

## Blue Economy in the Scottish Highlands & Islands

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### Case Study Overview

**Characteristics and history:** Blue Economy is a term that is increasingly being used in Government and governance organisations to encompass the ensemble of Scotland’s extensive marine and maritime resources. Marine Scotland estimates that Scotland’s marine assets extend over 617,000 km<sup>2</sup>, or roughly seven times its land area (Marine Scotland 2022). Its Blue Economy vision document is not specific about what sectors and activities are included but defines this economy as “the marine, coastal and the inter-linked freshwater environment of Scotland, the different marine and maritime sectors it supports, and the people connected to it”. Other initiatives, such as the MAXiMAR consortium formed in 2015 as part of the SIA consultation process, and Highlands and Islands Enterprise (HIE), are more specific. MAXiMAR (2019) focused their analysis on aquaculture, wave and tidal energy, and marine biotechnology, which were described as the most highly innovative sectors of the region’s marine economy. More recently, HIE has been refreshing their strategic priorities to include:

- Marine energy and renewables: floating offshore wind, wave and tidal energy, alternative (marine) fuels (e.g., hydrogen)
- Aquaculture: Finfish, shellfish, and seaweed farming
- Marine biotechnology and bioprocessing: extractives from marine products and waste processing
- Marine environmental services: marine monitoring around coastal erosion, fish stocks, ocean temperatures and acidification, pollution, etc.
- Decommissioning of existing offshore fossil fuel installations and infrastructure and, in future, of renewable energy assets being upgraded or replaced

It is notable that these areas of expertise build on legacies of, but do not include, industries that have for a long time anchored the Highlands & Islands economy and are still operating but are either viewed as less innovative, such as fisheries, or in the process of being dismantled, such as offshore oil. This is not surprising as the idea of a Blue Economy is closely tied to concepts of sustainability.<sup>1</sup>

The Government of Scotland’s Marine Economic Overview (2022) estimated the significance of the marine economy in the Highlands and Islands was £704 million in GVA, £1,640 million in turnover and employed over 22,200 people in 2019. This represented modest growth from the 2016 – 2018 figures. It estimates that the Highland & Islands represented approximately 15% of marine economy turnover in Scotland and 29% of employment.

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<sup>1</sup> This was reflected in the Blue Economy vision document in the statement that “The blue economy approach requires a transition from ‘environment versus economic growth’ (the prevailing status quo in Scotland and globally) to ‘shared stewardship’ of natural capital that is facing common pressures”.

