

A large, high-quality photograph of an underwater scene. The top half of the image shows sunlight filtering down through the water, creating a bright, glowing effect on the surface of the waves. The water is a deep, vibrant blue, and the sunlight creates a warm, golden glow. The bottom half of the image is a darker, deeper shade of blue, with the sunlight appearing as small, bright stars scattered across the surface.

STATE OF
THE SECTOR
2022

NOTE FROM EDITOR ON DATA VALIDITY

Report findings are based on data collected from Marine Energy Wales's annual membership survey. We revise our figures each year, based on the most recent information and historic data. This allows us to build a full picture of the developing socio-economic benefits created by the marine energy sector. The figures are our best assessments as of March 2022, and MEW does not accept liability for the use of the data.

During analysis, data is thoroughly checked for any discrepancies. In some cases, changes in reported values and spending allocations may affect past values presented. Updates and corrections are made accordingly.

Data validity is heavily dependent on the quality and quantity of survey responses. While we receive information from the majority of our active members, some choose not to or prefer not to disclose certain variables. Therefore, assuming the data obtained is accurate at the organisation level, the total values presented in this report are likely to be lower than the real-world values.

Data presented in this report is aggregated and anonymised to protect the commercial interests of our members.

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FOREWORD

I write this foreword for the 2022 State of the Sector report at a time where there is ever increasing certainty about the future of marine energy deployments in UK and Welsh waters. This is thanks to several major milestones over the last year. Notably we have seen The Crown Estate and UK Government set targets for floating offshore wind nationally and in the Celtic Sea, a ringfence created for both tidal stream and floating wind within the government's Contracts for Difference scheme, and the Morlais tidal demonstration zone off the coast of Anglesey now officially under construction.

These targets, developments and assigned funding bring a revitalised confidence that the marine energy industry will deliver. What better time then to take stock and utilise the latest data to drill down into what we have thus far achieved and can deliver in terms of jobs and the economy?

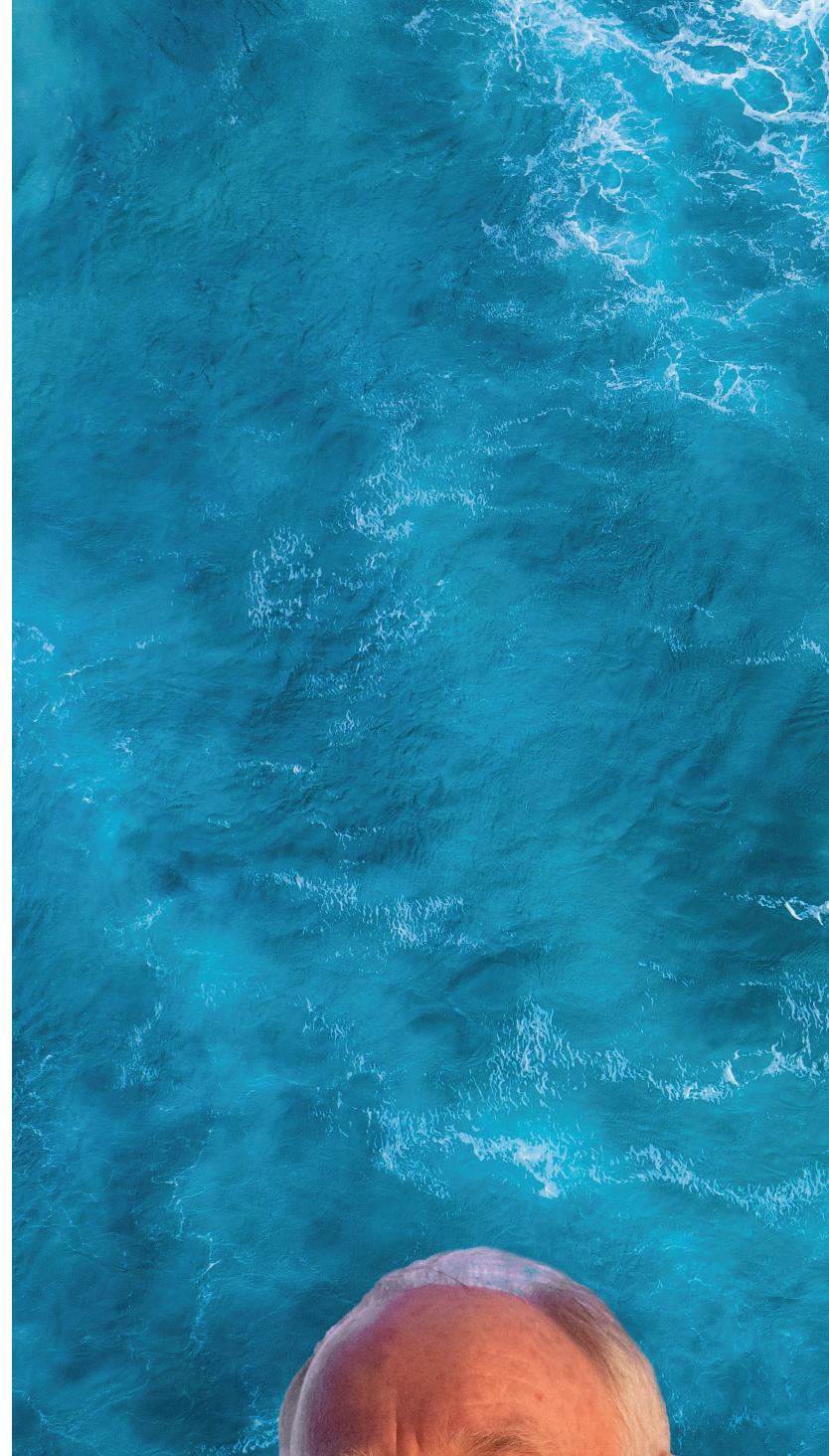
The last year has seen many challenges for society at large. Whilst now hopefully at the tail end, the global pandemic has continued to cause economic challenges across all sectors. The energy industry has been heavily impacted by Russia's invasion of Ukraine. In spite of these pressures, our sector continues to demonstrate its resilience as well the role it must play in reaching net zero targets, energy security and bringing high value jobs to coastal communities.

Marine Energy Wales continues to bring these messages into political conversations on behalf of our diverse community of members, so that decision makers comprehend the opportunities these technologies present. MEW recently signed a new funded business plan with the Welsh Government, in line with the vigorous and continued commitment by Welsh Ministers to support the growth of the marine energy sector. We look forward to continuing our collaborative work across Wales to support the development and deployment of marine renewable technologies.

**MARTIN
MURPHY**

Murphy.

**NON-EXECUTIVE
CHAIR OF
MARINE ENERGY
WALES**



INTRODUCTION

This year, the team at Marine Energy Wales have refined how we present our annual State of the Sector report. We have given a renewed focus on the socioeconomic benefits delivered by the Welsh marine renewable energy sector to date and present a range of case studies to bring life to the findings.

In addition to presenting the latest figures for the level of investment in Wales, we have also sought to gather and present data in additional areas. Most notably the type of employment being generated by the sector, alongside the projected growth in spending over the next five years.

We also cover other sector opportunities outside of Wales and highlight activity from our member network.



COLLABORATION IS KEY

Marine Energy Wales exists to foster a thriving, diverse marine energy sector within Wales. For that we need to develop new ideas and test new technology. Projects which unite our members, bringing together industry, academia and the supply chain, are golden markers for success. Offshore Renewable Energy Catapult's re-purposed buoy is a prime example. Adapted to conduct scientific trials in a harsh marine environment, the marine buoy features innovative technology from industry and academia, including sensors and mooring devices. Delivered by our local supply chain and tested at the Marine Energy Test Area (META), this truly is collaboration in action. It's hoped the results of the trials will help decarbonise the shipping industry and overcome significant engineering challenges from Floating Offshore Wind.

