSEA project, is advancing its 1 MW OE35 floating wave energy converter and commencing an ambitious build programme through winter 2025/26 in preparation for deployment at EMEC's Billia Croo wave test site.

Cross-sector Highlights

UK Marine Energy Council Marine Energy Taskforce

The UK Marine Energy Taskforce (MET) was launched in June 2025. The MET is an industry-led initiative established by the UK Marine Energy Council (MEC), which has acted as the sector's voice since its launch in 2018. The Taskforce was initiated with the support of the Minister for Energy, Michael Shanks, and is financially supported by The Crown Estate and Crown Estate Scotland.

Conceived as a focused 12-month cross-sector programme, the MET has been tasked with developing a roadmap and a set of recommendations to help realise the UK's marine energy potential. Its work is structured around four core themes critical to sector growth: site development, financing, innovation, and supply chain growth.

The MET consult with representatives from the UK, Welsh and Scottish Governments, alongside key bodies such as Mission Control and Great British Energy. The Taskforce brings together industry leaders to develop a series of recommendations for government. These recommendations will address challenges associated with these four themes and seize the opportunity represented by the marine energy sector.

The Supergen ORE Hub Ocean Energy Policymakers Toolkit

The Ocean Energy Policymakers Toolkit, a joint collaboration between Supergen ORE Hub and the University of Edinburgh, continues to expand its evidence base for ocean energy policy and industrial strategy. Originally launched in 2023, the Toolkit has now released two additional reports.

In March 2025, an updated and expanded version of the second report in the series, *'What is the Value of Innovative Offshore Renewable Energy to the UK Economy?'* was published, reflecting recent changes in the economic landscape and providing a more detailed quantification of jobs across the ORE sector.

Building on this, a sixth report, *'Disruptive Innovation and Industrial Modernisation: Pathways to Securing Offshore Renewable Energy Supply Chain Competitiveness'*, has been completed. This report examines the role of the underpinning supply chain and explores how the UK can better capture the economic value associated with the growth of the ORE sector. The report is scheduled for launch in January 2026.

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2 SUPPORTING POLICIES FOR OCEAN ENERGY

2.1 NATIONAL ENERGY STRATEGY

The design and implementation of energy policy in the UK reflect a complex mix of reserved, devolved and shared competencies. Responsibility is divided between the UK Government – where the research, development and implementation of energy policy at the national level sits primarily with the Department for Energy Security and Net Zero – and the devolved administrations in Scotland, Wales and Northern Ireland, each of which exercises differing degrees of autonomy over policy decision-making. While the delivery of a future clean energy system is a shared ambition across both national and devolved governments, there is some divergence in the net zero timelines adopted across the UK. For example, the Scottish Government has committed to achieving net zero by 2045, compared with a 2050 target for the rest of the United Kingdom [6].

Within the UK, energy policy is largely devolved to the Northern Ireland Executive. It is broadly reserved to UK Government in respect of Scotland and Wales, limiting the ability of Scottish and Welsh Governments to make decisions and policy independently of UK Government. However, the ability to enact policy which is designed to tackle climate change, through policy levers such as the promotion of renewable energy, energy efficiency, electricity generation, and transmission development is devolved to some extent. This provides each of the devolved governments with at least some powers to determine their overall domestic energy mixes.

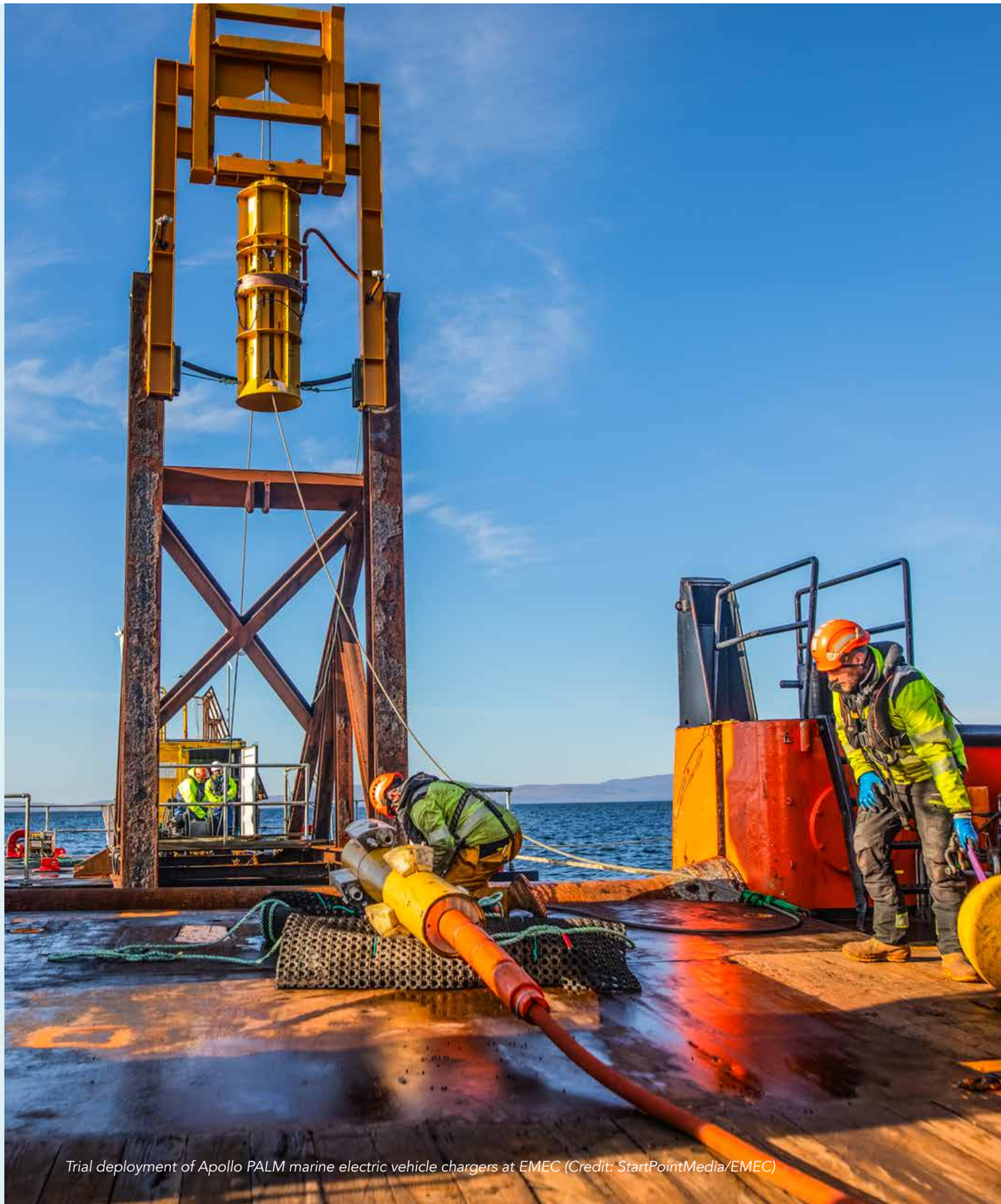
Orbital O2 generating power (Credit: Orbital Marine Power)

United Kingdom

2025 marked the first full year of the current UK Government, a year in which it firmly positioned the development of the UK as a clean-energy superpower as one of its central missions while in office. This ambition has been reflected in the clearer positioning of Great British Energy (GBE) and the ongoing implementation of the Clean Power 2030 Action Plan, as well as a series of major policy announcements aimed at accelerating the transition to a Net Zero energy system. Key developments include:

- **The UK's Modern Industrial Strategy**, launched in June 2025, is a focused 10-year plan to boost long-term economic growth by making it easier and faster for businesses to invest and expand, while fostering a more competitive and resilient UK economy [7]. Central to this strategy is the identification of eight priority sectors (identified as the IS-8) which together account for around one-third of UK GDP. Clean energy industries are among these priorities, with government recognising their potential to serve as both engines of growth and foundations of a sustainable economic future. This approach is also backed by a clear commitment to supporting innovation, with £86 billion of R&D investment specifically set aside to target the IS-8 sectors. The Industrial Strategy also places emphasis on the Supply chains and foundational sectors that underpin the growth of these key industries, considering areas such as electricity networks, ports, critical metals, composites, and steel.
- **The Clean Energy Industries Sector Plan**, part of the UK's Modern Industrial Strategy, outlines the necessary steps to ultimately lower the overall cost of energy and improve industrial competitiveness for the UK's clean energy industries [3]. The Sector Plan primarily focuses on frontier clean energy industries where the UK has the greatest growth potential, which includes industries such as offshore wind, nuclear fission, hydrogen and heat pumps. While it does not include wave and tidal stream, the Plan acknowledges the vital role that more nascent clean energy technology areas will play in future years, with the UK Government committing to continuing to support the development of these technologies. This Plan also connects the growth and clean energy missions by stressing the role of supply chains in delivering overall clean energy resilience and competitiveness.
- **The Great British Energy Strategic Plan**, launched in December 2025, outlines GBE's long-term objectives and its priorities for the next five years [8]. Between now and 2030, GBE will aim to deliver at least 15 GW of clean energy generation and storage assets, and mobilise £15 billion of private finance; support over 1,000 local and community energy projects, boosting community ownership; and support at least 10,000 jobs, including skills and locations historically dependent on oil and gas. It outlines that GBE will operate as both a project developer and equity investor, ensuring that the British public have a meaningful stake in the full lifecycle of clean energy deployments. To achieve this outcome, GBE has set out three priority areas for near-term investment: GBE Local; Onshore Energy; and Offshore Energy. While references to other sectors are limited, GBE does indicate that these are the types of technologies that could be supported by the newly formed GBE Ventures, with the potential for this GBE arm to take minority positions in projects and companies that have high growth potential and a strong UK innovation footprint. This strategic plan also considers the importance of coordinating investment in parallel with GBE's newly announced Energy, Engineered in the UK (EEUK) programme. EEUK is a £1bn funding programme designed to unlock industrial opportunities from the energy transition and to ensure the UK develops enduring capabilities in the clean energy technologies of the future.
- **The Clean Power 2030 Action Plan**, despite being launched in December 2024, continues to fundamentally shape UK Government energy policy and is key to maintaining overall momentum across the clean energy sector [1]. While the 2030 timeline limits the role for tidal stream and wave energy technology, the Action Plan highlights that the UK's ability to deploy these innovative technologies at scale could be important to the UK's achievement of longer-term decarbonisation objectives.

Taken together, these policy developments signal a renewed national commitment not only to expanding the UK's clean energy capacity but also to strengthening the domestic supply chains that will underpin this transition. Within this landscape, the ocean energy sector must continue to advocate for its place in the long-term plan, ensuring that tidal stream and wave energy – technologies uniquely aligned with the UK's natural strengths – are fully recognised for the value they can bring. Delivering a sustainable, diverse and resilient energy mix, that harnesses all of the UK's resources will be essential to achieving Net Zero in a cost-effective and secure manner. As understanding grows of the contribution that wave and tidal stream energy could make in underpinning and strengthening the national energy system, it is vital that these sectors remain integrated into the UK's broader vision for a clean-energy future.



Trial deployment of Apollo PALM marine electric vehicle chargers at EMEC (Credit: StartPointMedia/EMEC)

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Scotland

Scotland continues to hold the most ambitious climate targets within the UK, with the Scottish Government committed to achieving net zero emissions of all greenhouse gases by 2045. Meeting these ambitions will be challenging, as highlighted in April 2024 when the Climate Change Committee advised that Scotland's interim target of reducing greenhouse gas emissions by 75% by 2030 was at risk. In response, the Scottish Government adapted its delivery framework, announcing the replacement of annual emissions targets with a system of multi-year carbon budgets. This approach is supported by a statutory strategic delivery plan setting out how emissions reductions will be achieved, with updated plans to be published at least every five years. Alongside these strategic frameworks, the Scottish Government also exercises devolved powers over spatial planning, marine planning and consenting, providing important policy levers to shape the pace, scale and location of renewable energy deployment and associated supply chain development.