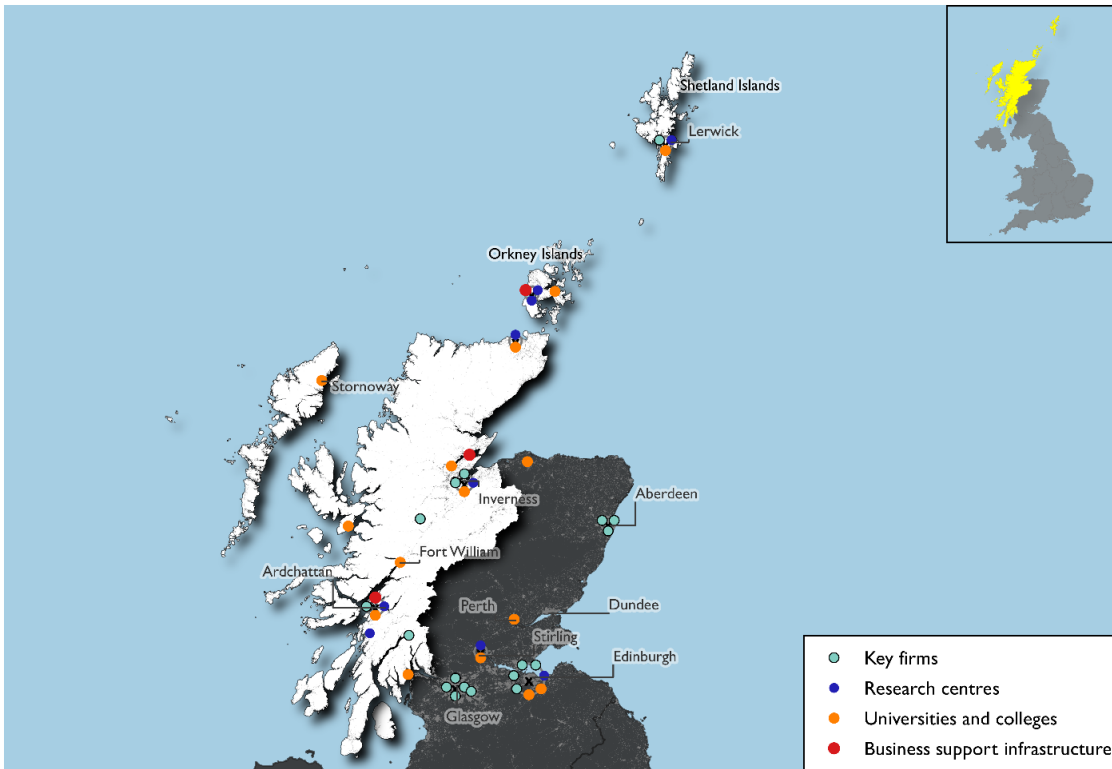


Figure 1: Blue Economy in the Highlands and Islands map.

**Geography and size:** Definitions of the Highlands & Islands geography vary, but for the purposes of this study we adopt HIE’s definition. This area includes Shetland, Orkney, Caithness and Sutherland, the Outer Hebrides, Moray, Inner Moray Firth, Argyll and the Islands, and Lochaber, Skye, and Wester Ross (see Figure 6).

This area is immense (over 400,000 km<sup>2</sup> of landmass) and fragmented, covering more than half of Scotland’s landmass and encompassing nearly 100 inhabited islands. However, the area is sparsely populated with only 469,500 inhabitants (HIE 2019) and facing challenges of gross population decline even though some parts are gaining inhabitants.

**Areas of potential future growth:** The Highlands & Islands area has a rich legacy in marine and maritime and, as HIE’s strategic priorities (above) attest, no shortage of vibrant industries with significant growth potential. Three of these stood out as particularly innovative.

- Offshore energy - The area is currently in a transition away from oil and gas exploitation towards offshore renewables. Where the region had previously focused on wave and tidal energy, offshore wind (both fixed and floating) is growing quickly. In 2021, the UK accounted for over 20% of total operating wind energy capacity and increased its capacity 8% over the previous year (The Crown Estate 2021). Beatrice and Moray East, off the Northeast coast of Scotland is among the largest operating sites in the country, both of which will be eclipsed in size by planned floating offshore installations (see ScotWind 2022). A recent article reported that jobs serving offshore wind development have increased about 16% (Reed 2022). This growth is being supported by the Scottish Government’s strong policy targets on renewable energies. Because of its natural advantages, the Highlands & Islands area will be home to a large proportion of offshore renewable energy development in Scotland.
- Aquaculture - Aquaculture is big business in Scotland, generating over £560 GVA in 2019 and accounting for over 11% of marine economy GVA (Government of Scotland 2022). Over 200,000 tonnes of salmon are farmed every year and the supply chain consists of over 3,600

Scottish businesses (Salmon Scotland 2021). While finfish aquaculture is the largest segment of this market, both shellfish and seaweed farming are emerging and growing markets. Innovations to increase the productivity of finfish and to scale shellfish and seaweed production will be real areas of growth.

- Marine biology, monitoring, and engineering - Offshore infrastructure and installations require detailed data and monitoring to function effectively. Considerable expertise has developed in sensors, data collection, and analysis of ocean environments for both environmental modelling and industrial applications. As offshore investment in aquaculture and energy increases, environmental regulations tighten, and climate change changes the marine environment, there will be greater demand for technology solutions that are sensitive to or can enhance our ability to support the sustainable use of ocean resources.

Significantly, there are also segments of the Blue Economy that could potentially be more joined up. Respondents reported that while each of these individual sectors is evolving, there are few formal relationships and synergies between them, particularly in industrial research and innovation. The marine biology, monitoring, and engineering segment of the Blue Economy could represent an opportunity to bridge energy and aquaculture innovation systems by providing technology solutions to shared concerns (e.g., sustainability and operations monitoring). This may result in important knowledge exchange and provide information feedback to bring these industries together to counter common threats to the environments in which they operate and their supply chains.