KEY FINDINGS

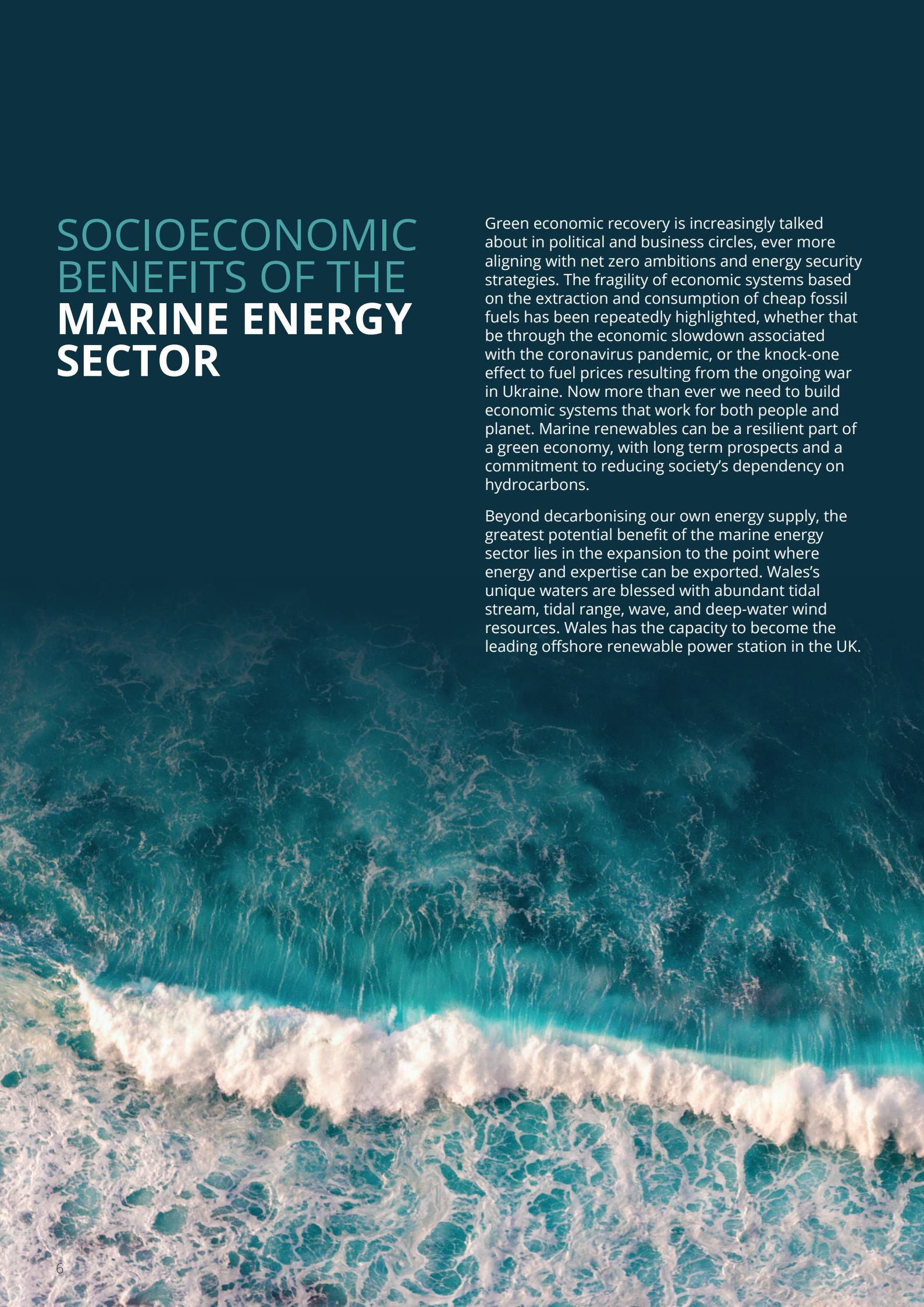
The report shows that the sector continues to grow, albeit with a slight slowdown in rate. Unlike previous years, the 2021/2022 financial year did not experience record growth. University research dominated spending and supply chain investment grew rapidly, most likely in anticipation of a burgeoning project pipeline that now has some certainty behind it thanks to government targets and policy.

Anglesey has seen the largest amount of investment of any Welsh county, due to the large amount of tidal stream activity in the area. Pembrokeshire currently sees the highest employment associated with the sector, due in part to the large established supply chain cluster around the Port of Milford Haven.

While only a small number of projects have been built and deployed to date, construction provides the most employment within the sector. This underscores the largescale jobs benefit of establishing Wales as a manufacturing hub for marine energy as regional, national and international project pipelines grow.

Looking ahead, both tidal stream and floating offshore wind represent a similar level of economic opportunity for Wales over the course of the next five years, with both technologies bringing benefits to different regions of the country.

SOCIOECONOMIC BENEFITS OF THE MARINE ENERGY SECTOR



Green economic recovery is increasingly talked about in political and business circles, ever more aligning with net zero ambitions and energy security strategies. The fragility of economic systems based on the extraction and consumption of cheap fossil fuels has been repeatedly highlighted, whether that be through the economic slowdown associated with the coronavirus pandemic, or the knock-one effect to fuel prices resulting from the ongoing war in Ukraine. Now more than ever we need to build economic systems that work for both people and planet. Marine renewables can be a resilient part of a green economy, with long term prospects and a commitment to reducing society's dependency on hydrocarbons.

Beyond decarbonising our own energy supply, the greatest potential benefit of the marine energy sector lies in the expansion to the point where energy and expertise can be exported. Wales's unique waters are blessed with abundant tidal stream, tidal range, wave, and deep-water wind resources. Wales has the capacity to become the leading offshore renewable power station in the UK.

The continued growth and development of the sector is leading to the build-up of much sought after skills and expertise across all points in the supply chain. As one of the global leaders in this industry, maintaining a competitive advantage brings increasing opportunities to secure contracts for the supply of hardware and expertise in developing markets abroad.

This year's data for the potential future benefits is underscored by increased certainty in project pipeline. The Crown Estate targets ensure floating offshore wind will be developed at scale in the Celtic Sea, revenue support for tidal stream, and planning approval for the Morlais tidal demonstration zone will lead to tidal turbines being deployed to Welsh waters. The country's leading wave energy developers have pivoted to target their technology at the growing floating offshore wind market, and tidal range may yet become a reality with revitalised project proposals and a commitment from Welsh Government to enable the first pathfinder lagoon.

"2022 is shaping up to be a watershed moment, not just for Wales but for Europe and the rest of the world. The Welsh Government's view is that our energy security is best, and most rapidly achieved, through an unremitting focus on creating a renewable energy future. Wales is a place where some of the most innovative and creative projects are already happening, and being directly supported by Government. We need to grab that moment to continue establishing our reputation as a genuine leader in new energy technologies."