In November 2025, the Scottish Government published the draft version of Scotland's Climate Change Plan (to be finalised in 2026) covering the years 2026–2040. This plan places a renewed emphasis on the development of renewable energy within Scotland, which extends to creating jobs and developing skills within this industry. The plan also emphasises a need for ongoing collaboration between national and devolved governments as 30–60% of the emissions reduction required in Scotland, Wales, and Northern Ireland will be in areas of policy that are mostly reserved to UK Government. Finally, this Plan makes clear that the renewable energy sector in Scotland will provide the foundation of the nation's future energy system, offering a sizeable opportunity for economic growth.

While the plan makes clear that Scotland's future renewable capacity will rely heavily on the development of offshore and onshore wind, other more nascent technologies, such as tidal stream and wave energy, can also play a role in the longer term. The Scottish Government has committed to continuing to support the development of these sectors in its Climate Change Plan. This is particularly important as Scotland's location on the western edge of Europe and its unique geography of seaways and firths, exposes it to a combination of intense winds, powerful Atlantic waves and fast-flowing tidal currents.

Scotland has also benefited from the formation of the Offshore Wind Directorate, a Scottish Government department responsible for the development of policy related to offshore renewables, marine energy, and sectoral marine planning. Scotland has also completed the world's largest commercial offshore wind leasing round in ScotWind. Developer commitments could see an average spend of £1.5 billion in Scotland across the ScotWind offshore wind projects. The Scottish Government has also committed to invest up to £500 million over five years to leverage private investment in ports, manufacturing and fabrication to support sector needs. Given the technological and supply chain overlaps between the Scottish offshore wind and ocean energy sectors, tidal stream and wave energy developers may also stand to benefit if their requirements are taken into consideration at an early stage.

In the last few years, Scotland's ocean energy sector has continued to make substantial progress as wave and tidal stream developers progress on the journey towards commercial-scale deployment. Sustained success in the bidding process for CfD means that there is now nearly 84 MW of tidal stream energy set for deployment in Scotland by the end of 2029. This represents a significant proportion of the global allocated capacity for tidal stream and highlights Scotland's position as a pioneering the development and deployment of tidal stream technologies. Finally, in addition to the CfD awards, three pilot farms at EMEC have been successful in gaining significant support through Horizon Europe funding:

- Scottish tidal stream developer Nova Innovation are leading the SEASTAR project, which aims to deploy a 4 MW tidal farm of 16 tidal stream;
- Scottish tidal stream developer Orbital Marine Power are leading the EURO-TIDES project which aims to deploy a 9.6 MW tidal farm of 4 tidal stream turbines;
- Swedish wave energy developer CorPower Ocean have been selected to lead the €30 million POWER-Farm Project which aims to test and deploy a 5MW farm.

Aerial shot of O2 turbine off Orkney (Credit: Orbital Marine Power)

Wales

Wales remains committed to its target of decarbonising the energy sector, accelerating renewable energy deployment and reaching net zero greenhouse gas emissions by 2050, with interim targets of a 63% reduction by 2030 and 89% by 2040. In 2025, the Climate Change Committee advised that the Welsh Government's existing carbon budget and interim targets remain credible and evidenced. Alongside its emissions targets, Wales has, for nearly a decade, maintained an ambition for 70% of electricity consumption to be met from renewable sources by 2030, which was further strengthened in 2023 through a new commitment to 100% renewable electricity by 2035. While Welsh Government strategies continue to prioritise offshore wind and solar in the near term, tidal stream and wave energy are recognised as longer-term opportunities due to Wales extensive coastline, strong tidal currents, and energetic wave conditions in the Celtic Sea.

In 2025, the Welsh Government strengthened its support for ocean energy through a combination of equity investment and regional infrastructure funding. It holds an £8 million equity stake in the Morlais tidal stream demonstration zone, while a further £8.87 million has been committed through the North Wales Growth Deal to support the Cydnerth grid expansion phase, bringing total project investment to over £16 million. Completion is expected in late 2026, with the project anticipated to support up to 230 jobs and generate up to £30 million in net additional GVA for North Wales. In parallel, the Welsh Government also took a £2 million equity stake in tidal stream technology developer Inyanga Marine Energy, supporting the demonstration phase of its Hydrowing technology at Morlais.

Several additional project milestones occurred during the year. Tidal technology developer Inyanga announced UK-based contractors for manufacturing, system integration, and offshore operations on its upcoming CfD supported 20 MW HydroWing array. 2025 also saw the launch of a Welsh Government-backed R&D collaboration to develop next-generation tidal turbine blades. The project brings together the Advanced Manufacturing Research Centre Cymru, Morlais developer Menter Môn, and ORE Catapult's Welsh team, alongside Spanish partners Magallanes Renovables and D3 Applied Technologies. Funded under the VInnovate Wales programme, the project aims to design more efficient and durable tidal stream blades, laying the groundwork for future cost reductions.

Early-stage technology testing continued at the Marine Energy Test Area in Pembrokeshire. CGEN Engineering and Swansea University's "Tidegen" project, funded by Innovate UK, completed a series of real-sea trials of a next-generation, modular tidal generator at METAs Warrior Way site in early 2025. Separately, Innovate UK awarded £750k to Checkmate Flexible Engineering for its "Môr Neidr" (Welsh for Sea Snake) wave energy converter project.

Marine Energy Wales (MEW), the industry-led stakeholder group, continued to coordinate activity across government, industry, academia and local supply chains. In 2025, MEW's core public remit was renewed with a further three years of Welsh Government funding, providing continuity for policy engagement, market development and supply-chain mobilisation across Wales. MEW also co-led a major cross-technology advocacy milestone, launching "Wind, Solar and Tidal Stream: Unleashing the Full Value of Welsh Renewables" in partnership with RenewableUK Cymru and Solar Energy UK. The report positions tidal stream as a meaningful contributor to Wales renewables growth and quantifies its prospective economic contribution at £696 million in gross value added between 2025 and 2035, supporting average annual employment of 700 jobs over the period.

The Morlais Tidal Energy Zone (Credit: Welsh Government)

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Management of UK Seabed

The seabed that surrounds the UK lies largely under the ownership of the British Crown. Where this applies, this seabed portfolio is maintained and managed for the benefit of the nation by The Crown Estate and, in Scotland, by Crown Estate Scotland.

The Crown Estate

The Crown Estate has a diverse £15bn portfolio that includes urban centres and development opportunities; one of the largest rural holdings in the country; Regent Street and St James's in London's West End; and Windsor Great Park. It also manages the seabed and much of the coastline around England, Wales and Northern Ireland, playing a major role in the UK's world leading offshore wind sector.

It is a unique business established by an Act of Parliament, tasked with growing the value of the portfolio for the nation and returning all of our net profit to HM Treasury for the benefit of public spending. This has totalled £5bn over the last ten years.

Through its activities and investments, The Crown Estate creates environmental, social and financial value both for now and into the long term.

https://www.thecrownestate.co.uk/

Crown Estate Scotland

Crown Estate Scotland manages land, property, coastline and seabed assets on behalf of the Scottish people, operating within the framework set out by the Scottish Crown Estate Act 2019. The Act requires assets to be managed in a way that supports economic development, regeneration, and social and environmental wellbeing. As a self-financing public corporation, Crown Estate Scotland holds rights to lease the seabed out to 12 nautical miles for cables, pipelines and aquaculture, and out to 200 nautical miles for offshore renewable energy and gas storage.

Net surplus revenues are returned to the Scottish Government and reinvested in the estate, with £132 million returned in 2024/25. Analysis by Bigger Economics in 2025 found that Crown Estate Scotland enabled £2.1 billion in GVA and supported almost 17,000 jobs in a single year, with the potential to facilitate up to £100 billion of renewable energy investment over the next 10 –15 years through seabed leasing [9].

In wave and tidal energy, Crown Estate Scotland continues to offer ad-hoc leasing for projects of up to 30 MW and supports sector development through targeted initiatives. In 2025, this included support for the Tidal Industry Seal Project, addressing consenting risks associated with seal interactions in harbour locations [10].

https://www.crownestatescotland.com/

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2.2 MARKET INCENTIVES

Contracts for Difference

The Contracts for Difference (CfD) scheme is the UK government's flagship program for supporting low-carbon electricity generation [11]. CfDs provide long-term price stabilisation through a two-way payment mechanism that settles the difference between a market reference price and an agreed strike price. When market prices fall below the strike price, generators receive a payment; when prices exceed it, they return the difference. The CfD scheme incentivises investment in renewable energy by providing developers of renewable energy projects, normally projects with high upfront costs and long lifetimes, protection from volatile wholesale prices. To date, six allocation rounds (AR) had been completed, with a range of renewable energy technologies successfully bid for contracts through competitive auctions. In AR4, AR5, and AR6, tidal stream benefitted from a dedicated minimum budget in the auction, where support was ringfenced for tidal stream in the CfD auction round before the competition opened to other renewable technologies. From these three AR, there is now a total pipeline for 122 MW of tidal stream projects in the UK, all expected to be commissioned by 2029 [2]. While wave energy projects have not yet won CfD contracts and the sector remains at an early stage relative to tidal stream, there is ongoing technology development and industry interest in progressing devices toward a level of maturity that could make them competitive for future CfD auctions.

In July 2025, DESNZ published the results of its CfD AR7 consultation, which focussed on making reforms to AR7 and the broader CfD scheme in support of the renewable deployment targets set out in the Government's 2030 Action Plan. The most significant change outlined that AR7 would be split into two separate allocation rounds – one for offshore wind technologies (AR7) and a second for non-offshore wind technologies (AR7a) – with separate timelines being published for each. Additionally, prices are now reported in 2024 values, while all previous AR were in 2012 prices. AR7a contains two technology pots, with Pot 2 including both tidal stream and wave. Unlike previous years, Pot 2 does not currently have any ringfenced funds for specific technologies. Results from AR7a are expected February 2026.

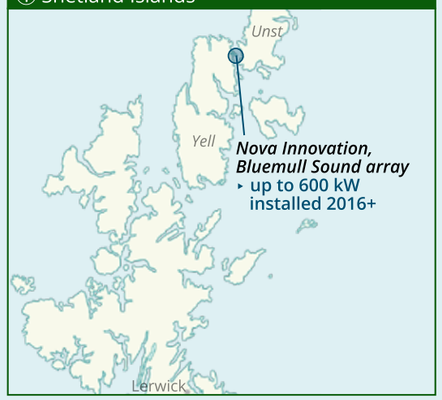
The UK has also provided a funding boost for the CfD associated Clean Industry Bonus (CIB), increasing the overall budget to £544 million, up from £200 million the previous year [12]. While the CIB is only available to offshore wind developers, its aim of supporting cleaner manufacturers, new and upgraded factories, port infrastructure and more support for UK or cleaner supply chains, is likely to have positive knock-on effects for the UK ocean energy sector.