**Reflections:** While the Blue Economy label has strong buy-in at the policy level, it is less clear that this identity is shared by marine and maritime stakeholders in the Highlands & Islands area. The various industries that make up the Blue Economy tend to operate in silos and are sometimes competitive over marine resources. As such, this is currently less of a coherent cluster than a set of industries, activities, and assets that could *potentially* be more effectively connected to maximise opportunities for knowledge synergies<sup>2</sup>. Another element is that respondents often perceived clusters to be very small and localised - for instance different actors expressed an aim to grow very specialised but small scale clusters around research organisations in Shetland, Oban, and Orkney. This, combined with the large geography and industrial silos, makes constructing a cluster at the Highlands & Islands scale quite challenging. Apart from the cluster question, a common challenge for many of these industries, and for economic development policy, is also ensuring that the benefits from these largely extractive industries are better captured locally through supporting the development of a vibrant innovation system and supply chain.

## Core Assets

**Market structure and anchor firms:** In the Highlands & Islands case, the two largest industries - offshore energy (renewable and otherwise) and the salmon farming segment of aquaculture - are dominated by large multinationals.

In offshore wind, firms like Shell, BP, SSE, Total Energies, Ocean Winds (EDP Renewables and ENGIE), Orsted, Floating Offshore Alliance, and Falck Renewables are the core developers currently working in partnership or competition with Scottish and UK companies such as ScottishPower Renewables. Developers are supported by an ecosystem of Scottish suppliers (Offshore Wind Scotland lists 800 supply chain stakeholders in the DeepWind Cluster) including innovative companies such as Global

<sup>2</sup> Respondents had different views on the feasibility of this type of thing

Energy Group (wind and tidal turbine manufacture and assembly), ACT Blade (wind turbine blades), and Xodus Group (energy consultancy). Scottish companies are also involved in providing support, crew, and maintenance services, many of which have pivoted from petroleum industry support functions.

Salmon aquaculture is similarly dominated by a few multinationals based in Norway, Chile, and Canada such as Mowi (Norway), Scottish Sea Farms (Norway), Bakkafrøst (Faroe Islands), and Cooke Aquaculture (Canada). This industrial structure is the result of significant consolidation and foreign direct investment over the past 30 years. As with offshore energy, the salmon farming industry has attracted international investment and attention due to its natural geographical advantages: Scottish waters are one of the few places favourable to salmon aquaculture. The Scottish supply chain and support ecosystem is relatively large and decentralised and consists primarily of SMEs.

Supply chains in both industries share some broad similarities that have important implications for the cluster development potential of the Highlands & Islands area. First, while Scottish supply chains - for manufacturing, construction, maintenance in offshore renewables and construction, processing, and logistics in aquaculture - are substantial, they are often measured at the national level. That is, many of the firms that support these industries are based or headquartered in the Southern parts of the country and outside of the Highlands & Islands. Second, because of the multinational nature of both industries, supply chains are genuinely global. For instance, most offshore wind manufacturing is located overseas. This also applies to research and development. The farming and energy installations are supported by Scottish enterprise, but many of the innovations that sustain their competitiveness are developed at company headquarters and through global innovation networks. While innovation does happen locally, and localised research and innovation partnerships do occur, it's just one, sometimes quite minor, pipeline into the industry. The challenge within this industrial structure, then, is to grow the share of local firms benefiting from foreign investment and to connect to pipelines of international research.

And I think that would be my big message for Innovate UK, that the cluster is not, it's not a geographical cluster, it's an intellectual cluster, or it's a supply chain cluster. And probably at least 50% of the supply chain for [fish] farming in the highlands, is in the central belt of Scotland, or it's in England or it's in Wales.

Firms in marine biology, monitoring, and engineering, and in the other segments of aquaculture, all tend to be SMEs. These include firms like Ocean Ecology, Ocean Kinetics, Gael Force Fusion, and Cuan Tec.

**Higher education and training institutions:** Because of the sparsely populated nature of the Highlands & Islands area there are not many higher education and training institutions. The **University of Highlands and Islands (UHI)** is a hybrid university and further education college. It is composed of 12 colleges and research institutions spread around the Highlands and Islands, Moray and Perthshire regions of Scotland. It hosts a Marine and Environmental Science research group that focuses on research themes around understanding environmental change, people and the environment, energy and national resources, water quality, energy innovation, and hosts the **Environmental Research Institute (ERI)**, **North Atlantic Fisheries College Marine Centre**, **Aquaculture Hub**, and **Institute for Biodiversity and Freshwater Conservation**. The UHI Tern Campus hosts the **PowerHouse**, which aims to become a centre of excellence for floating offshore wind and green hydrogen and offers training modules for the renewable energy industry. The **Scottish Association of Marine Science (SAMS)** is the country's oldest independent marine science organisation and is a leading partner in UHI (based at the European Marine Science Park in Oban). SAMS also delivers a Marine Science BSc; Aquaculture, Environment, and Society MSc; Algal Biotechnology, Biology, and

Ecology MRes and PhD. It also hosts the Culture Collection of Algae and Protozoa and the Scottish Marine Robotics Facility.