Mark Drakeford,
First Minister of Wales

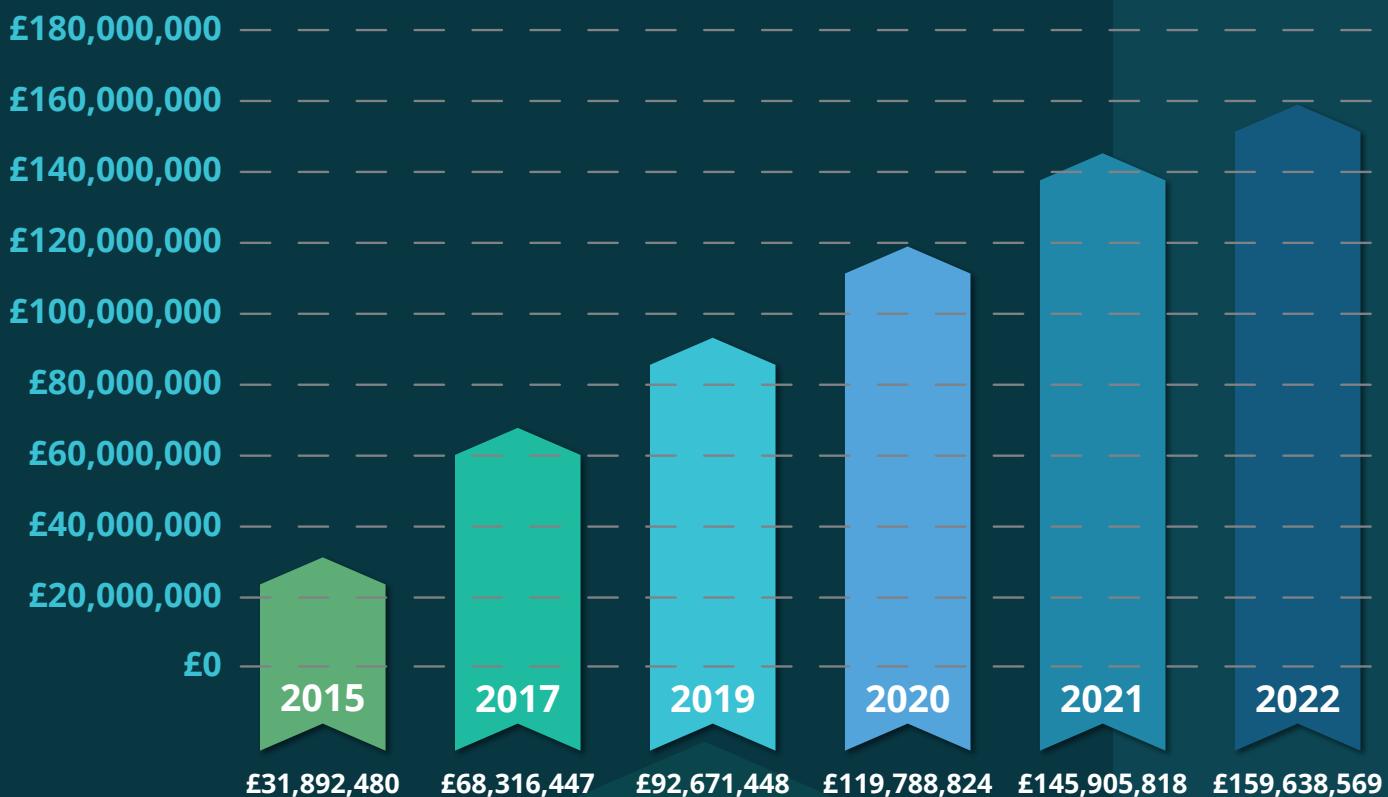


SPENDING & INVESTMENT

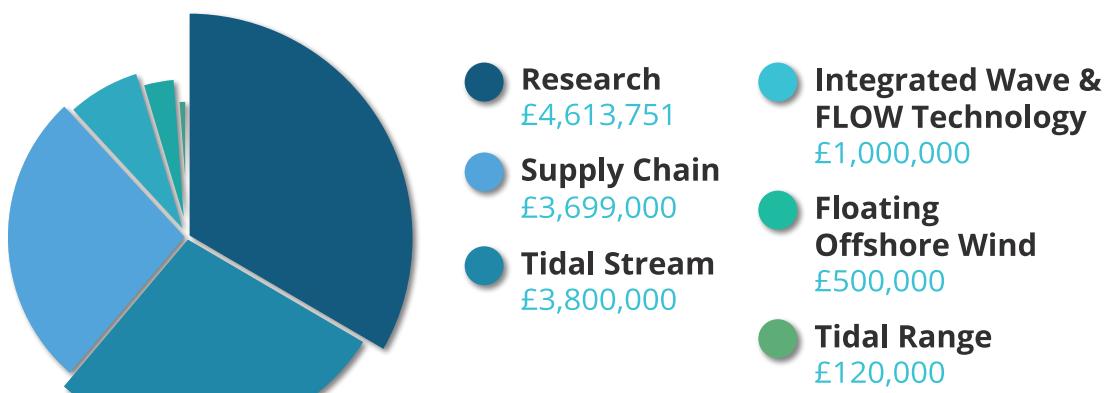
Cumulative investment and spend in Wales by the marine renewable energy sector now amounts to **£159.6 million**, an increase of **£13.7 million** on last year. To date, record levels of growth have been seen year on year, but this year marks a change, with a slight slowdown. This is possibly due to the knock-on effects of Covid-19 with lockdowns interrupting work and causing delays across the sector.

TOTAL WELSH INVESTMENT

Breaking down the £13.7 million spent over the last year by sector area, it can be seen where the most money has been spent.



BREAKDOWN OF THIS YEAR'S SPEND



Research across Wales's universities and academic institutions accounts for the largest portion, with a combined spend of approximately **£4.6 million**. Wales is currently a hotspot for marine renewable energy research with Bangor University, Swansea University and Cardiff University leading the way in resource assessment, environmental monitoring, technology testing and engineering.

Tidal Stream is the second biggest contributor to this year's spending and investment, with a combined total of **£3.8 million**. Much of this is attributed to the further development of the Morlais tidal demonstration zone and technology developers looking to deploy to this zone, including (but not limited to) Nova Innovation, Orbital Marine Power and QED Naval. Nova Innovation continue to develop their project on the Llŷn Peninsula and QED Naval undertook major refit work of their SubHub device in Pembroke Dock. Minesto also continue their longstanding Welsh activities out of their UK base and assembly hall in Holyhead.

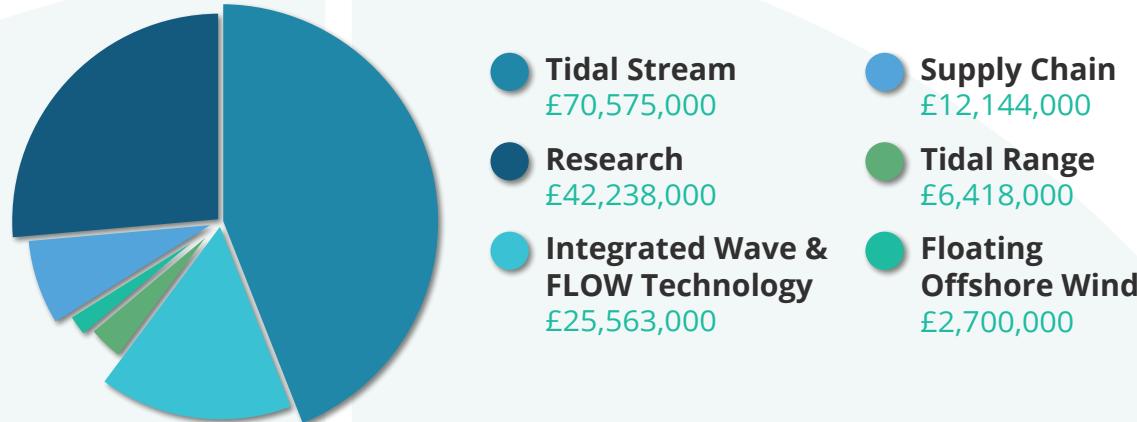
Supply Chain comes in at a close third with net spend of approximately **£3.7 million**. The last year has seen a significant increase in supply chain spending, the largest growth year to date, corresponding to investments made to expand service offerings in anticipation of further growth in opportunities. This level of spending indicates increased confidence in the sector, with companies seeing a clear business case to invest.

Wave & Floating Platform Technologies saw a total spend of **£1 million**. This is due to the combined efforts of two companies, Marine Power Systems and Bombora Wave Power, who are both currently progressing full-scale demonstration projects harnessing wave power and floating platform designs to integrate their technology with the emerging floating offshore wind market.

Floating Offshore Wind project development spent **£0.5 million**. As no projects have been built or deployed to date, most of this spending can be attributed to project planning and consenting. Notable contributors in this category include Blue Gem Wind, Floventis and DP Energy (the latter having recently opened their UK head offices in Pembroke Dock).

Tidal Range saw the smallest amount of investment into Wales over the period, with a total spend of **£0.12 million**. Wales continues to see a small amount of investment into tidal range year on year as a case continues to be made for a first of its kind tidal lagoon.

BREAKDOWN OF TOTAL HISTORIC SPEND IN WALES



Adding this year's spend to the total historic investment figures (data we have gathered since 2015), it can be seen how spending and investment can be broken down into different sector areas. Of the **£159.6 million** spent in Wales to date:

Tidal Stream is responsible for the majority, with approximately **£70.6 million** Welsh investment to date. Most of this has taken place on the island of Anglesey, where the planned Morlais tidal demonstration zone is currently being built and Swedish tidal kite developer Minesto has established a manufacturing and operations base in Holyhead. Additionally, historic projects from the likes of Tidal Energy Ltd. in Pembrokeshire have contributed significantly to this total investment.

Research has seen a total spend of approximately **£42.2 million**. This is mostly attributed to Bangor, Swansea and Cardiff universities, although a small amount emanates from other institutions. This figure underscores how Welsh universities have been a major component in the development of the marine renewable energy sector to date.

Wave & Floating Platform Technologies have been responsible for approximately **£25.6 million** investment. There have been a wide variety of Welsh wave energy projects over the years, but most of the spending originates from two companies, Bombora Wave Power, and Marine Power Systems. Bombora Wave Power is an Australian company that has established a manufacturing base in Pembroke Dock, and Swansea-based Marine Power Systems are Wales's only indigenous marine energy technology developer.

Supply Chain development is responsible for approximately **£12.1 million** of the cumulative spend and is currently the fastest growth area. A substantial portion can be attributed to Welsh ports, as key gateways to marine renewable supply chain opportunities, and organisations such as the Offshore Renewable Energy Catapult, who support innovation in the supply chain.

Tidal Range has seen a total historic investment of approximately **£6.4 million**. Much of this is a result of the original Swansea Bay Tidal Lagoon project, from Tidal Lagoon Power, which was halted in 2020.

Floating Offshore Wind has so far seen an investment of **£2.7 million** into Wales. Nearly all of this occurred in the last 2 years, as early work began on the first 100MW test and demonstration projects, scheduled for completion at the latter end of this decade.