UK Deployments

Maps show projects **currently installed** and planned for deployment
- tidal stream
- wave energy
- test sites
- ‡ not grid connected

Project pipeline as of December 2025
Additional projects for CfD AR7a expected in Febuary 2026

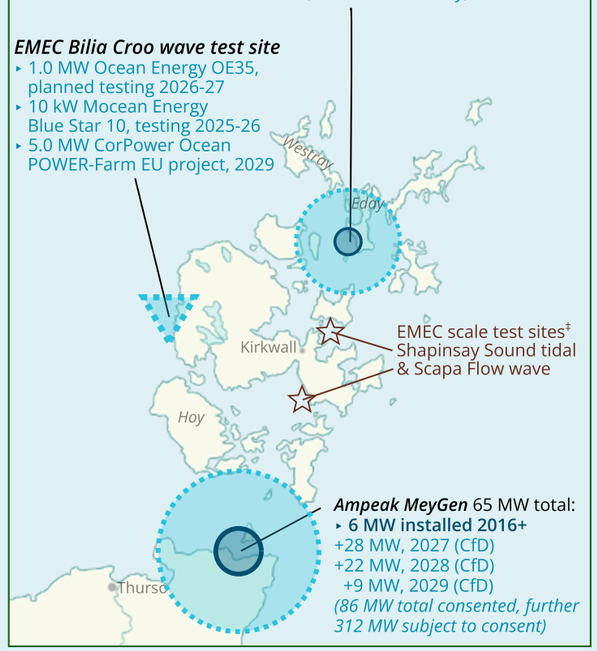
① Shetland Islands



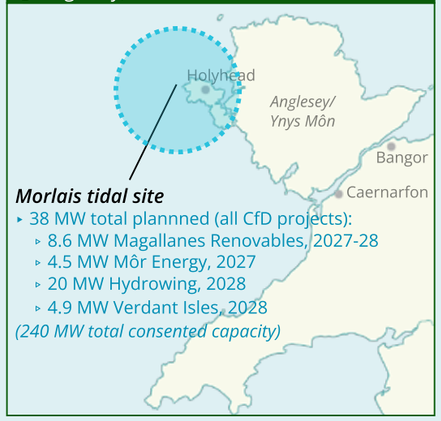
② Orkney Islands and Pentland Firth

EMEC Fall of Warness tidal test site
- **2.0 MW Orbital Marine Power O2, installed 2021+**
- 24.9 MW total planned (all CfD), comprising:
  - 7.2 MW Orbital Marine Power, 2027
  - 7.2 MW Orbital Marine Power, 2028
  - 1.5 MW Magallanes Renovables, 2028
  - 3.0 MW Magallanes Renovables, 2029
  - 4.0 MW Nova Innovation, 16 turbine SEASTAR array, 2029
  - 2.0 MW Nova Innovation, OCEANSTAR array, 2029

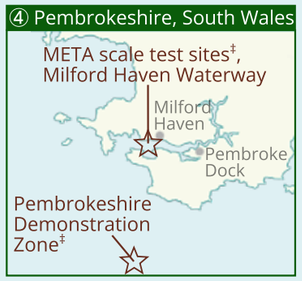
EMEC Bilia Croo wave test site
- 1.0 MW Ocean Energy OE35, planned testing 2026-27
- 10 kW Mocean Energy Blue Star 10, testing 2025-26
- 5.0 MW CorPower Ocean POWER-Farm EU project, 2029



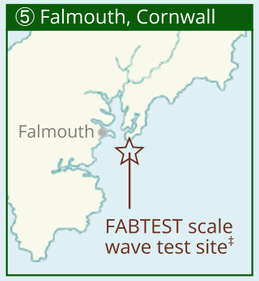
③ Anglesey, North Wales



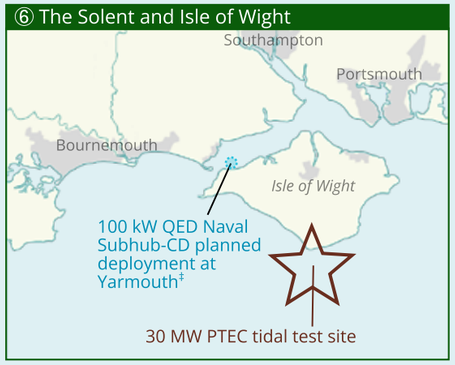
④ Pembrokeshire, South Wales



⑤ Falmouth, Cornwall



⑥ The Solent and Isle of Wight



Details correct as of publication but projects subject to change, some sites may have grid connection or other constraints.

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2.3 PUBLIC FUNDING PROGRAMMES

UK Research and Innovation (UKRI)

Launched in April 2018, UK Research and Innovation (UKRI) is a non-departmental public body sponsored by the Department for Science, Innovation and Technology. UKRI is the national funding agency investing in science and research in the UK. Operating across the whole of the UK with a combined budget of more than £6 billion, UKRI brings together the seven Research Councils, Innovate UK and Research England.

https://www.ukri.org/

Innovate UK

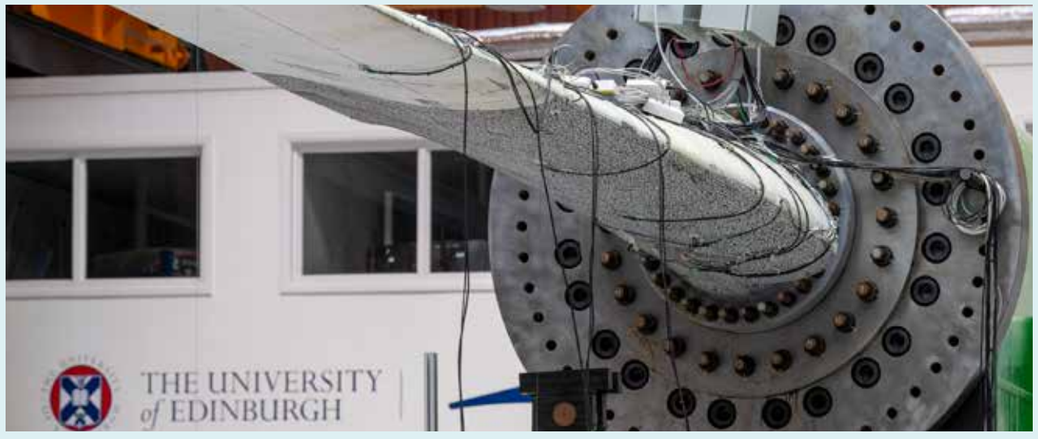
Part of UKRI, Innovate UK inspires, involves, and invests in businesses developing life-changing innovations to create a better future. Providing sectors with expertise, facilities and funding, Innovate UK helps test, demonstrate and evolve ideas, driving UK productivity and economic growth. Innovate UK's network and communities of innovators realise.

www.ukri.org/councils/innovate-uk/

The Engineering and Physical Sciences Research Council (EPSRC)

The Engineering and Physical Sciences Research Council (EPSRC) is the main funding body for engineering and physical sciences research in the UK. The EPSRC aims to create knowledge and fund innovation with the capability to benefit both society and the economy by supporting research through the provision of fellowships, studentships, research and training grants, competitive funding, and prizes. EPSRC funds and co-invests with industry, at both national and international levels, helping to deliver advanced research facilities and resources for engineering and physical sciences, including wave test facilities and tidal tank testing. EPSRC also provides technology push policy support mechanisms, such as the Industrial CDT in Offshore Renewable Energy (IDCORE), a programme designed to provide sector-specific training to bring forward the next cohort of highly skilled engineers, funding for which was renewed to run until 2032. In addition, IDCORE also provide a number of fellowships, managed activity, standard grants and programme grants and is also responsible for funding the ORE Supergen Impact Hub.

https://www.ukri.org/councils/epsrc/



FastBlade tidal turbine blade test facility (Credit: University of Edinburgh)

Wave Energy Scotland (WES)

Since 2014, Wave Energy Scotland (WES) has been using Scottish Government funding, alongside a competitive stage gate process, to tackle the key technical challenges of wave energy conversion, pushing innovative solutions from concept towards commercialisation. Separate funding streams have supported the development of novel wave energy devices, power take-off systems, control systems, quick connection systems and materials. Alongside this, WES is supporting further development of wave devices through the EuropeWave programme, in partnership with the European Commission, Ente Vasco de la Energía (EVE) and Ocean Energy Europe.

During 2025, WES focused on continued innovation support and promoting commercialisation pathways for the emerging technologies, including future opportunities for co-location with the growing floating wind sector. Building on a 2023 study which showed significant cost of energy reduction for wind and wave projects, WES is working to demonstrate the benefits and feasibility of multi-use marine spaces, aiming to maximise the energy generation and economic benefit from available sea areas while helping balance the energy system.

In support of more radical cost-reduction opportunities, WES completed the Direct Generation competition, funding enabling R&D and concept design projects using flexible wave energy devices based on electrostatic power conversion technologies. The programme has guided the future R&D needed to make such technology feasible in the future and exploitable in other near-term markets. WES continues to collaborate widely, playing a leading role in the guidance and delivery of the innovation activity required to take wave energy towards commercial readiness and contribution to Net Zero. Echoing the positive message on the economic benefits of tidal energy [13], WES published a report in February exploring the potential economic benefits of deployment of wave energy technologies [14], highlighting the opportunities for domestic content, jobs and a strong export market. Through the companies and projects funded by the WES programme, this report further demonstrated the opportunity for emerging marine energy industries to deliver extensive economic value in domestic and export markets, while contributing value to the decarbonisation of the UK energy system.

The qualities of the WES programme have been recognised globally and can be replicated in other low-carbon sectors where the value of focused innovation, detailed evaluation and rigorous project management can steer emerging technologies towards their potential.

https://www.waveenergyscotland.co.uk/

Testing of NetBuoy at FloWave (Credit: Wave Energy Scotland)

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Scottish Enterprise

Scottish Enterprise is Scotland's national economic development agency and a non-departmental public body of the Scottish Government. It supports businesses to transform the Scottish economy by targeting new market opportunities through investment, innovation and internationalisation. Its focus on economic transformation is delivered through three interlinked missions: building an internationally competitive renewable energy industry; scaling Scotland's innovation strengths in high-growth sectors; and driving capital investment to deliver a step change in productivity.

Marine energy is an important part of the effort to create an internationally competitive renewable energy industry, and as such, in 2025 SE commissioned a report to provide an "Economic Review of Tidal Stream Energy in Scotland" [13]. The report shows that the potential economic benefit, measured in GVA to Scotland by 2050 is £4.5 billion from Scottish and other UK projects, with a further £11.4 billion coming from international projects if Scotland can maintain its sector leadership. Further to the GVA figures, a potential 22,500 jobs could be generated in Scottish companies in 2050 from UK and international deployments. This report was published in February 2025 alongside a summary report, "The Future Economic Potential of Tidal Stream & Wave Energy in Scotland", which combined findings from the Wave Energy Scotland economic review on wave energy [14,15].

Scottish Enterprise's international arm, Scottish Development International (SDI), has continued to strengthen international links for Scotland's marine energy sector. In 2025, SDI supported trade delegations from countries including France, Canada, Indonesia, the Philippines and Indian Ocean States, alongside providing market intelligence to help Scottish companies access overseas opportunities. Together, these activities support the sector's international growth ambitions.

Scottish Enterprise also led Scotland's participation in the European Clean Energy Transition (CET) Partnership, a Horizon Europe initiative supporting transnational RD&I projects. The 2025 Joint Call allocated a Scottish budget of €3.5 million, including opportunities for ocean energy under the "advanced renewable energy technologies for power production" module, with results due in July 2026.

In addition, Scottish Enterprise continued to support investment in the marine energy sector in 2025, co-investing in ocean energy technology developers alongside private capital to support the expansion of tidal stream deployment in Scotland and overseas.

https://www.scottish-enterprise.com/

Nova Innovation tidal farm render (Credit: Nova Innovation)

Trade Associations

UK Marine Energy Council

Launched in 2018, the UK Marine Energy Council (MEC) acts as the representative voice of the UK's tidal stream and wave energy industries.

In 2025, the MEC worked with the Department for Energy Security and Net Zero (DESNZ) to establish the Marine Energy Taskforce (MET) [5]. Launched by the Energy Minister in June 2025, the MET is a 12-month, industry-led initiative tasked with developing a roadmap and recommendations to support the UK in realising its tidal stream and wave energy potential. The Taskforce is financially supported by The Crown Estate and Crown Estate Scotland and is structured around four work programmes covering finance, supply chain, site development and innovation.

To date, the MET has received over 100 submissions and engaged with more than 100 stakeholders across the UK. Activity has included a supply chain event with the Global Underwater Hub in Aberdeen, an innovation roundtable in London, and participation in conferences across Europe.