Universities outside of the Highlands & Islands make significant contributions to the research landscape and are often involved in partnerships with researchers at the various marine and maritime research groups and centres. While it is unusual, in a study such as this, to cite knowledge generating and training institutions outside of the study area, because of the lack of population density and higher education in the Highlands & Islands, other Scottish universities also fill the skills gap and, more frequently, play crucial roles in research networks. The **University of Stirling** hosts the Institute of Aquaculture, which does research and offers undergraduate and postgraduate degrees. It also operates the **Marine Environmental Research Laboratory** (MERL). The **University of Edinburgh** provides MScs in Marine Systems and Policies as well as Aquaculture Genetics and Health. **Heriot-Watt University** hosts the Centre for Marine Biodiversity and Biotechnology and provides MSc programmes in Maritime Logistics and Business and Marine Renewable Energy. The university also supports the **International Centre for Island Technology** based at the Orkney Research and Innovation Campus that specialises in areas of interest to islands including marine resources and coastal zone management, renewable energy, waste minimisation, fish stock habitats and technologies, marine and coastal estates and conflict, biodiversity and marine conservation, and diving science.

**Other research and anchor organisations:** While the higher education offering in the Highlands & Islands is dominated by UHI, there are several other research organisations that contribute to the Blue Economy research and innovation ecosystem.

- **Scottish Association for Marine Science (SAMS)** is an independent marine science organisation, delivering marine science for a productive and sustainably managed marine environment through innovative research, education and engagement with society. SAMS has a diverse marine research and teaching portfolio that is global in outlook, project locations and relevance, and delivered by a highly skilled team working in partnership with academic, business, government, regulatory, voluntary and civic society colleagues. Its main facilities are located at the **European Marine Science Park** in Oban. SAMS offers state of the art facilities for marine robotics, research vessels, sampling equipment, analytical services, a research aquarium, research seaweed farm and hatchery, experimental artificial reef, coastal ocean modelling system, and scientific diving services.
- **Sustainable Aquaculture Innovation Centre (SAIC)** is based at the Stirling University Innovation Park, and so is located outside of the Highlands & Islands area. However, it has close links with the aquaculture industry and researchers working in the area. Its mission is to transform aquaculture by unlocking sustainable growth through innovation excellence. SAIC works to reduce the environmental footprint and increase the economic impact of aquaculture. It supports world-class research and collaborations with industry as well as offering skills and training programmes (MSc, PhD, innovation and leadership development). It also offers funding and business networking support.
- **The PowerHouse** is a relatively new applied research centre dedicated to developing floating offshore wind and green hydrogen technologies located on the Cromarty Firth. It aims to become a global centre of excellence and renewable energy innovation. The centre will also act as a specialist educational hub to deliver training modules from STEM activities for school pupils to continuous professional development (CPD) for workers interested in joining the renewable energy industry, throughout the Highlands and beyond, to ensure people across the region have the skills and experience to take advantage of these nationally significant projects being constructed in the region. This initiative is connected to the Opportunity Cromarty Firth consortium.



**Support structures:** Support structures in the Highlands & Islands Blue Economy typically take the form of innovation campuses where research, specialised infrastructure, business, and business support are collocated. These often involve partnerships with or house university research centres and programmes or independent research organisations, and are supported by governance networks (such as HIE) and demonstrate an ecosystem that strongly links knowledge creation, firms, and supportive structures.