WALES'S TOP INVESTORS

Who's brought the most money into Wales through MRE activity to date:

- Minesto
- Bangor University
- Swansea University
- Bombora
- Tidal Energy Limited
Historic project
- Morlais
- Marine Power Systems
- Tidal Lagoon Power
Historic project
- Cardiff University
- Marine Current Turbines
Historic project



The list of top spenders highlights a list of technology developers currently based in Wales (Minesto, Bombora Wave Power, and Marine Power Systems), academic institutions (Bangor University, Swansea University and Cardiff University), historic projects that are no longer progressing (Tidal Energy Limited, Tidal Lagoon Power, and Marine Current Turbines), and the Morlais tidal demonstration zone, now under construction.

Welsh academic institutions have been carrying out leading research, including high profile projects such as SEACAMS and SELKIE in recent years. Much of the focus is coordinated to address critical environmental evidence gaps and reduce deployment costs. Such institutions continue to play a key role in the career development of those going on to work in offshore renewables. As mentioned, at least one technology developer (Marine Power Systems) spun out of a Welsh university. Our universities also recently entered a formal collaboration with the Offshore Renewable Energy Catapult's Marine Energy Engineering Centre of Excellence (MEECE), to help develop new products, processes, and services for the offshore renewable energy sector.

Historic projects listed here were halted for a variety of reasons. Despite no longer operating or progressing in Wales, they created employment and supply chain opportunities and contributed to the development of technologies and understanding during their active period. They also led to the development of skills and expertise among individuals and supporting companies who continue to work in the sector. In the case of the tidal stream project, developed by Tidal Energy Limited, the installed infrastructure and associated consents are now planned to be reused by another project, Cambrian Offshore, who seek to repower the original site.

The Morlais tidal demonstration zone has already delivered a large amount of employment and spending in Wales during its nine-year development period. With construction work beginning in earnest earlier this year and plans to attract tidal turbine developers to deploy their technology from 2024, Morlais is expected to be a major magnet project attracting further investment into the country over the coming years.

RESEARCH

WHAT HAS BEEN THE RESULT OF SPENDING ON RESEARCH?

Funding has focused on a number of key industry-academia collaborations across Wales:

- SEACAMS 2: A partnership between Bangor and Swansea Universities pairing marine scientists to help support industry.
- SELKIE: A Wales-Ireland initiative between Swansea University and University College Cork designed to develop a streamlined commercialisation pathway for marine energy.
- MEECE (Marine Energy Engineering Centre of Excellence): based in Pembrokeshire and delivered by Offshore Renewable Energy Catapult to support innovation.

Professor Ian Masters from Swansea University works on the Selkie Project. Now in its third year, they have built a business network and developed a series of open-source tools to benefit the whole industry. These tools cover site selection, mooring design, tidal turbine performance, new tidal measurement techniques, data logging systems and operations & maintenance. With a revenue support scheme for tidal now in place, small arrays will soon begin to develop. One of the Selkie modelling tools shows the interaction between devices in an array, predicting the wake shadows between devices. This should help the sector overcome a very complex technical problem.

WHY IS RESEARCH IMPORTANT?

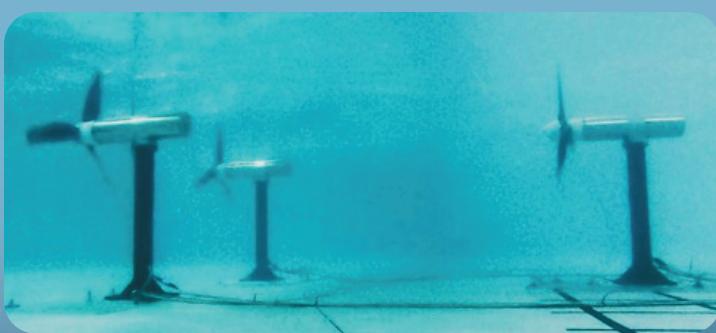
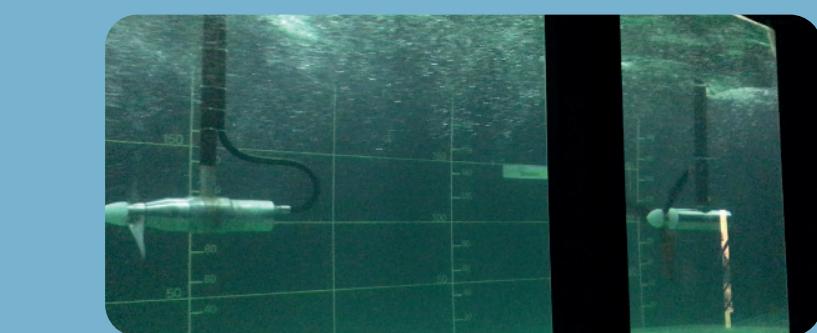
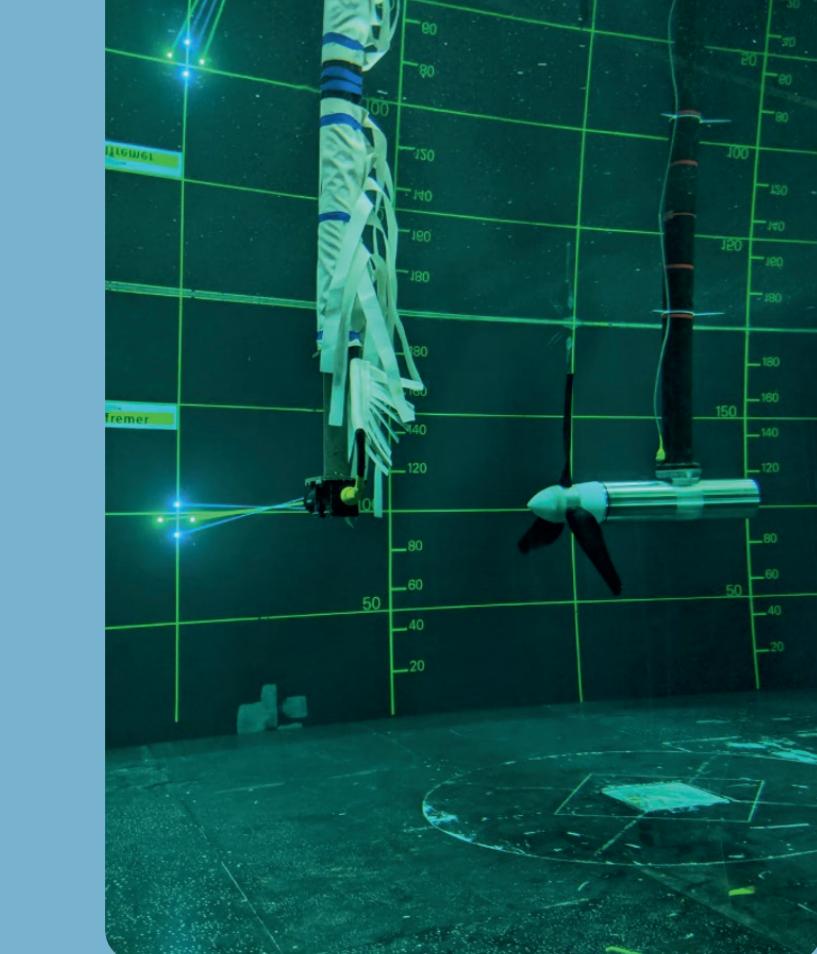
"Research works best when the team have time to go deep into a difficult problem. You do research to answer the questions you are going to have five years from now. The clever bit is knowing what those questions will be," says Professor Masters.

WHICH AREAS DO YOU SEE RESEARCH FOCUSING ON IN THE FUTURE?

"Reduction of uncertainty is going to really drive down costs in tidal stream. We have a number of new project ideas in the pipeline to address these topics."

Better sensors will reduce uncertainty in forces from the turbulent flow. Better models of turbines will reduce uncertainty in the response of the system to those forces. This means engineers can significantly reduce overdesign, removing excess material and increasing reliability.

Another area of interest is the long-term fatigue behaviour of materials. In the MEECE project we recently purchased a test rig for flexible membrane materials used in wave energy. This will allow us to dig deeper into this area. We are also developing understanding of composites used in tidal turbine blades."



LEDWOOD MECHANICAL ENGINEERING

Mechanical engineering contractors, Ledwood, are a classic example of supply chain investment. Ideally positioned with a vast lay down area and mooring capability at their 10-acre facility on the Cleddau estuary in Pembroke Dock, they are taking full advantage of the growing marine renewable energy sector.

Having delivered a quarter-scale device for Swansea-based Wave developers Marine Power Systems, they have also recently been awarded joint funding through BEIS to work on the development of Trivane's catamaran-styled floating wind platform. With marine engineering sector opportunities still in their infancy, bespoke manufacturing is required. For that reason, Ledwood's core investment is centred around training committed personnel.