Beyond the Taskforce, the MEC has continued to engage closely with UK Government on renewable energy market design, including the development of Allocation Rounds 7 and 7a. In December 2025, it was confirmed that tidal stream and wave energy would compete in Pot 2 for emerging technologies, with a budget of £15 million allocated.

During 2025, the MEC convened industry roundtables with the Energy Minister, Ed Miliband; the Secretary of State for Wales, Jo Stevens; and the Chair of the Energy Security and Net Zero Select Committee, Bill Esterson. It has also engaged regularly with Great British Energy during its establishment, supporting knowledge exchange and securing recognition of tidal energy within its strategic framework.

The MEC continues to act as secretariat for the Marine Energy All-Party Parliamentary Group. In January 2025, it worked with the APPG Chair, Alistair Carmichael MP, to secure a Westminster Hall debate featuring contributions from 16 parliamentarians across the UK and political spectrum. The MEC's membership now includes 35 organisations, supported by 10 Lead Partners and a Board representing the sector's interests.

https://www.marineenergycouncil.co.uk/

Proteus AR1100 deployment in the Naru Strait, Japan (Credit: Proteus Marine Renewables)

3 R&D INSTITUTIONS AND TECHNOLOGY DEMONSTRATION

3.1 KEY R&D INSTITUTIONS

Supergen Offshore Renewable Energy

Supergen Offshore Renewable Energy (ORE) Hub

Funded by the UKRI's Engineering and Physical Sciences Research Council (EPSRC), the Supergen Offshore Renewable Energy (ORE) Hub was established in July 2018 and continues in its current phase (2023–2027) with £7.5 million of funding. The Supergen ORE Hub provides ambitious research leadership and fosters collaboration between academia, industry and policy stakeholders to accelerate innovation across offshore wind, wave and tidal energy for the clean energy transition. The Hub is a collaboration of 10 leading UK Universities, led by the University of Plymouth, with co-directors from the Universities of Aberdeen, Edinburgh, Exeter, Hull, Manchester, Oxford, Southampton, Strathclyde, and Warwick. Leadership of the ORE Supergen Hub will move to Oxford in February 2026.

Strategic Research

The Supergen ORE Hub has worked with stakeholders across the sector to establish strategic Research Challenges – priorities within research that have the potential to unlock a step-change in the development of offshore renewable energy. This targeted research addresses a broad range of challenges such as novel anchoring systems and advanced environmental classification, as well as reducing deployment barriers, including planning and consenting processes and supply chain bottlenecks. Their Flex Fund provides research funding as a key mechanism for addressing near-term priorities: £4.6 million has been provided to 46 targeted Flexible Funded projects to date, involving over 100 industry partners and nearly £6 million in matched contributions.

Research Outputs

Supergen ORE Hub research reaches across industry, policy and standards development. Recent outputs include contributions to new British Standards guidance on undersea cables, and early support for prototype development, such as the semi-commercial M4 wave energy device in Western Australia. The Hub has made a strong contribution to offshore renewables research with over 430 research papers published, leveraging c.£136 million total invested in research. With £228,000 having been awarded to 55 Early Career projects, with the aim of supporting emerging researchers and contributing to the long-term success of the sector.

Collaboration

The Supergen ORE Hub provides regular events as a platform for a cross-disciplinary, whole sector audience to examine the key challenges limiting progress and explore the opportunities emerging within the rapidly evolving offshore renewables landscape, including an Annual Assembly and Early Career Forum.

https://www.supergen-ore.net/

Image left: FloWave ocean energy research facility (Credit: University of Edinburgh)

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Offshore Renewable Energy Catapult

The Offshore Renewable Energy (ORE) Catapult is the UK's flagship technology and innovation research centre for offshore renewable energy, and a key actor in helping to deliver the UK's Net Zero targets. Their aim is to accelerate the creation and growth of UK companies in the ORE sector by providing access to its unique research and development capabilities along with its demonstration and testing facilities. ORE Catapult receives core UK Government support as part of the Catapult Network, including ongoing public funding through Innovate UK to underpin its national mission in offshore renewable energy innovation.

In partnership with Renewable Risk Advisers (RRA), ORE Catapult has continued to develop an insurance solution for the marine energy sector, referred to as the Ocean Energy Accelerator (OEA). The OEA seeks to extend the scope of insurance coverage in pre-commercial marine energy projects that do not have sufficient performance track record, by developing an insurance entity with a protected cell company structure and backed financially by a public guarantor.

This is expected to significantly reduce capital costs in early-stage projects until such a time when the commercial insurance market is ready to provide greater support. By engaging with the industry to quantify project risks, the team has developed an OEA business case for the first Contracts for Difference (CfD) projects in the UK, which has been presented to potential public guarantors.

Over the past year, alongside its wider industry support, ORE Catapult has worked directly with tidal stream developers across a range of areas, including component selection, cost reduction, blade design, subsea architecture design and decision-making. This has also included investigating how tidal energy could be used to meet the energy demands of data centres, with the aim of presenting a compelling business case and opening up new routes to project finance. In parallel, ORE Catapult has been working closely with developers preparing for deployment at the Morlais Demonstration Zone.

https://ore.catapult.org.uk/

Testing at the COAST Laboratory at the University of Plymouth (Credit: Supergen ORE Hub)

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3.2 KEY DEMONSTRATION AND R&D PROJECTS

The UK was well represented throughout 2025 in collaborative European projects, which are primarily funded through Horizon 2020 and Horizon Europe:

COIN

COIN (Control-Oriented INnovations for future wave energy farms) is an EU-funded research project that commenced in November 2025, led by Technische Universität Braunschweig, with participation from Edinburgh-based consultancy Quoceant. The project aims to improve the reliability, efficiency and competitiveness of wave energy by developing advanced control-oriented solutions for future wave energy farms.

COIN focuses on the design of smart subsea connectors to protect critical infrastructure, AI-driven real-time wave prediction tools to support more efficient energy management, and digital twin technologies for condition monitoring to enhance performance and extend system lifetime. Together, these innovations seek to address key barriers to commercial wave energy deployment and support Europe's efforts to diversify its renewable energy mix while strengthening energy security and sustainability.

https://cordis.europa.eu/project/COIN

EURO-TIDES

EURO-TIDES, funded by the EU and UK Research and Innovation (UKRI), aims to deploy a 9.6 MW tidal energy farm comprising four Orbital Marine Power turbines. The project seeks to de-risk tidal technology development, reduce LCOE, improve availability to over 95%, and strengthen the bankability, insurability and supply chain readiness of Orbital's technology, while improving understanding of environmental impacts.

EURO-TIDES supports the commercialisation of Orbital's technology through manufacturing optimisation, long-term operations and maintenance development, and accelerated performance data collection. It also aims to advance commercial-scale tidal projects in French waters, complementing Orbital's existing UK portfolio. Early results, including work on drivetrain testing, digital twins and European supply chain competitiveness, were presented at European Wave and Tidal Energy Conference. The project is coordinated by OEE, the consortium comprises the Center for Wind Power Drives, EMEC, Énergie de la lune, ENGIE Laborelec, MaraSoft, Orbital, and the University of Edinburgh.

https://www.euro-tides.eu/

EUROPEWAVE

Wave Energy Scotland (WES), Ente Vasco de la Energía (EVE) and Ocean Energy Europe (OEE) are currently delivering the EuropeWave wave device development programme, with co-funding from the European Commission. Phase 3 of EuropeWave (aligned with Stage 3 of the IEA-OES Evaluation and Guidance Framework[16]) is supporting three projects to deploy large-scale wave energy converters during 2025-26. CETO Wave Energy Ireland and IDOM Consulting Engineering will deploy their devices at the Basque Country's BiMEP test site, while Mocean Energy will demonstrate the improvements incorporated into its technology off the coast of Orkney in Scotland. Alignment with the IEA-OES recommendations helps the funders guide rigorous, multi-disciplinary engineering activities, and helps the developers to demonstrate their technical qualities as they progress towards realising future commercial opportunities.

https://www.europewave.eu/

FOREST

FOREST (Future Ocean Renewable Energy System Technologies) is a Horizon Europe-funded project that began in November 2025. Led by EMEC, the three-year project brings together eight partners from the UK, Portugal, Spain and Sweden to drive advancements in subsea components and digital technologies that will set new global standards for durability, reliability and efficiency in ocean energy systems.

The oceans offer vast potential for renewable energy, and subsea components are key to unlocking scalable ocean energy deployments. Yet challenges remain around the survivability, reliability, maintenance costs and performance monitoring of ancillary systems

The FOREST project is tackling these barriers with innovations in subsea components and digital technologies, including: a 33 kV dynamic cable and spar connection hub for ocean energy arrays; a quick connector system to streamline deployment and maintenance; and an AI-enhanced optical measurement platform to measure cable and device health. Validated at test sites in Orkney, these innovations will boost the reliability and efficiency of critical ancillary systems, optimising array performance, cutting costs and accelerating global ocean energy deployment.

https://cordis.europa.eu/project/FOREST

FORWARD 2030

FORWARD-2030 will deploy the next iteration of Orbital Marine Power's turbine, the O2-X, incorporating cost-reduction innovations alongside integrated hydrogen production and battery storage. The project will assess large-scale integration of tidal energy within the European energy system and develop smart energy management and operational forecasting tools. The demonstration will be hosted by the European Marine Energy Centre, which will also deliver hydrogen production and a comprehensive environmental monitoring programme. Techno-economic analysis will be led by the University of Edinburgh, with marine spatial planning addressed by the MaREI Centre at University College Cork. n April 2025, Lloyd's Register awarded Orbital an IECRE Feasibility Statement for the O2-X turbine. During the same year, EMEC conducted drifting acoustic surveys to assess underwater sound impacts and led a world-first demonstration combining tidal power, vanadium flow batteries and hydrogen electrolysis. Results, including technical, safety and socio-economic findings, were presented at European Wave and Tidal Energy Conference.

https://forward2030.tech/

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MAXBLADE

MAXBLADE is a €10 million project funded by the EU and UKRI, to investigate the performance and full lifecycle of tidal turbine blades from fabrication to decommissioning, embedding a circular economy element in their design. The project is currently progressing through a range of blade testing activities which will culminate in the full-scale, accelerated life testing of an optimised blade in 2026.

Work is also ongoing to improve the environmental performance of tidal turbines blades. This includes testing the use of more recyclable materials for tidal turbine applications and enhanced health monitoring to extend blade lifetime.

MAXBLADE is led by TechnipFMC and includes Orbital Marine Power, Marasoft, TECNALIA, The University of Edinburgh, EMEC, Laborelec and European Composites Industry Association. It is supported by Edinburgh University's commercialisation service Edinburgh Innovations.

https://maxblade.tech/

MEGA WAVE PTO

MEGAWAVE PTO is a pan-European initiative jointly funded by Horizon Europe and UKRI to design, develop and commercialise a modular, all-electric Power Take-Off (PTO) system for wave energy devices. The drivetrain integrates C-GEN Engineering's modular generator, an axial magnetic gear configuration, and a novel power electronics topology. Its unique value lies in its adaptability, scalability, manufacturability and reliability, enabling reductions in both cost and environmental impact. The modular architecture provides flexibility and inherent redundancy, allowing the same PTO concept to scale from kW to MW capacities depending on site and sea-state requirements, while also maintaining operation in the event of partial PTO failure.

In 2025, the project delivered the design and manufacture of a 1 kW generator and magnetic gear prototype, alongside preparations for experimental testing. Work also progressed on modelling tools, advancement of condition-monitoring and fault diagnostics, maintenance planning, sustainability assessment, LCOE baseline development, and mapping of the European supply chain. Scale-up activities toward the full 100 kW system continued, with project completion planned for 2027.

https://www.megawave-pto.eu/

POWER-Farm EU

The POWER-Farm EU project is a flagship initiative designed to transition wave energy from pilot-scale to commercial bankability. Funded through Horizon Europe, it was launched in December 2025. By validating wave array performance in the rigorous conditions of the Atlantic, the project aims to demonstrate that wave energy is a "clean-firm" renewable source capable of complementing wind and solar.