- **European Marine Science Park (EMSP)** - was developed by HIE in partnership with Scottish Development International and the Scottish Association for Marine Science (SAMS). EMSP is SAMS' principal research centre. It is located in Argyll and has world-class facilities for marine science research and blue economic business growth. In addition to SAMS' research and academic programmes, EMSP is home to incubator, specialised lab, and business development space. Business support services at EMSP are provided through HIE and include expert advice and support, funding and investment, and networking facilitation.
- **European Marine Energy Centre (EMEC)** is the world's first and leading facility for demonstrating and testing wave and tidal energy converters – technologies that generate electricity by harnessing the power of waves and tidal streams – in the sea. EMEC is also pioneering the development of a green hydrogen economy and smart local energy systems. Its operations are spread over five sites across Orkney. EMEC provides a wide variety of services in addition to testing including certification, numerical modelling and data collection, environmental services, regulatory consulting, business services (including bid writing consultations), and technology assessments. EMEC clients include Alstom, Magallanes REnovables, ScottishPower Renewables, Nautricity, and others.
- **Orkney Research & Innovation Campus (ORIC)** is a joint venture between Orkney Islands Council (OIC) and HIE, creating an improved home for Orkney's wide range of clean energy and low-carbon expertise. ORIC aims to strengthen Orkney's global lead in the field of renewables research and innovation, providing purpose-built business and educational facilities within Stromness, where much of the sector's activity is currently focused. One of EMEC's sites is based at the campus and it is also home to Heriot-Watt's International Centre for Island Technology. Robert Gordon University is also a partner.

**Finance:** The deep and well-connected nature of the Blue Economy support structures in the Highlands & Islands means that there are numerous organisations that are spreading word about and supporting firms and researchers in accessing funding from various sources. On the economic development side, funding from Scottish and UK public streams and regional deals (such as the Islands Deal) has been important in enabling the development of support structures and facilities and will remain critical in expanding capacity and sustaining funding to research and development. This research did not reveal clear bottlenecks with firm financing and we recommend further follow up with firms to establish what the issues are, if any, in each of the industrial segments we have identified.

**Reflections:** For a large, in many cases remote and sparsely-populated area, the Highlands & Islands has a rich foundation of core assets in the Blue Economy. Industries with large multinational anchor firms and growing international investment, well-established and well-connected research programmes in universities and independent research organisations, specialised infrastructure, and active and engaged supportive organisations mean that the area has a lot of expertise and engagement to build on. On the research and support side, there are clearly strong links between organisations across the broad geography. What is less clear is how that is both contributing to the development of a collective - meaning at the Highlands & Islands scale - identity around the Blue

Economy, or whether the localised connections (and agendas) and industrial silos are more compelling foundations for place-based development.

## Skills

**Talent pool:** Talent was described as a perennial problem but there are several interrelated dimensions to the skills challenge. Most of the industries in the Blue Economy have been traditionally labour-intensive but, with the adoption of technologies are now transitioning to being less labour-intensive and more highly skilled. While there are local skills providers (see below), the perception is that as industries grow they will be reliant on attracting talent from other parts of the country and internationally. As many of the multinationals mentioned above have vast resources and global networks, at least some of the skills needed will be met through workers attracted from abroad and through their own (re)training programmes. This option is only really available to the largest and best resourced firms. Furthermore, attracting skilled labour is easier said than done. Some respondents report that housing costs are rising due to a number of factors, including the increase of second home ownership and people working from home in more attractive locales in the Highlands & Islands. Attracting and retaining people in sometimes remote locations can also be challenging.

The nature of skill needs varies by industry and firm, and there is a perception that human resources will be a significant constraint on growth across the board.

These sectors are at different stages of maturity. So those with predominantly the larger businesses transition faster, they invest in transition sooner, and to a greater scale, I think. So if we look at for example, oil and gas, they are transitioning to renewables, they are transitioning their workforce to renewables. So when they are taking on undergraduates, the type of the training pathway is similar, but slightly different, for example, and if we look at even aquaculture and actually some of the supply chain within that we are much more looking at people who can work automated systems - strong in technology, computer science, for example, and biology - because it's no longer a manual job. And we are seeing both vocational and academic pathways adapting to respond to what the industry needs. I think in some of the newer sectors, such as moving bioprocessing, probably, and definitely seaweed farming, for example, we've a way to go. Quite a way to go.

Training, retraining, sourcing labour from other parts of the country (and the world), and issues around lifestyle, attractiveness, and retention will remain important for all skills and qualifications. But, if done effectively, could help turn around stagnating population growth and meaningfully impact prosperity.