Asked what's driving this confidence to invest, Project Engineer Craig Young said, *"The renewable energy industry is growing at a rate not seen since the industrial revolution. Not just in the UK but worldwide. In order to succeed we need competent, motivated, and engaged people to manage, fabricate and deliver renewable energy projects to prove that the change is not only feasible, but also beneficial, both environmentally and economically."*



INTEGRATED WAVE AND FLOW – BOMBORA & MARINE POWER SYSTEMS

There are multiple reasons for wave developers like Bombora Wave Power and Marine Power Systems to combine wave and floating wind. Firstly, by sharing common elements in the machine architecture and operations, electricity is provided at a lower overall cost. Secondly, floating wind turbines take up large areas of seabed. Building platforms that integrate wind and wave result in greater energy yield for a given area with less environmental impact per MWh generated. Lastly, there is a phase difference between wind and wave energy. Waves continue rolling long after the wind has stopped blowing, so an integrated design capitalises upon this effect by providing electricity with a smoother generation profile.

This summer Bombora will deploy their first full scale mWave machine off the coast of Pembrokeshire. At 1.5MW, it will validate the technology that will go on to be integrated into future hybrid floating wind and wave devices. In parallel Bombora are also working with TechnipFMC and MOL to develop a floating platform to form the backbone of their integrated wind and wave machines.

Marine Power Systems highlight how the speed of the Net Zero challenge affects their design process. The scale of infrastructure required to meet the UK's future energy targets mean farm developments will need to be delivered quickly. The assembly and deployment of a single floating platform will need to take around a week.



To address these challenges, Marine Power Systems have developed their flexible floating offshore wind platform, PelaFlex.

The platform's low mass reduces quayside requirements, including load bearing capacity and storage needs, and the shallow draught system removes the need for expensive dredging. Multiple launch options support a distributed port model for faster industrial scale deployments and reduces specific port requirements. The modular nature of their technology and structurally efficient tetrahedral design means their floating platform has only ten primary steel components and four distinct parts.

Minesto, Bombora Wave Power and Marine Power Systems have all put down roots in Wales. Marine Power Systems are a homegrown technology developer that grew out of Swansea University, whereas Minesto and Bombora Wave Power have both moved into Wales from Sweden and Australia respectively. All three companies have offices and/or manufacturing facilities in Wales, employing teams in Anglesey, Pembrokeshire and Swansea, where they work with local suppliers to further develop and deploy their technology.



In 2019 Minesto secured €14.9 million of EU funding through the Welsh Government for the next phase of their tidal energy scheme in Holyhead Deep. The company credits the Welsh Government's commitment to the renewable energy sector and support for innovative technology as one of the key factors influencing their decision to set up a base here.

We asked Osian Roberts, Minesto UK's Business Development Manager, what else makes Wales an attractive investment option?

"Wales became the natural partnership area for us to take our technology to commercialisation when looking into export opportunities outside of Sweden. The world class energy rich resources here are a perfect match with our technology."

"Then there's the excellent logistics between the port of Holyhead and Minesto's site at Holyhead Deep, the proximity to the National Grid network, and the ability to build a World-Class Operations team."

Local Holyhead companies, such as boat suppliers Anglesey Marine Services, are adapting to help service this new and high-tech industry on their doorstep. And within Minesto itself, as transferable skills become more apparent, a marked migration is emerging.

"Over the last six years we have been able to attract individuals from those more established offshore industries such as oil and gas into the marine energy sphere with great success. Specific skill sets are around subsea operations and mechanical and electrical engineering," says Osian Roberts.

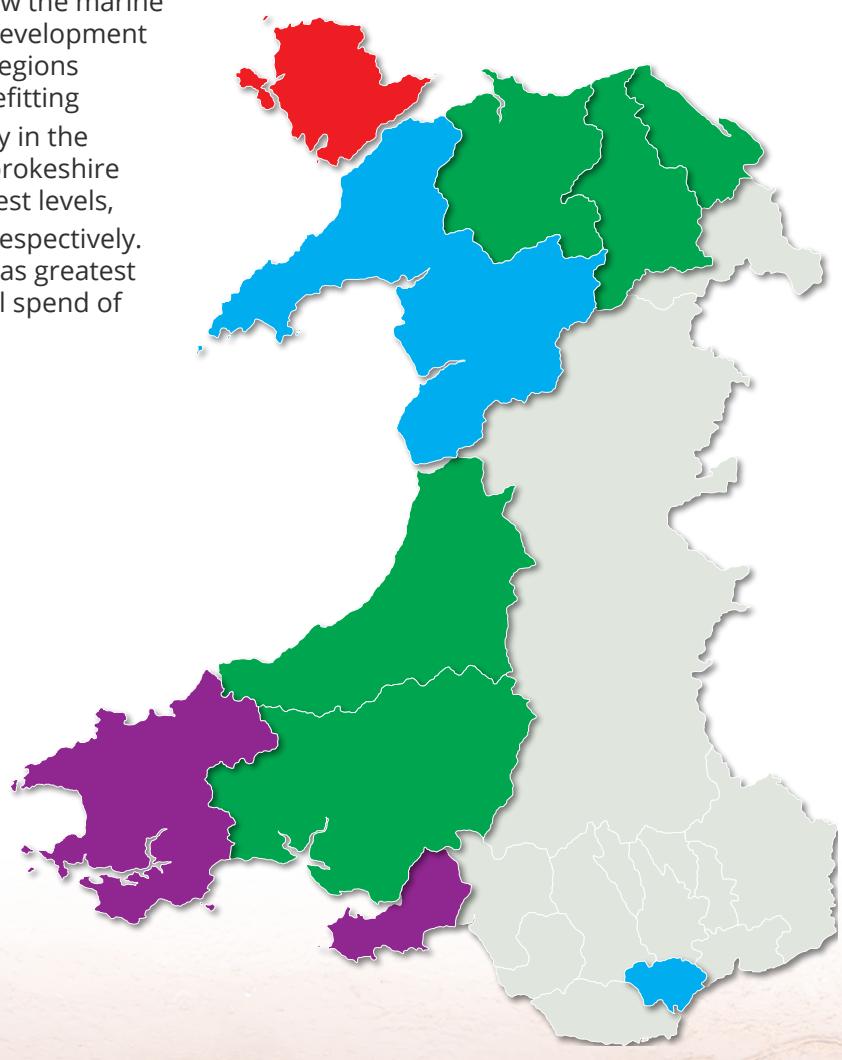


SPENDING & INVESTMENT

The map of regional spend demonstrates how the marine energy sector continues to drive economic development and regeneration in coastal and peripheral regions of Wales. Anglesey retains the top spot, benefitting from **£57.9 million** to date, predominantly in the development of tidal stream activities. Pembrokeshire and Swansea saw the second and third highest levels, with **£35.4 million** and **£30.8 million**, respectively. Over the last year alone, economic activity was greatest in Swansea, with an increase in total regional spend of **£4.1 million**.

SPEND PER COUNTY

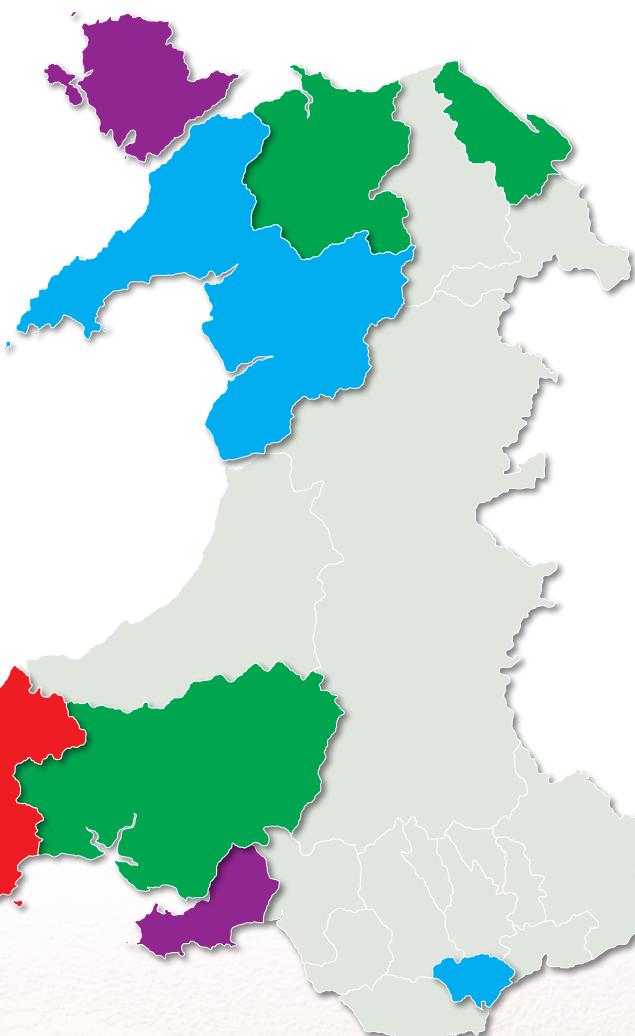
Anglesey	£57,907,500	
Pembrokeshire	£35,413,000	
Swansea	£30,783,000	
Gwynedd	£18,037,500	
Cardiff	£13,929,000	
Ceredigion	£932,000	
Flintshire	£450,000	
Denbighshire	£362,000	
Conwy	£312,500	
Carmarthenshire	£100,000	



EMPLOYMENT

Currently there are **422** full time employees (FTEs) in Wales, an increase of **188** compared with last year. These are split across technology and project developers, and associated supply chain. Much of the growth occurred in the supply chain, with an increasing number of companies gaining work in the sector. Those already significantly involved also took on more staff in anticipation of a growing project pipeline.