The project focuses on verifying survivability and reliability at the EMEC Billia Croo test site. It specifically targets the "bankability" gap by providing empirical data on O&M (Operations and Maintenance) costs and yield predictability for large-scale investors. The project will bring the technology from TRL7 to TRL8. Led by CorPower Ocean, the partnership includes EMEC, The University of Edinburgh, Ocean Energy Europe, Renewable Risk Advisers, and Kristinehamn Teknik & Service.

https://cordis.europa.eu/project/id/POWER-FarmEU

SEASTAR

The Sustainable European Advanced Subsea Tidal Array (SEASTAR) project will deliver a 4 MW tidal farm of 16 tidal stream turbines – the largest number of turbines deployed in a single location globally. Building on the success of Nova's previous 6-turbine array in Shetland, SEASTAR will utilise Nova's well-proven turbines to deliver the large-scale 16-turbine array at the EMEC Fall of Warness tidal site in Orkney. Jointly funded by the EU Horizon Europe programme and UKRI, the SEASTAR project will run from December 2023 to February 2029.

In 2024, Nova Innovation was successful in securing a 4 MW CfD contract, via AR6, for the SEASTAR project, ensuring long-term price certainty for the project and delivering a positive step forward in enhancing the bankability and insurability of the SEASTAR tidal farm.

https://www.seastar-tidal.eu/

SEETIP Ocean

The Horizon Europe funded SEETIP Ocean project is coordinated by Ocean Energy Europe, involving the University of Edinburgh, Wave Energy Scotland, and other European partners. It supports the activities of the European Technology & Innovation Platform for ocean energy (ETIP Ocean) and the SET Plan Ocean Energy Implementation Working Group (OceanSET). These facilitate widespread knowledge-sharing within SEETIP Ocean, the ocean energy sector and support the execution of the SET Plan Implementation Plan.

The updated Strategic Research and Innovation Agenda (SRIA) for Ocean Energy was published in October 2024. The SRIA identifies the main 'Challenge Areas', each of which contains research and innovation priorities that the ocean energy sector should work on and what EU, national and regional R&I funding should focus upon during the period of 2025-2030 to deliver the greatest progress in the ocean energy sector.

https://www.etipocean.eu and *https://www.oceanset.eu*

M100-D tidal turbine "Eunice" before deployment (Credit: Nova Innovation)

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In addition to these large European projects, there were also several nationally funded ocean energy R&D projects:

Bionic Adaptive Stretchable Materials for Wave Energy Converters (BASM-WEC)

Launched in November 2021 and concluding in early 2025, BASM-WEC (Bionic Adaptive Stretchable Materials for Wave Energy Converters) was a three-year £1 million project led by the University of Strathclyde, aiming to develop and test advanced wave energy technologies. Drawing inspiration from the flexible bodies and fins of aquatic animals, BASM-WEC sought to create an analysis and laboratory testing toolbox designed to reliably develop, analyse, and process a new generation of adaptive and stretchable materials applicable to WECs.

The project developed a fluid–structure interaction (FSI) analysis tool to predict the dynamic response of flexible WECs, accounting for nonlinear material behaviour, mooring interactions and six-degree-of-freedom motion, alongside demonstrating that structured sheet materials can improve performance by enabling large deformations at low stress to increase power capture while limiting deformation at higher stresses to reduce structural failure risk.

https://basm-wec.org/

Co-Design to Deliver Scalable Tidal Stream Energy (CoTide)

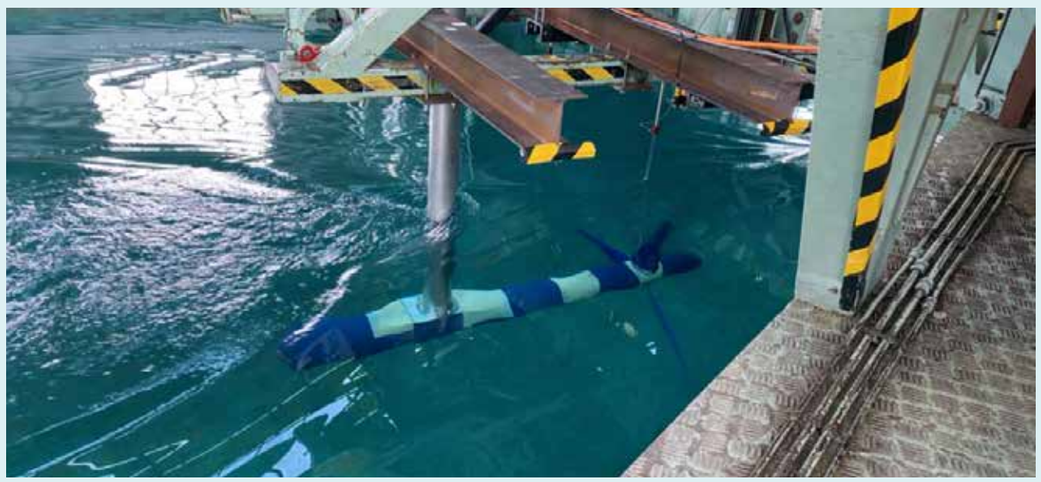
CoTide (Co-design to deliver Scalable Tidal Stream Energy) is a five-year, £7.4 million EPSRC-funded programme running to 2028, focused on developing integrated tools and design processes to reduce costs and accelerate innovation in tidal stream energy. The programme brings together 40 researchers from the Universities of Oxford, Edinburgh, Strathclyde and Sheffield, supported by around 30 project partners including OEMs, utilities, standards bodies and government agencies.

In 2025, CoTide tested highly instrumented 1.6 m-diameter rotors under head and following waves and yawed flow, generating detailed loading and performance data to inform design and fatigue analysis.

Novel turbine blades using steel–FRP composites and recyclable thermoplastics were designed, manufactured, and tested at FastBlade. CoTide also delivered its first integrated engineering model, linking hydrodynamics, structures, materials, corrosion, and resilience to enable system-level optimisation, and launched annual industry–academic workshops.

In 2026, CoTide will test a 3 m-diameter pitch-controlled turbine to assess mitigation of wave-induced loads, alongside oscillation experiments in Oxford's hydraulic flume and Edinburgh's FloWave, and will build and test fully recyclable thermoplastic blades.

https://cotide.ac.uk/



Yawed turbine testing of a 1.6m rotor (Credit: CoTide)

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HAPiWEC

HAPiWEC (Holistic Advanced Prototyping and Interfacing for Wave Energy Control) was a £1 million UKRI EPSRC-funded wave energy research project completed in September 2025. Delivered by the Universities of Strathclyde, Edinburgh and Heriot-Watt, with support from NREL, Renewable Dynamics and Wave Energy Scotland, the project aimed to reduce time, cost and complexity barriers to testing advanced wave energy control strategies, contributing to lower LCOE.

Centred on a control co-design approach, HAPiWEC developed rapid-prototyping hardware, open software tools, advanced control algorithms and remote-access capabilities. Following commissioning of the OSPREY-1 system in 2024, multiple test campaigns were undertaken at the FloWave Ocean Energy Research Facility during 2025. Key outputs included a configurable real-time control and power-driver platform, a high-performance PTO unit, rapid deployment of benchmark and novel control strategies, and fast nonlinear hydrodynamic models.

Final project findings were presented in a special session at EWTEC 2025. In addition, follow-up work is being explored through new international partnerships, including ongoing controller development work with research teams from the UK, Italy and USA. In the UK this has led to the establishment of a follow up training and outreach project, AIM-WEC. This project will involve the development and delivery of training resources for industry, further education and outreach, with the aim of building industry capability and understanding of wave energy control.

https://www.hapiwec.net/

Môr Neidr

Môr Neidr is an 18-month Innovate UK-supported programme advancing Checkmate Flexible Engineering's Lobe-Tendon Anaconda wave energy converter technology. Supported by a £750k Innovate UK grant, the project builds on two years of in-house innovation to improve technology readiness, refine performance, and develop the evidence base required to progress toward future open-water trials at the Welsh Marine Energy Test Area.

Môr Neidr combines numerical modelling, physical testing and prototype hardware development to validate and optimise the Anaconda design. The first quarter of the project has focused on programme mobilisation and delivery planning, including partner coordination with Swansea University, CGEN Engineering, the Offshore Renewable Energy Catapult and Wave Venture; technical planning for modelling and testing to ensure early analysis informs design decisions; and scoping the 2026 test programme across numerical modelling, tank testing, power-take-off dry testing and materials testing.

https://checkmateseaenergy.com/

Morphing-Blades

Funded by the EPSRC, "Morphing Blades: New-Concept Tidal (and Wind) Turbine Blades for Unsteady Load Mitigation" demonstrated, at model-scale, a novel technology to reduce unsteady-loading for tidal and wind turbines and decrease the levelised cost of energy. Led by the University of Edinburgh and involving University of Bath and several UK based ocean energy developers, the project tested a 1.2 m diameter turbine at the Institute of Marine Engineering in Rome in 2022, and at FloWave in Edinburgh between 2023 and 2025, resulting in two patents and several publications. Testing has demonstrated that a passive pitch system with rigid blades, as well a fixed-pitch with flexible blades, can entirely substitute an active pitch to control the power above power rated and resulting in the same energy yields. Furthermore, both systems can critically mitigate high and low frequency root bending moment fluctuations.

https://voilab.eng.ed.ac.uk/morphing-blades

MU-EDRIVE

Launched in August 2021 and concluding in early 2025, MU-EDRIVE (Marinisation and Upscaling of an All-Electric Drivetrain) is a collaborative project led by Newcastle University, with the University of Edinburgh and Mocean Energy, investigating the feasibility and advantages of all-electric power-take-off (PTO) systems for wave energy converters. Key activities have included the fabrication of a full-scale (2 m diameter) marinised PTO, 1:10-scale hydrodynamic tank testing, laboratory testing of electrical machines, and long-duration submerged trials using Newcastle University's USMART acoustic network gateway buoy.

The project has removed key barriers to the economic deployment of wave energy in deep water by demonstrating both magnetic gearing and the marinisation of electric machines for marine use. A full-scale, contactless magnetic gear rated at 1,000 Nm has been designed and built to replace mechanical gearboxes, improving reliability and robustness for wave energy applications. In parallel, the project has demonstrated a direct-drive, marinised electrical machine capable of operating with large magnetic gaps required for encapsulation and fouling protection, including a fabricated 2 kW demonstrator and validated biofouling protection approaches through laboratory and field testing.

https://gtr.ukri.org/MU-EDRIVE

TALOS WEC

TALOS WEC (Technologically Advanced Learning Ocean System-Wave Energy Converter) aims to minimise the size and scale of machinery required to harness wave energy. Initially funded by EPSRC under the project name Novel High Performance Wave Energy Converters (NHP WEC), now also funded by the US DoE, the project is led by Lancaster University, with current research outputs from UK, USA, Ireland, Greece and Turkish researchers. TALOS WEC is a novel high-performance wave energy converter, multi axis and omni directional, point absorber style, completely enclosed where inside the outer shell there is a ball that moves with the flow of the ocean causing strong hydraulic cylinders to pump hydraulic fluid through a hydraulic motor attached to an electric generator to generate electricity or directly using linear generators for increased performance. TALOS WEC has been tested in Lancaster University's wave tank facility and results so far have been extremely positive.

https://www.lancaster.ac.uk/engineering/research/talos/

TIDEGEN

TIDEGEN is a £299k Innovate UK–funded project running from November 2024 to October 2025 that developed and demonstrated a modular, all-electric generator system designed specifically for tidal energy devices. The project addressed the need for robust, maintainable and easy-to-integrate power take-off solutions suited to harsh tidal environments, reducing system complexity while supporting flexible deployment, servicing and long-term operation at tidal sites.