**Local skills provision:** Because the skills required for many of these evolving industries are quite technical and specialised, firms tend to rely on Scottish and even international labour markets to fill gaps. Consequently, there is a complex relationship between the local labour force and Blue Economy industries that create accessibility challenges. One observer commented that, on the higher skill end, local workers often choose to go away to university or college in other parts of the country. The word choice is deliberate here, as there are several programmes being delivered by universities and their Highlands & Islands based research centres that provide training - in higher educational and vocational levels - to contribute to and connect with Blue Economy industries. The perception is that younger people do not always want to stay in the Highlands & Islands for their higher or further education and that there can be some difficulty in re-attracting them. Retraining local workers for jobs in Blue Economy industries appears to be an important emerging issue. This is already happening in the oil and gas industry as workforces are being re-skilled for offshore renewables. However, many of these industries are more automated and less labour intensive than in the past, and are increasingly requiring digital and other skill sets. The PowerHouse is one example of an initiative that is focusing on increasing

inclusiveness and ensuring that local residents can get qualifications for and access jobs in these growing industries.

There are also specific skills initiatives growing around particular industries. UHI is involved in a collaborative effort to establish a skills strategy for the energy industry. The initiative is reportedly cataloguing the skills needed in 5,000 different job types and modelling predicted need as well as time to train people to meet those needs<sup>3</sup>. This will be shared among education providers to respond to critical demands. Skills providers also report meetings with stakeholders in the area and in Government to share information and plan for growth, suggesting that there is a collective effort underway to fill gaps with Scottish talent.

**Reflections:** As some industries are projected to grow very rapidly over the next decade, skills constraints are front of mind. Several initiatives are underway to respond to these evolving needs, but most respondents lack confidence that it is possible to meet skills needs locally. It is also clear that ensuring a sufficient skills base is about more than just filling training needs, but is also tied to the area's ability to offer an attractive, and affordable, lifestyle. While emphasis on attraction, and sourcing labour from a national pool, is understandable, attention should also be paid to ensuring that the existing workforce is not left behind and that support enables local residents to participate in these growing industries.

## Knowledge Exchange

**Firm research and development practices:** The Blue Economy industries that are the focus of this report are quite research and development intensive. The growth and competitiveness of all of these industries is reliant on advancements in materials or manufacturing of equipment, maintenance and monitoring, or related to understanding biological systems, animal welfare, or the health of the oceanic environment, all of which require strong and sustained research and innovation efforts.

The large multinationals maintain global research programmes and are plugged into international pipelines of knowledge exchange. They also maintain relationships with the Scottish (though not always “local”) research community. Some firms have strong relationships and engage in collaborative research with, or take advantage of, research and innovation funding provided by research centres in the Highlands & Islands. However, those that do participate in those structures and relationships are a subset of the active firms in these industries.

**Knowledge access and cultures:** Research performing organisations have very strong relationships with one another and there appears to be a tradition of working together, where appropriate, on collaborative projects or initiatives. Researchers were careful to stress, however, that they did not prioritise research relationships in the Highlands & Islands and that they frequently worked with partners from other parts of the country and world. Firms engaged in accelerator or innovation parks reportedly engaged in network relationships and were likely more open to knowledge sharing with peers. Respondents noted that there were not many cross-industry interactions or partnerships for knowledge sharing, but suggested that this was because of a lack of obvious overlaps between certain activities. The closest synergies were likely in marine biotechnology and aquaculture, where research on the marine environment (etc.) and innovations in feed and waste management fed directly into the aquaculture industry.

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<sup>3</sup> These estimates were not public at the time of writing.



**Firm network relationships:** As suggested above, industries appear to operate in silos with very few notable inter-industry interactions. However, firm networks are relatively strong (a) within their own industries, and/or (b) within their own areas. Each industry has one, or several, associations that facilitate networking between members, which typically include firms, research, and government agencies (see below for a selection of these). Networking also appears to be strong within specific localities and nodes in the Highlands & Islands area. Innovation campuses, such as EMSP and ORIC, function as “cluster” conveners and bring together tenants and firms in their broader areas to share information about opportunities and events. These nodes often have specific industrial and thematic focuses around which networking is reportedly most synergistic. However, these geographically concentrated groups of firms are relatively small and respondents struggled to ascribe concrete innovation outcomes from network relationships at that scale.

The question of industrial silos and geography is a particularly interesting one for this area, and opinions differ about what a Blue Economy strategy should aspire to in terms of connecting different actors. As one person noted:

*I think where [the previous cluster strategy] tried and failed was to say that all parts of the Highland coast were part of the same cluster. And they're not. There are pockets of expertise. And they are different. Trying to mush everything into one thing doesn't make sense.*

This highlights some of the geographical and industrial barriers that governance networks must grapple with as they encourage knowledge sharing and firm networking.