Pembrokeshire currently has the highest number of people employed in the sector, **284.55** FTEs, or two-thirds of all employees across Wales. This is due to a well-established supply chain cluster that includes fabricators, engineers, environmental consultants, marine operators, technology developers, project developers and other supporting organisations. Anglesey and Swansea also have a sizeable number of people employed, reflective of the level of investment both areas have seen, with **54.8** and **40.9** FTEs respectively.



FTE CURRENTLY EMPLOYED

Pembrokeshire	284.55	
Anglesey	54.8	
Swansea	40.9	
Gwynedd	26.7	
Cardiff	11.15	
Carmarthenshire	2	
Flintshire	1	
Conwy	1	

EMPLOYMENT BREAKDOWN

Digging a little deeper, this year we have gathered additional data on the types of jobs created and sustained across the sector in Wales. Of the **422 FTEs** currently employed, they can be broken down into six distinct categories.

35% of people are in a **Construction and Fabrication** role. This includes jobs such as mechanical engineers, electrical engineers, environmental engineers, welders, fabricators, shipwrights, apprentices, and painters. They are employed directly in the manufacturing of hardware to capture energy from our coasts and seas. While only a small number of devices are currently being built in Wales, the manufacture of each device supports the employment of many people. This highlights the employment opportunities associated with not just deploying marine energy, but also carrying out manufacturing locally.

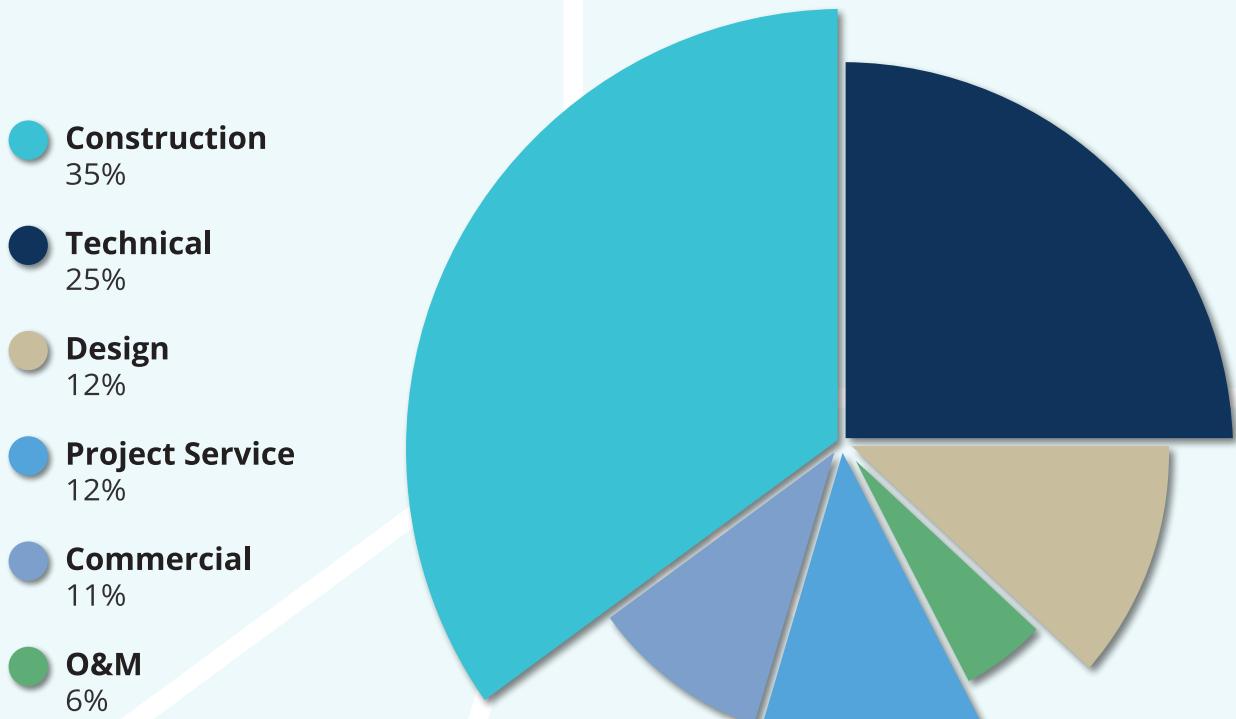
25% of people are in a **Technical** role. This includes jobs such as software developers, data analysts, GIS technicians, environmental analysts, marine scientists, marine mammal observers and consents managers. Academia makes up a substantial portion of these positions, but they are also prevalent amongst technology developers and consultancies.

12% of people are in a **Design** role, such as design and development engineers, 3D modelling, CAD designers and prototype engineers. They are employed mostly by technology developers, however, there are also a small number in academia and the supply chain.

12% of people work in a **Project Service** role, including finance, office management, HR, marketing, PR and communications, administrators, and personal assistants. They are employed throughout the sector, with a higher concentration in larger organisations.

11% of people have a **Business Development and Commercial** role. They may be project managers, business managers, financial analysts, funding specialists, patent advisors and lawyers. Again, we find a higher concentration in larger organisations or within specialist organisations offering tailored services.

6% of people are in an **Operations and Maintenance** role, such as marine operatives, divers, HSE managers, pilots, crane operators, drone operators, and asset engineers. This is currently the smallest area of employment but is expected to grow significantly as more technology is deployed and installed.



POLICY ASKS

Marine Energy Wales works to create a supportive policy environment for marine energy to ensure that Wales remains one of the best places globally for emerging offshore renewables. To date, MEW has been increasing support for the sector by engaging with politicians and decision-makers to outline the industry's key asks and to influence change.

1. DELIVER THE WELSH SPECIFIC REVENUE SUPPORT MECHANISM

for budding projects in Wales to bridge the gap between grants and the Contracts for Difference.

2. GRID AND PORT INFRASTRUCTURE

Invest in Welsh ports and grid infrastructure upgrades to enable gigawatt scale deployment in Welsh waters by the mid-2030s.

3. SUPPLY CHAIN

Welsh Government should continue regional coordination to maximise local supply chain opportunities and facilitate and attract inward investment to grow domestic supply chain capability.

4. CONSENTING AND EVIDENCE

Sufficiently aid National Resources Wales to enable consenting processes to keep pace with commercial and Contracts for Difference timescales.

5. COLLABORATION AND FUNDING

Continued support for collaborative (national and cross border) funding mechanisms, with a focus on emerging offshore renewable energy technologies.

6. TIDAL RANGE

Progress the 'Tidal Lagoon Challenge' and develop a competitive support package to enable a first of its kind pathfinder project.





DP Energy and Pembrokeshire College

DP Energy opened its UK headquarters in Pembroke Dock in March 2022. Head of Development UK and New Markets, Chris Williams, who grew up in Pembrokeshire, has recruited a talented team of 5 local industry professionals with experience working on Welsh projects.

A key focus for the team is Gwynt Glas, a floating offshore wind development of up to 1GW in the Celtic Sea, in partnership with EDF Renewables.

Having worked across onshore and offshore wind, tidal stream, tidal lagoon, wave energy, hydro and landfill gas projects, all of the DP Energy UK team grew up and were educated in Wales and are keen to maximise the benefits for local communities.

"As passionate local people we are keen to ensure our developments are as sympathetic as possible to the environment and maximise the supply chain opportunity for business and families in the region," says Ffion Wright, DP Energy Stakeholder and Communications Manager.

The team are working with Pembrokeshire College on a new 'Destination Renewables' course launching in September 2022 to A-level Students. Students will gain industry insight, aimed at encouraging young people to consider careers in the renewable energy sector.

Project Manager, Lee Watt, who studied Coastal Zone Management and Marine Environment BSC at Pembrokeshire college, will be sharing his career journey as part of the programme.

Hayley Williams, Curriculum Development Manager at Pembrokeshire College says, "Learners will be taken on a journey that will expose them to key business areas such as planning consent, environmental law, stakeholder engagement and project management, in addition to the engineering technologies and challenges that will change our future lives."