Building on technology developed by CGEN Engineering, a University of Edinburgh spin-out specialising in modular generators for wind, wave, hydro and tidal power systems, TIDEGEN produced a lightweight, interchangeable generator system that can be assembled, serviced and adapted to different tidal platforms. The project represents an important first step in applying CGEN's modular generator technology to the tidal sector, generating real-world operational insight to inform future product development.

https://www.c-gen.co.uk/projects/tidegen

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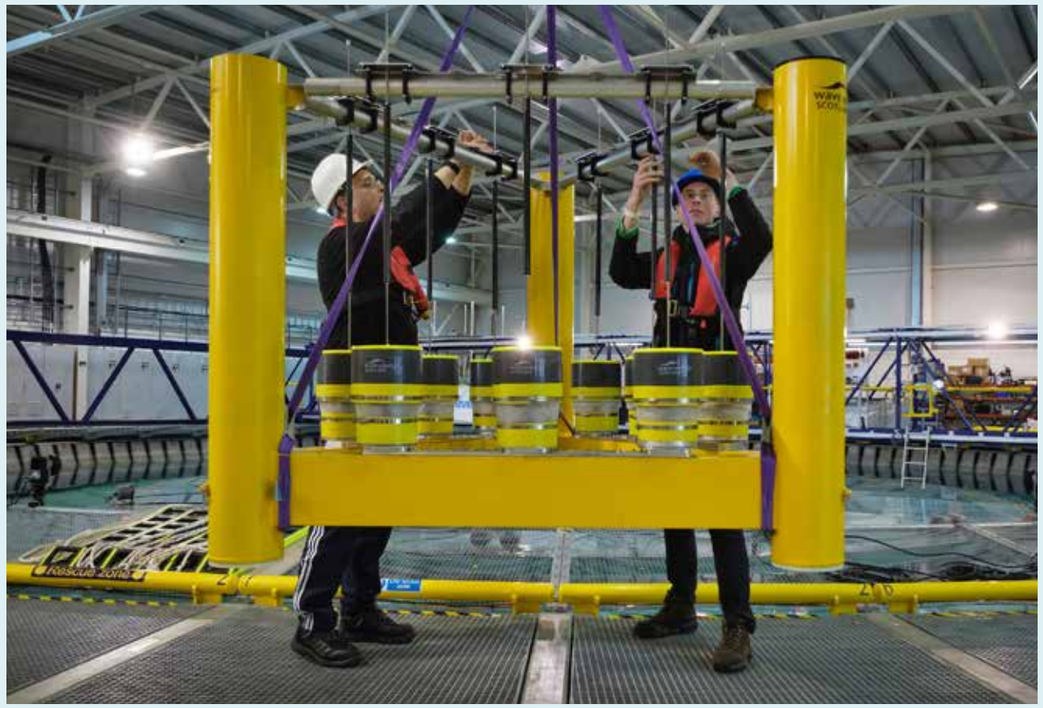
wave energy SCOTLAND

Wave Energy Scotland: Core Innovation Programme and EuropeWave

Since 2014, WES has delivered individual targeted innovation competitions, based on the Pre-Commercial Procurement process that enables up to 100% funding to be provided to emerging technologies. The five core programmes and the subsequent EuropeWave project (co-funded by the European Commission, Ente Vasco de la Energía (EVE) and WES) have delivered a range of technologies to large-scale demonstration, many of them now finding near-term opportunities in offshore industries. The core WES programme has been complemented by a range of collaborative activities, guiding research programmes and targeted innovation support activities.

https://www.waveenergyscotland.co.uk/



Testing of multi wave absorber platform at FloWave (Credit: Wave Energy Scotland)

Wave Energy Scotland: Direct Generation Programme

Wave Energy Scotland's Direct Generation Programme supports next-generation wave energy technologies using novel electrostatic approaches based on flexible elastomers and polymers, including Dielectric Elastomer Generators (DEGs) and Dielectric Fluid Generators (DFGs). To advance understanding of these concepts, WES has supported a structured design competition and targeted enabling R&D activities.

Design Competition: The second round of the Direct Generation design competition concluded in summer 2025, completing a two-phase programme launched in late 2023. 4c Engineering and TTI Marine Renewables participated in this round, investigating DFG-and DEG-based wave energy concepts respectively.

Fundamental Research: In parallel, WES funded fundamental research in priority areas identified through the design competition. The Universities of Oxford and Plymouth investigated origami-inspired structures for DFGs, the University of Manchester examined nanocomposite electrode solutions for DEGs, and the University of Swansea continues to analyse the electro-mechanical fatigue behaviour of both technologies.

Programme Outcomes: Both 4c Engineering and TTI Marine Renewables are exploring intermediate markets, with soft robotics and sensing applications providing potential stepping stones toward future energy harvesting. Wider academic engagement continues through longer-term projects and PhD research, while WES is monitoring progress and plans to publish guidance on the programme's technical conclusions, supporting a phased pathway initially focused on non-generation applications.

https://www.waveenergyscotland.co.uk/wave-technology/direct-generation/

Wave Energy Scotland: Multi Wave Absorber Platform Programme

Opportunities for wave energy to co-locate and share infrastructure with floating offshore wind are becoming increasingly relevant as wind developments move into deeper waters and more energetic wave climates. This presents potential benefits for both sectors, including reduced costs, increased energy yield and improved supply consistency. Since 2022, WES has been investigating these opportunities, focusing on economic viability, performance impacts and engineering feasibility.

An economic study led by OWC Limited found that simple co-location of wave and wind technologies offers the strongest near-term benefits, while also highlighting longer-term potential for versatile platforms capable of hosting either technology. Building on this, WES worked with the FloWave Ocean Energy Research Facility to investigate MWAP behaviour, where multiple wave energy converters are mounted on floating platforms analogous to those used in floating wind. Numerical modelling comparing MWAP configurations with solo absorbers was presented at EWTEC 2025, alongside PhD research supported by WES and Engineering and Physical Sciences Research Council examining model validation.

In parallel, a 2025 engineering feasibility study led by Blackfish Engineering Design Limited identified clustered wave energy converters on shared host platforms as a more cost-effective alternative to standalone devices. In response, WES has developed a cluster concept design targeting utility-scale, multi-megawatt wave energy deployment.

https://www.waveenergyscotland.co.uk/research-strategy/strategic-research/multi-wave-absorber-platform/

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Wave Energy Scotland: Quick Connections System

This programme supports projects aimed at reducing the duration, cost and risk of offshore operations associated with connecting prototype wave energy converters to their moorings and/or electrical systems. Its impact is already extending beyond the wave energy sector. Published in January 2025, the Scottish Offshore Wind Energy Council Innovation Guide highlights impactful innovation taking place in Scotland, and features all three technologies that progressed to Stage 3 of the WES Quick Connection Systems competition, demonstrating the wider value of the programme.

- Quoceant are working with CETO Wave Energy Ireland to further develop their connector for use in their EuropeWave deployment at BiMEP and will continue development through the COIN project funded through Horizon Europe.
- Apollo continue towards certification of their connection system and will be testing it in Orkney as part of the FOREST project funded by the same Horizon Europe call.
- Blackfish are working with a manufacturing partner identifying opportunities for extended test to build upon the earlier at sea test campaign. The connection system has achieved Approval in Principle through Bureau Veritas.

https://www.waveenergyscotland.co.uk/wave-technology/quick-connection-systems/

Blackfish Engineering 'C-Dart' quick-connector mooring system (Credit: Wave Energy Scotland)

4 TEST SITES AND TECHNOLOGY DEMONSTRATION

Acoustic surveys conducted at EMEC (Credit: EMEC/Colin Keldie)

4.1 EXISTING OPEN SEA TEST AND DEMONSTRATION SITES

European Marine Energy Centre

The European Marine Energy Centre (EMEC) is the world's leading centre for testing and demonstrating wave and tidal stream technologies in the sea. It is the only IECRE-recognised Renewable Energy Testing Laboratory (RETL) for ocean energy. As a plug-and-play facility, EMEC reduces the cost, time and risk of offshore testing by providing pre-consented, grid-connected sites in harsh wave and tidal regimes, alongside sites in less challenging conditions for smaller devices, subsystems and components. EMEC is also an internationally-recognised innovation catalyst, pioneering the transition to a clean energy future through first-of-a-kind and pilot projects spanning ocean energy, offshore wind, renewables integration, hydrogen, e-fuels, and islands decarbonisation.

2025 began with changes to EMEC's leadership team, followed by the creation of an Innovation Team. These changes complement growing engagement with the research community, building on its Independent Research Organisation status, strengthening co-creation with partners and reinforcing EMEC's role in bridging academic research, tank testing, offshore demonstration and real-world data.

EMEC has supported major sector-wide initiatives to help accelerate ocean energy and overcome barriers to deployment. For example, EMEC is leading the 'site development' working group in the Marine Energy Taskforce. Meanwhile, a sector-wide effort to resolve consenting challenges reached a milestone in May with the publication of an evidence-led report setting out recommendations for robust consenting pathways for tidal energy in Scotland while addressing environmental concerns around the potential impact on harbour seals.

At EMEC's Fall of Warness tidal energy test site, preparations continued for upcoming arrays from Orbital Marine Power and Nova Innovation. A major milestone in 2025 was the submission of a Section 36 application to increase consented capacity from 10 MW to 50 MW. EMEC also conducted acoustic surveys around Orbital's O2 as part of the EU-funded FORWARD2030 project.

On the wave energy front, OceanEnergy, through the EU-funded WEDUSEA project, has commenced the build programme for its 1 MW OE35 wave energy converter to demonstrate at EMEC's Billia Croo wave test site. CorPower Ocean announced its ambitions to deliver a 5 MW array featuring 14 wave energy converters at the site. EMEC also launched the ambitious €4 million EU-funded FOREST project to advance subsea components and digital technologies for ocean energy arrays.

Beyond ocean energy, EMEC is exploring options for developing a national deepwater and floating offshore wind test site to the west of Orkney. 2025 also marked progress in projects aiming to integrate renewables with complementary energy vectors and offtake industries. Highlights include the completion of two pioneering hydrogen projects: a hydrogen-powered combined heat and power unit at Kirkwall Airport – a UK first; and a world-first three-in-one demonstration integrating the O2 tidal turbine, vanadium flow batteries, and an electrolyser to smooth the cyclical nature of tidal generation and unlock new offtake opportunities.

EMEC reinforced its role as an anchor institution for clean energy innovation globally and locally. Globally, EMEC co-hosted its International WaTERS workshop with OES-IEA, bringing together 18 test sites and organisations from 10 countries. The centre delivered consultancy services across the USA and Asia and strengthened European partnerships through various EU-funded projects, including MaRINERGi.

https://www.emec.org.uk/

Marine Energy Test Area (META)

The Marine Energy Test Area (META), situated in the Milford Haven Waterway, Pembrokeshire, Wales is managed by Marine Energy Wales and offers pre-consented 'Open Water' and 'Quayside' test sites alongside world class port, engineering, and manufacturing facilities. Aiming to bridge the gap between tank testing and the Welsh Demonstration Zones, this series of eight non-grid-connected sites is suitable for a range of wave and tidal component, sub-assembly, part-scale, and full-scale device tests. META is the only pre-consented, pre-commercial test facility of its kind in Wales and has been funded through the Swansea Bay City Deal as a key partner of the Pembroke Dock Marine Project.