Nova Innovation

The emerging marine energy sector is already delivering employment opportunities for peripheral coastal regions. Bardsey Island (Ynys Enlli) residents are benefitting from a project by tidal stream developers Nova Innovation, where the ambition is to deliver the world's first blue energy island. Ynys Enlli residents are among the local contractors and suppliers being employed to conduct extensive bird and mammal data gathering, including boat charters and surveyors. An Aberdaron-based translator has also produced Welsh language materials, a project update newsletter and bi-lingual website.

Simon Forrest, Nova Innovation CEO says, *"For any project, preparation and planning are key, especially when working in a new location and meeting our neighbours. Through open two-way dialogue, Nova can share information on our projects with local communities from the earliest possible stage. By listening to local communities and asking questions we gain a better understanding of their local livelihoods, needs and opportunities."*

MarineSpace Jobs

Consultancy firm MarineSpace are steadily expanding their technical team. Twenty-five new staff members have been taken on in the last two years to help support the growing Celtic Sea developments.

Director Jonny Lewis says,

"Technical roles are vital. Without consents there would be no marine sector. With the Celtic Sea ambition, we're anticipating an increased need for Environmental Impact Assessment Project Managers, Consenting specialists, Marine Ecologists and Geoscience advisers."

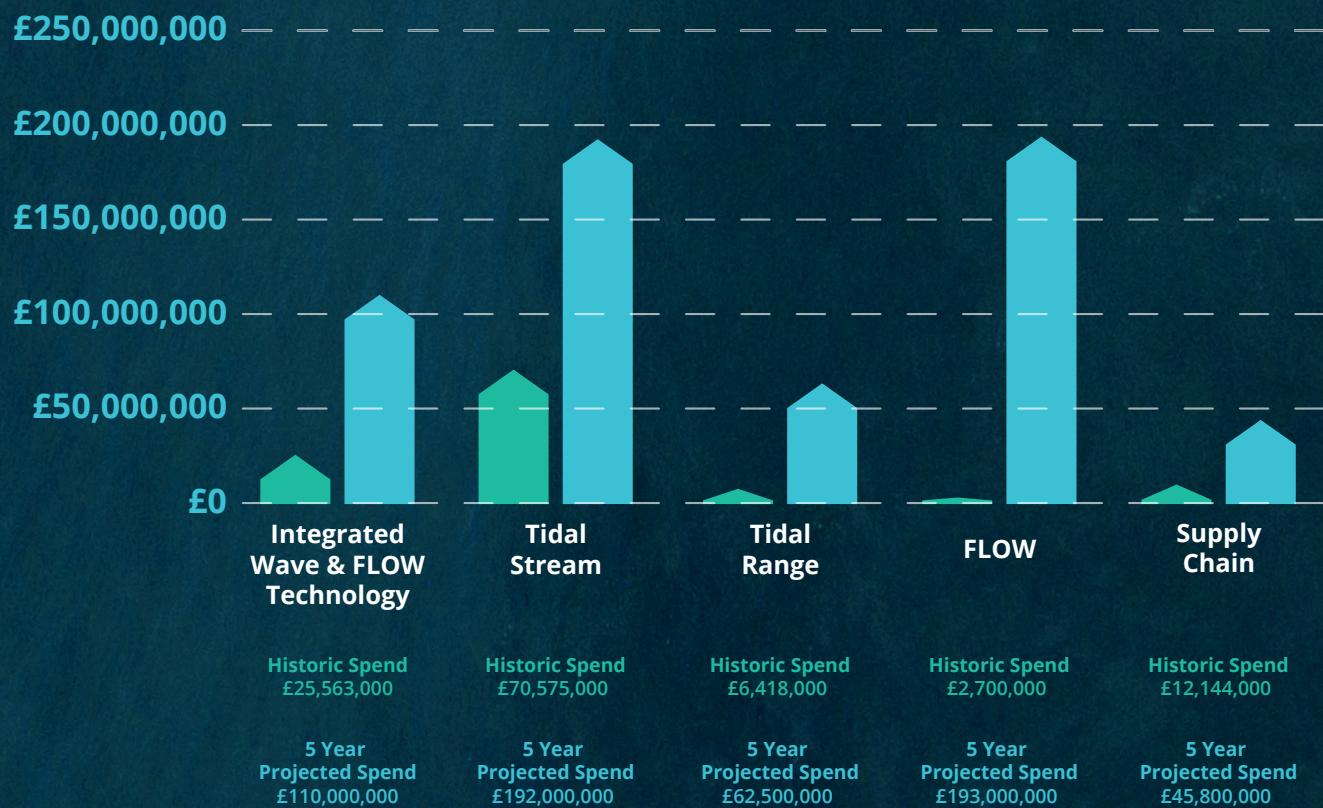


FUTURE OUTLOOK

As part of our data, we also asked members about their level of projected spending in Wales over the next five years. These projections are based on current market activity and operate under the assumption of a continuation of project pipelines. The sum of this predicted spend produced the following values, compared with known historic spend to date.



PROJECT GROWTH



Of note is the similarity in projected spend for tidal steam and floating offshore wind, with an estimated **£192 million** and **£193 million** respectively. Tidal stream and FLOW can therefore be considered parallel in terms of the level of near-term economic opportunity. Further homegrown development and deployment of both technologies should be pursued with equal weight to maximise the benefits.

Also of relevance is the geographical spread for these two technology types. Much of the country's tidal stream activity is centred around the island of Anglesey in Northwest Wales, whereas floating offshore wind activity is clustered in the Southwest close to the Celtic Sea. These technologies will therefore deliver economic benefits to different parts of the country.

There is also a large projected outlook for integrated wave and floating platform technologies, with an estimated five year spend of **£110 million**. Within Wales, wave energy developers are targeting a very specific niche, attempting to tap into the floating wind market by integrating their technology with floating platforms for floating offshore wind. As well as maximising power generation from a single site, thereby lowering the levelized cost of energy, these technological developments offer significant economic potential given Wales's early mover advantage in this area. As the home of pioneering technology developers, Wales is positioned to benefit from their project designs, as well as provide a base for export further afield.

The projected future spend for tidal range, **£62.5 million** over the next five years, is heavily contingent on projects being approved. While there are multiple proposed tidal lagoon projects along the Welsh coast, all are currently lacking clear project approval for developments to move forward. Project consent and approval is a precursor to unlock this future economic investment in the country.

The projected five-year growth for the supply chain, **£45.8 million**, is derived from the supply chain companies currently working and active in the sector. This does not account for additional companies that may diversify into the sector in the future. This figure should therefore be considered the projected growth of the existing supply chain.

No projected values were determined for academia. The funding structure of academic projects makes it difficult to forecast future spending beyond the timelines of ongoing projects.

If all these projections are realised, the marine energy sector could deliver an estimated **£603.3 million** in economic benefits to Wales over the course of the next five years, roughly four times what has been delivered by the sector to date. Much of this is contingent on the continuation of current project pipelines. Tidal stream activity is pinned to the success and further development of the Morlais tidal demonstration zone, and site developers being able to secure part of a £20 million ringfenced pot set aside by UK Government to support tidal stream developments. FLOW activity is dependent on ports maintaining their commitments and following through with planned infrastructure upgrades. Integrated wave and FLOW technology still needs to undergo successful real sea testing and validation. Future prosperity is also dependent on the development of the floating offshore wind market. Tidal range growth is heavily reliant on individual projects being granted approval.

OPPORTUNITIES BEYOND WALES

The Welsh marine energy sector does not exist in isolation. There are several countries globally with significant opportunities for marine power generation, some already with close ties to our sector. As part of our data collection, we asked members to give an indication of where else in the world they are pursuing market opportunities in marine energy.

It came as no surprise that Scotland came out at the top of the list of mentions. Scotland has a well-developed marine energy sector, along with abundant tidal stream, wave, and deep-water wind resources. Several tidal stream developers with plans to deploy in Wales have their roots and manufacturing bases in Scotland, and there has been a long history of technological development and testing at sites such as the European Marine Energy Centre in Orkney. There are many supply chain companies carrying out work in both Wales and Scotland. People often move between employment in both countries, ensuring that the skills and expertise are intricately linked.

ORBITAL
MARINE POWER

ORBITAL MARINE

Scottish tidal developers Orbital Marine recognise the value of close integration and building up the wider UK supply chain. They were one of the first to come on board with the Morlais project off Anglesey, and have selected local Llangefni-based fabricators, Faun Trackway, to manufacture their anchors.

Orbital Marine's Commercial Director, Oliver Wragg, describes the recent changes for tidal stream energy through the Contracts for Difference scheme as the UK Government "firing the starting gun", paving the way to provide meaningful volumes of clean and predictable energy to turn the tide on climate change.