In 2025, META successfully completed three test programmes: Porpoise Power trialled their highly innovative tidal energy convertor which uses an oscillating hydrofoil inspired by a porpoise tail fin; Exo-Engineering completed testing of their eco-engineered scour protection systems known as Exo-reefs; and CGEN Engineering deployed and validated an adaptable modular generator designed for tidal turbines.

https://www.meta.wales/

Marine Energy Test Area (Credit: META)

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Morlais

The Morlais scheme, encapsulates 35km² of seabed around the promontory of Holy Island being developed by Menter Môn. It boasts powerful tidal current resources and relatively low wave regimes, representing a prime site for future exploitation of tidal energy, and has been leased for 45 years. Infrastructure works to enable the export of electricity generated from tidal stream devices was completed in 2023.

The first phase of the project was successfully delivered in February 2024 with the handover of the substation to Menter Môn. Four developers have secured subsidy support under the Contracts for Difference (CfD) scheme in AR4, AR5 and AR6, namely Hydrowing, Magallanes Renovables, Môr Energy, and Verdant Isles.

https://morlaisenergy.com

Morlais onshore substation (Credit: Morlais/Menter Môn)

4.2 RESEARCH AND TEST FACILITIES

In addition to these large-scale test sites, research institutions across the UK continue to maintain and operate several cutting-edge test facilities, providing invaluable support to early-stage technologies and simulations of real-sea conditions. These include but are not limited to:

- COAST Laboratory – Plymouth University
- Fastblade – University of Edinburgh
- Flowave – University of Edinburgh
- Kelvin Hydrodynamics Laboratory – University of Strathclyde

4.3 ARRAYS AND DEMONSTRATION PROJECTS IN THE WATER

MeyGen

The MeyGen project, led by Ampeak Energy (previously called SAE Renewables), established in 2010 and situated in the Pentland Firth, is the largest operational tidal stream project in the world. The site has consent awarded for 86 MW, and the option to develop up to 398 MW. The project is being delivered in phases with the 1st phase operational since 2018, with four 1.5 MW turbines. This incorporated two different turbine technologies, Proteus Marine Renewables AR1500 and Andritz Hydro Hammerfest AH1000 MK1.

As a pathfinder, Phase 1 of the MeyGen Project has overcome a range of early technical challenges. Overcoming initial breakdowns, the turbines selected for Phase 1 are now demonstrating their suitability for long-term continuous deployment, with the longest-running turbine exceeding six years of uninterrupted operation.

In March 2025, the AR1500 turbine exported a record 372 MWh in a single month, and by November 2025 the project had delivered a total of 84 GWh to the local grid. The next phase of MeyGen will deliver an additional 59 MW of capacity utilising 3 MW turbines of up to 24 m rotor diameter. In maintaining its leading position within the tidal industry MeyGen is working to expand its current 86 MW capacity up to 200 MW+ in support of the UK government NET Zero targets and continued support under the CfD.

https://ampeak.energy/tidal-stream/meygen/

AR1500 deployment at MeyGen site (Credit: Proteus Marine Renewables)

Nova Innovation

Nova's Shetland Tidal Array has been generating for more than nine years, accumulating over 86,600 operating hours and counting. The company is currently advancing the design and testing for their next-generation tidal turbine, developed under the UpTEMPO project. Nova is also leading the pan-European SEASTAR project that will see a 4 MW tidal array deployed at the European Marine Energy Centre in Orkney. Nova has won 6 MW of CfD contracts, via AR6, to support the deployment of turbines at EMEC's Fall of Warness site.

https://novainnovation.com/

Nova Innovation completing tidal turbine maintenance (Credit: Nova Innovation)

Orbital Marine Power

In 2025, Orbital Marine Power advanced the development of what could become the world's most powerful tidal turbine, the 2.4 MW O2-X. In April, Lloyd's Register awarded the O2-X an IECRE Feasibility Statement, recognising the maturity of its design, which builds directly on Orbital's proven O2 turbine currently operating at the European Marine Energy Centre in Orkney. Throughout the year, the O2 continued long-term operation at EMEC, providing critical data on component reliability, offshore operations, and environmental performance.

The O2-X incorporates lessons learned from the O2, featuring a larger rotor, improved hydrodynamics, modular construction, and advanced monitoring and control systems. These enhancements are intended to optimise performance, reduce operational risk and support environmentally responsible deployment at scale. Designed to bridge the gap between demonstration and commercial tidal arrays, the O2-X is being delivered through the Horizon 2020 FORWARD-2030 project.

https://www.orbitalmarine.com/

Orbital O2 device at sea (Credit: Orbital Marine Power)

4.4 PROJECTS PLANNED FOR DEPLOYMENT

CorPower Ocean

Following the successful HiWave-5 demonstrator program in Portugal, CorPower Ocean has signed a berth agreement for Project Valiant. This 5 MW array will consist of 14 Wave Energy Converters and represents the UK's first pre-commercial wave farm at this scale. The array is designed for a 15-year operational life, with deployment scheduled for 2029. It aims to provide a critical data set for grid-connected performance and long-term structural integrity. The Valiant project will demonstrate that the technology is fully commercial and moved beyond TRL9.

https://corpowerocean.com/

HydroWing

Inyanga Marine Energy Group plan to deploy their HydroWing technology at Morlais in Wales. The 20 MW tidal array will incorporate the Tocardo T3 turbine, with each of the twenty HydroWing units to be powered by two T3 turbines. The turbines include a Passive Pitch Unit which was successfully tested at the Kelvin Hydrodynamics Laboratory at the University of Strathclyde in 2024.

The company has secured 20 MW of capacity for their project at Morlais through the CfD scheme in AR5 and AR6, to be commissioned in 2027/28. A demonstration project will take place at Morlais in 2025. HydroWing is also developing tidal energy projects in Indonesia and Philippines.

https://hydrowing.tech/

Magallanes Renovables

Spanish tidal leader, Magallanes has completed its final tests and validation of it real-scale prototype ATIR 1.0, addressing a complete successful track record and achieving a new step to commercialization. With the closing of the first project finance for tidal energy in the world for its commercial device, the ATIR 2.0 (to be deployed in the Orkney Islands, Scotland), Magallanes will lead the way and will be the first floating tidal converter to pour energy into the grid and apply the CfD scheme.

https://www.magallanesrenovables.com/

CorPower C4 device towed out during deployment (Credit: CorPower Ocean)

Mocean Energy

UK developer Mocean energy has continued to build on the successes of the Renewables for Subsea Power (RSP) project, through which its prototype device, Blue X, achieved over 13 months of reliable offshore operation. Delivered alongside a Tier 1 integrator and several oil and gas operators, this world-first pilot advanced turn-key, off-grid, "always-on" renewable power solutions.

Across 2025 several priority technical areas were addressed through a series of targeted projects:

- EuropeWave is entering its final phase, with offshore trials of the Blue Star 10 OEC scheduled in Orkney from summer 2026. Blue Star 10 represents an evolved, product-ready iteration of Blue X, incorporating expanded solar capacity, onboard batteries and satellite communications, and will also trial a novel direct-drive Vernier Hybrid Machine generator optimised for high-torque, low-speed applications.
- OceanREADI CCS, supported by Innovate UK, will undertake accelerated lifecycle and environmental testing of upgraded powertrain, energy management and power-take-off control systems, focusing on functionality, reliability and resilience.
- OceanPULSE will extend the international reach of Blue Star technology, culminating in a deployment in Australia in 2028. By testing performance under region-specific temperature and biofouling conditions and integrating a fully electric subsea system, the project will support market readiness and commercial acceptance across CCS, oil and gas, and wider Blue Economy applications.

https://www.mocean.energy/

Mocean Blue X wave energy converter (Credit: Mocean Energy)

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OceanEnergy

Through the EU-funded WEDUSEA project, Irish developer OceanEnergy is advancing the development of its 1 MW OE35 floating wave energy converter and is undertaking an ambitious build programme through winter 2025/26 in preparation for deployment at EMEC's Billia Croo wave test site. The deployment phase is scheduled to begin in April 2026 with the installation of mooring components, followed by device hook-up in June 2026, marking a key step towards commercial-scale wave energy demonstration.

https://oceanenergy.ie/oe-team/

Orbital Marine Power

UK developer Orbital Marine Power continued to expand its international activities in 2025, securing 12.5 MW of tidal capacity in Nova Scotia through the province's tidal energy procurement process. Eauclaire Tidal Ltd. and Orbital were awarded two 15-year power purchase agreements, including seabed and grid connection rights at the Fundy Ocean Research Centre for Energy (FORCE) in the Bay of Fundy. The project represents Orbital's largest deployment outside the UK, and positions Nova Scotia to harness one of the world's most energetic tidal resources. The partnership plans to deploy up to six O2-X turbines at FORCE, with an initial staged deployment of up to three units following a Fisheries Act Authorisation issued by Fisheries and Oceans Canada in November 2025. This staged approach enables early operation and environmental monitoring prior to scaling, balancing innovation with ecological protection. Each 2.5 MW O2-X turbine is expected to generate enough electricity to power around 2,000 homes, with the initial 7.5 MW array supplying Nova Scotia's grid.

In December 2025, Orbital also secured £7 million in funding from PXN Ventures, alongside existing shareholders including Scottish Enterprise, to support the delivery of its international commercial projects.

https://www.orbitalmarine.com/

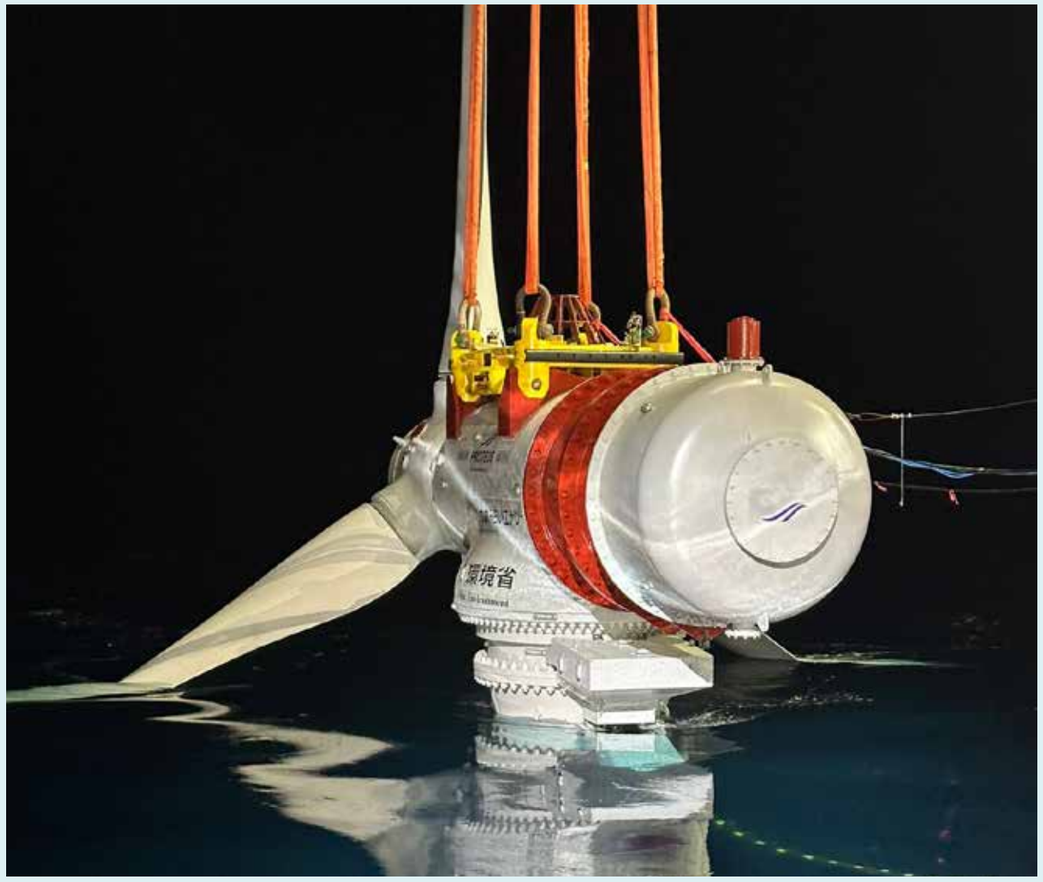
Proteus Marine Renewables

Proteus Marine Renewables brings over 20 years of tidal stream experience, with turbines deployed internationally and more than 22 GWh generated to date. Its AR-Series subsea turbines reflect decades of refinement and are engineered for long-term operation in high-energy environments.