He added, *"Successful project applications will result in substantial inward investment in UK supply chain, with the creation of hundreds of jobs across the length and breadth of the country."*

In addition to the manufacture of Orbital turbines, long-term local employment will be created to support the ongoing delivery of these flagship renewable energy projects."



England and France were also highly mentioned. Being part of the UK, companies in England are heavily embedded within marine energy supply chains across Great Britain. The Southwest region is poised to play a key role in the development and deployment of floating offshore wind to the Celtic Sea. There is also the opportunity to learn lessons from offshore wind deployments off the east coast of England. Opportunities exist for tidal stream developers to deploy their technology at other sites, such as the Perpetuus Tidal Energy Centre off the coast of the Isle of Wight.

The Northwest coast of France has a large amount of tidal stream resource with several tidal stream technology developers indigenous to the region. Companies active in Wales have plans to deploy to the Northwest of France, and one French developer has plans to deploy in Wales. The tidal stream sectors are intrinsically linked, but not to the same extent as Scotland due to added barriers such as language, policy, and legislature. Additionally, the French coast faces onto the Celtic Sea, with plans for developers to deploy floating offshore wind turbines to the region. French ports are likely to play an important role in the deployment of FLOW projects across the wider Celtic Sea region.

Ireland and Canada received several mentions amongst our members as places where additional opportunities in the marine energy sector are being pursued. Ireland has a vast wave resource on its west coast, and the country will be heavily involved in floating wind developments in the Celtic Sea. There have also been several initiatives in recent years aimed at fostering collaboration between Wales and Ireland in offshore renewable energy, such as the SELKIE project.

Canada has a highly developed tidal stream sector on its east coast, with sites being developed by some of the same technology and project developers active in Wales. Given the increased geographical distance when compared to other countries in northwest Europe, the sectors are not so heavily integrated, but there remains significant scope for expanding market opportunities between Wales and Canada.



BUSINESS NETWORKS

To better understand the business ecosystem and networking within the marine energy sector in Wales, we asked members who they are working with. Findings are aggregated to determine who works with the most businesses actively involved in the marine energy sector. The results are a mix of supply chain companies, developers, and research organisations. The “Top 10 Most Active in the Sector” therefore represent the leading expertise in the marine energy sector and those who have played important roles in the development of the sector to date.





Celtic Sea

Developer Alliance

The CSDA facilitates and encourages collaboration and engagement between Floating Offshore Wind (FLOW) developers to help support the delivery of strategically beneficial interests for floating wind energy in the Celtic Sea region. Through promotion and sector representation the CSDA aims to highlight the opportunity that exists in the Celtic Sea for the growth of floating offshore wind to support the UK's drive towards Net Zero. The CSDA also seeks to bring together cross border interests of Ireland, Wales and Southwest of the UK to share experiences, promote cohesive progress and learning to maximise regional contributions and benefits.



COPENHAGEN
OFFSHORE
PARTNERS





BECOME A MEMBER

Marine Energy Wales (MEW) is the representative body of organisations with interests in marine renewable energy in Wales. Our aim is to create a thriving and diverse marine energy industry in Wales, working with a broad range of industry stakeholders to maintain Wales's place as a global leader in sustainable marine energy generation, all while making a significant contribution to the low carbon economy.

**JOIN US ON OUR MISSION TO NET ZERO,
BECOME A MEMBER TODAY.**

To find out more email info@marineenergywales.co.uk





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SAVE TIME AND MONEY ON GETTING MARINE ENERGY PROJECTS IN THE WATER

SELKIE tools have been developed specifically to assist with the main hurdles in Research & Development:

- Where would be an optimal site to put a wave or tidal energy device?
- What foundation and mooring designs would be recommended?
- What is the optimal layout of an array of devices for maximum energy output?
- How can we reduce operation & maintenance costs?

The SELKIE Project is keen to support marine energy developers on the pathway to commercialisation.

To find out more, contact: matt.telfer@marineenergywales.co.uk,
Selkie Project Coordinator, www.selkie-project-eu

CLOSING REMARKS

I kindly thank all that have taken the time to read this latest edition of our State of the Sector report. While there is no doubt as to the imperative of reaching our net zero objectives to stave off the worst effects of climate change, our report highlights another element of the green transition, one with jobs and economic prosperity for coastal communities at its heart.

Whilst this industry is still nascent, and we are yet to see large scale deployment of marine renewable technologies, government backing means we are now on the cusp of this becoming a reality. Already we can point to a diverse range of meaningful careers the sector can create and maintain, and employment opportunities in the sector are set to grow exponentially.

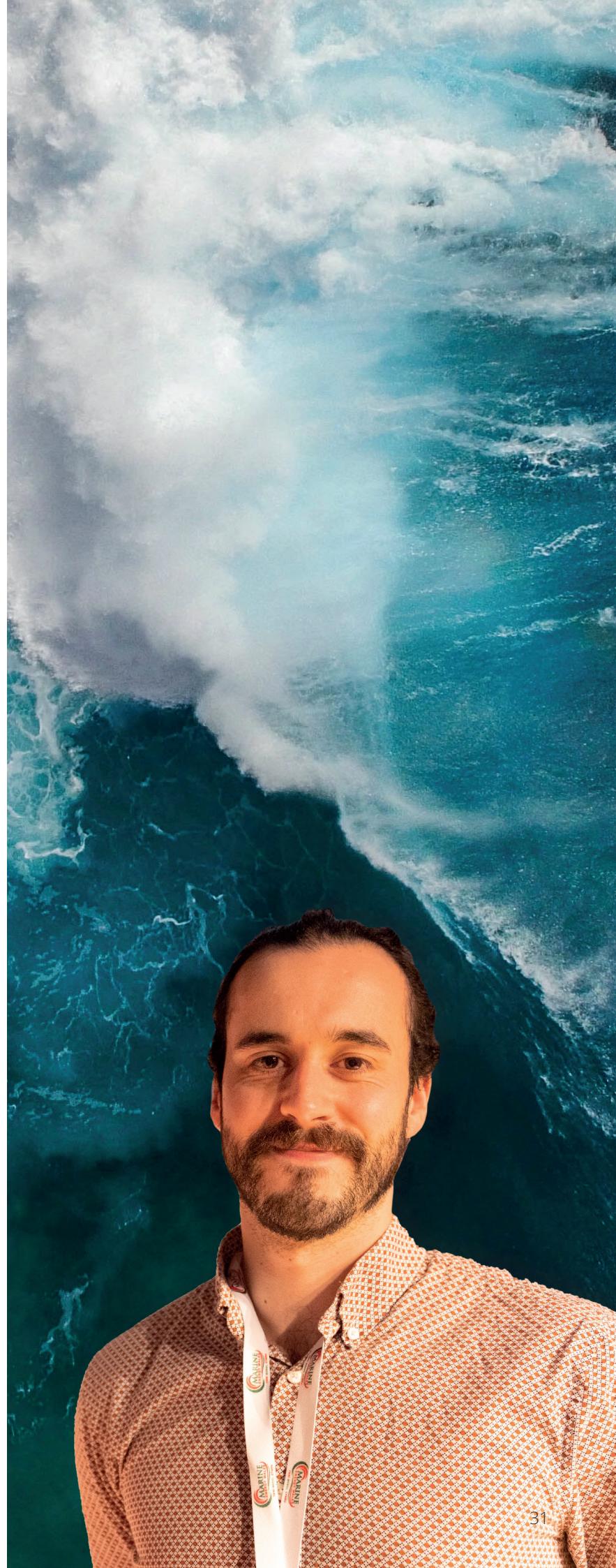
All is not yet set in stone though, and much work needs to be done to secure a future whereby a well-established and resilient marine energy industry becomes a major employment hub for Wales. As has been the case in other industries, economic factors can push jobs and manufacturing overseas to cut costs. Building British must be something we as a nation are prepared to pay more for if we want to fully realise the potential benefits exemplified in this report.

Instead of prioritising "lowest cost at any cost" we need to prioritise the prosperity of our own communities through acknowledging the fiscal multiplier effect of a Welsh and UK supply chain. People employed in this sector support families and spend money in their communities, circulating and distributing economic value many times over.

We look forward to continuing to work with our collaborative partners across Wales and the rest of the UK to promote this message, thereby maximising local opportunities associated with the growth of wave, tidal and floating wind technologies.

JAY
SHEPPARD

MARINE ENERGY WALES
PROJECT MANAGER





ANOTHER PCF PROJECT

Marine Energy Wales (MEW) and its associated projects including META are operated by Pembrokeshire Coastal Forum. Pembrokeshire Coastal Forum is a community interest company, registered in England and Wales with company number 08447094. Registered office : Pier House, Pier Road, Pembroke Dock, Pembrokeshire, SA72 6TR.