In December 2025, Proteus completed a major offshore service operation at the MeyGen tidal stream project in Scotland. The campaign involved multiple turbine interventions, subsea cable works and on-deck maintenance, returning two turbines to service and recovering a third for planned upgrades. Proteus' 1.5 MW AR Series 1 turbine has been exporting power at MeyGen since 2017 and a Proteus-led group has been selected to deliver the next 59 MW phase, via the UK Government's CfD scheme.

Internationally, Proteus' 1.1 MW AR1100 turbine became the first grid-certified tidal turbine deployed in Japan in 2025. In France, through its involvement in Normandie Hydroliennes, Proteus is advancing the 12 MW NH1 pilot array at Raz Blanchard, utilising four AR3000 turbines. The project has secured €31 million from the EU Innovation Fund, with deployment planned from 2028. Proteus is also partnering with ORPC on a 2 MW tidal pilot project in Cook Inlet, Alaska, and working with SBS and PLN Indonesia Power on early-stage tidal energy development in Indonesia, where approvals were granted in 2025.

https://proteusmr.com/



Installing a Proteus AR1100 device in the Naru Strait, Japan (Credit: Proteus Marine Renewables)

QED Naval

2025 marked a year of significant progress for QED and its subsidiaries, including the establishment of UK-based Tocardo assets with new workshops and facilities in Anglesey, North Wales. Front-end engineering and design work advanced on the next-generation Subhub-ID, alongside major upgrades to the Tocardo T3 turbine, including a larger rotor diameter to improve energy capture and commercial viability. Through Môr Energy, QED also progressed the Morlais project towards a final investment decision and is on track to deliver its first commercial phase, comprising 4.5 MW within a planned 30 MW project.

The QED Subhub tidal technology has now accumulated over two years of operational experience at Strangford Lough. The platform is currently located in Langstone Harbour, pending a Marine Management Organisation application that is nearing completion to enable longer-term remote testing and environmental monitoring.

https://qednaval.co.uk/

Spiralis Energy

Spiralis Energy is developing the biomimetic Axial Skelter tidal stream device, a simple and scalable system inspired by seashell geometry. In 2025, the company advanced preparations for tidal testing, initially exploring deployment in Alderney before refocusing demonstration plans on Orkney's EMEC facilities to benefit from established infrastructure and grid access. In 2026, Spiralis aims to progress testing at EMEC and validate the Axial Skelter at scale, supporting its pathway toward commercial deployment.

https://www.spiralis.energy/

Verdant Isles

Verdant Power is developing the Verdant Isles project at Morlais. The first stage of 4.9 MW was awarded a CfD in AR5 and is expected to be commissioned in 2028/29. Resource assessment and front-end-engineering and design for the project is ongoing. Verdant is working with potential tidal stream technology providers to develop the project.

https://verdantpower.com/

5 SPECIFIC INITIATIVES FOR INTERNATIONAL COOPERATION

This is a non-exhaustive list of examples of different bilateral/regional cooperation initiatives involving the UK:

Clean Energy Transition Partnership (CETP)

The CETP is a transformative Research, Technological Development and Innovation (RTDI) programme designed to accelerate the clean energy transition through annual joint funding calls. CETP operates as an international collaboration involving more than 30 countries and over 40 national and regional funding agencies, supported through the Horizon Europe R&I framework, with the aim of aligning priorities, pooling national budgets and delivering coordinated calls. In 2025, CETP launched its fourth joint call. Within Scotland, the programme continues to be delivered by Scottish Enterprise on behalf of the Scottish Government, supporting Scottish participation across the CETP modules.

https://cetpartnership.eu/

European Energy Research Alliance (EERA)

The UK continues to chair the European Energy Research Alliance (EERA) Ocean Energy Joint Program (JP), providing the UK the opportunity to continue to guide and assist in the development of the Horizon2020 and now Horizon Europe European funding and work programmes. Comprising of nine full participants and four associate partners, the EERA Ocean Energy JP has identified areas of research, based on existing research roadmaps, which are considered critical for meeting the necessary requirements for the successful growth of the industry.

https://www.eera-set.eu/

Ocean Energy Systems (IEA-OES)

Ocean Energy Systems (OES) is the abbreviated name for the International Energy Agency (IEA) Technology Collaboration Programme on Ocean Energy Systems. It is an intergovernmental collaboration between countries, founded in 2001, which operates under a framework established by the IEA. The need for technology cooperation was identified in response to increased activity in the development of ocean wave and tidal current energy The UK was a founding member of the IEA in November 1974 and has maintained a close relationship since then, utilizing its position of leadership to strengthen energy security, spur economic development and advocate for the implementation of cleaner forms of energy.

https://www.ocean-energy-systems.org and *https://www.iea.org*

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6 RELEVANT NATIONAL EVENTS

Relevant events for the ocean energy sector that took place in the UK in 2025 include:

25th - 28th February – Scottish Marine Energy Research (ScotMER) symposium, Stirling/hybrid

15th April – Supergen ORE Hub Annual Assembly, Manchester

7th - 8th May, Marine Energy Wales Conference, Cardiff

14th – 15th May – All-Energy, Glasgow

2nd October – Global Underwater Hub Marine Energy Conference, Aberdeen

Relevant events planned for 2026:

5th March – Global Underwater Hub Marine Energy Conference, Newcastle

13th - 17th April – Environmental Interactions of Marine Renewables Congress, Oban

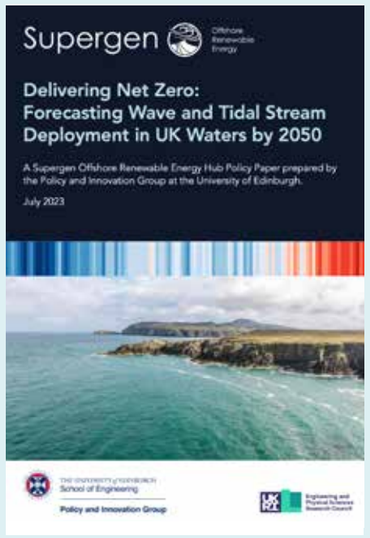
22nd April – Supergen ORE Hub Annual Assembly, Warwick

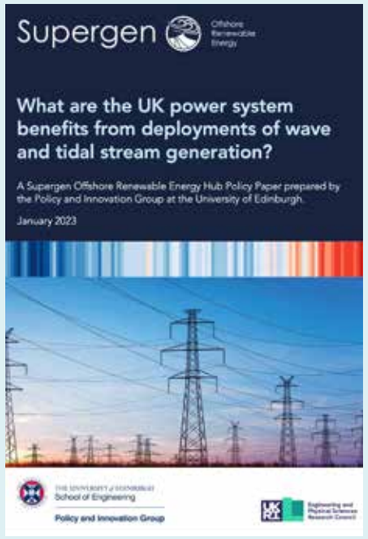
28th - 29th April – Marine Energy Wales Conference, Llandudno

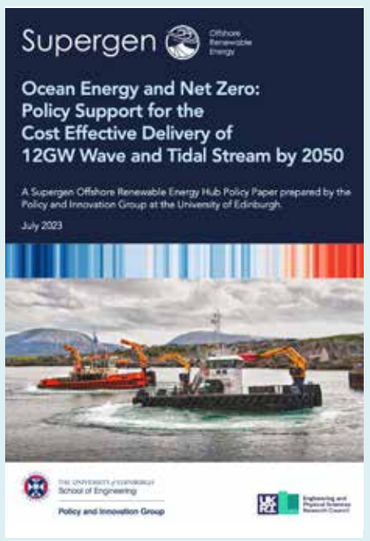
13th – 14th May – All-Energy, Glasgow

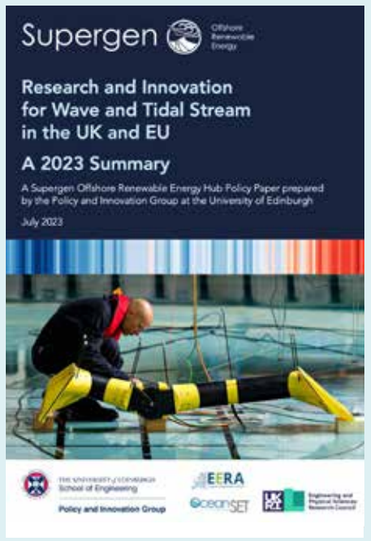
Supergen ORE Hub Annual Assembly 2025 (Credit: Supergen ORE Hub)

7 THE OFFSHORE RENEWABLE ENERGY POLICYMAKERS TOOLKIT









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Forming a clear, consistent and coordinated policy framework is a vital step in helping to accelerate the commercialisation and long-term viability of the UK Offshore Renewable Energy sector.

For prospective policymakers, attempting to do so can raise many questions, such as:

- What represents a realistic deployment target and timeline?
- What are the potential socio-economic benefits that the UK can expect to gain?
- How will ocean energy benefit a future Net Zero national energy system?
- How should future innovation challenge areas be identified, targeted and budgeted for?
- What are the long-term costs associated with policy support for the ocean energy sector, and how will they be responsibly funded?
- What steps are required to develop the underpinning supply chain to capture the economic benefit on offer?

The Policy and Innovation Group, in collaboration with the Supergen ORE Hub, has produced the Offshore Renewable Energy Policymakers Toolkit , a series of six policy guidance reports that aims to provide the answers to these questions.

1. The toolkit starts by forecasting a realistic, quantifiable and, most importantly, affordable pathway to the deployment of innovative ORE technologies, including 6 GW of wave, 6 GW of tidal stream, and 45 GW of deep-water wind in UK waters by 2050.
2. The next report in the series then investigates the value that the deployment of innovative ORE technologies can bring to the UK. If these deployment targets are achieved, the UK has the potential to unlock between £18 billion and £45 billion of GVA for the UK economy. UK exports supporting international deployments could generate an additional £3.3bn to £45bn, also by 2050.
3. The third report examines the UK power system benefits that tidal stream and wave energy technologies have the potential to bring. Their unique energy generation profile can lead to reductions of £1.03 billion per annum in the overall cost of electricity dispatch and can also help to underpin and strengthen an energy mix that will be dominated by intermittent energy sources.

In summary, commercialising innovative ORE technologies has the potential to create huge opportunities for the UK across Net Zero, the Just Transition and energy security. However, realising these potential benefits will require a shift away from business-as-usual policymaking.The series therefore continues by looking at the strategic interventions, innovation requirements and supply chain developments that are needed to ensure the ORE sector reaches full commercialisation.

4. This begins by outlining the need for a balanced approach to the administration of both market pull mechanisms and technology push policy programmes. Market pull mechanisms, such as the CfD programme, have an important role to play in providing long-term financial support. However, the cost of providing this support is greatly dependant on the rate of technological innovation sustained across the sector, which is tied directly to the application of a comprehensive technology push policy programme.
5. Having identified the importance of technological innovation to cost-reductions, the fifth report provides a snapshot summary of the main cross-cutting innovation challenges facing the sector.
6. Finally, the report series concludes by exploring how disruptive innovation and industrial modernisation can be used to develop the sector's underpinning supply chains, ensuring that a greater share of the economic value created is captured within the UK.

Through a combination of quantitative analysis of existing data and future evidence-based scenarios – all in collaboration with industry and government decisionmakers – this report series outlines how offshore renewable energy can grow to play a critical role in the future UK Net Zero energy mix and industrial strategy.

Scan the code to download all six reports.

https://policyandinnovationedinburgh.org/policymakers-toolkit.html

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Subsea cables making landfall at Fall of Warness test site (Credit: EMEC)

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