**Reflections:** Knowledge exchange is relatively strong but suffers from several challenges (that may not be worth attempting to surmount). Research partnerships are strong but not primarily anchored in the Highlands & Islands. Industrial associations span large geographical distances, but also tend to function at the national scale, even if a large proportion of activities occur in the Highlands & Islands area. Nodes of vibrant network activity have emerged around specific research centres but are small and specific. Meanwhile, many remain sceptical about the value of pushing an agenda that seeks to maximise inter-industry and inter-local relationships across the Highlands & Islands.

## Networks of Coordination

There are several notable networks, past and present, that bring together and coordinate actors in the Blue Economy in the Highlands & Islands. As noted above, some of these networks are industry specific and function at a broad national scale, some are industry specific and are more locally focused, and some focus on all Blue Economy industries at the Highlands & Islands scale. While the ecosystem of governance actors is relatively rich, the challenge is whether a Blue Economy vision is appropriate for the area or whether it may be more effective to concentrate on strengthening sub-clusters by industry.

- **Highlands and Islands Enterprise (HIE)** is the economic and community development agency for the north and west of Scotland. HIE supports businesses, communities and social enterprises through a range of services, including advice, funding, events and property. The organisation is also active in developing strategies for the Blue Economy sector (as a participant in MAXiMAR and through its own internal strategies) and backing these with investments (such as in EMSP and other initiatives).
- **MAXiMAR Consortium** was convened in 2015 to shape the science and innovation audit in

the Highlands & Islands. It included Highlands and Islands Enterprise (HIE), EMEC, Wave Energy Scotland, UHI, IBioIO, Heriot-Watt University, SAMS, Marine Scotland, Marine Alliance Science Technology Scotland, SAIC, National Oceanography Centre, and the University of Stirling. While the initiative generated several reports on strategy and skills, and two (unsuccessful) bids for Strength in Places funding, it is currently inactive.

- **SAIC Consortium** is a free network for aquaculture professionals and academics to connect, collaborate, and get advice on funding opportunities. It includes over 280 businesses and organisations, from SMEs to large multinationals, and from cutting-edge research institutes to Scotland's oldest universities.
- **Scottish Offshore Wind Energy Council** is a partnership between the Scottish public sector and the offshore wind industry. Its mission is to coordinate and grow the sector, ensuring the Scottish offshore wind industry is more sustainable, competitive, and commercially attractive, both domestically and in the global offshore wind market.
- **DeepWind Cluster** is a supply chain cluster and the largest offshore wind representative body in Europe with over 800 members from industry, academia, and the public sector. The main purpose of the DeepWind cluster is to help its members achieve greater benefits from the current and future development of offshore wind in the UK and internationally. It specialises in fixed and floating offshore wind in deeper waters, usually considered to be greater than a 40m depth. The organisation originally covered a geographical area that stretched along the Scottish coastline from Wick in the far north to Montrose in the north east. Due to the introduction of the 25GW ScotWind offshore wind leasing round, DeepWind's ports and harbours members now extend around the North Coast, Northern Isles, Western Isles and West Coast as far south as Campbeltown in Argyll & Bute, and across to Hunterston PARC (Port and Resource Centre) in North Ayrshire. This now encompasses 25 ports and harbours members and represents coverage of over 70% of the Scottish coastline.
- **Salmon Scotland** represents every company farming salmon in Scotland along with companies from across the Scottish salmon supply chain, championing the sector's interests. It also works with its members, the UK and Scottish governments and regulators to help shape the regulatory environment so both Scotland and its members can thrive.
- **Opportunity Cromarty Firth (OCF)** is a consortium leading a bid in the current competition for Green Freeport status, which could "revolutionise" the Highland economy and stimulate major new manufacturing activity locally and elsewhere in Scotland and the UK. The consortium is backed by port owners Port of Cromarty Firth, Global Energy Group, Port of Inverness and The Highland Council alongside a dozen regional businesses, public sector organisations and academic bodies. OCF believes the creation of such a zone on the Firth would maximise local and Scotland-wide benefits from a pipeline of renewable energy projects, placing the Highlands at the heart of the drive towards net-zero and will drive job creation.
- **Blue Economy Cluster Builder** was a 3 year programme to communicate and raise awareness of the benefits of the Blue Economy in Scottish SMEs and enable them to take advantage of new opportunities, which included an online tool. While this focuses on the Blue Economy broadly, it was organised for the whole of Scotland.

**Reflections:** Of all the networks, HIE is best placed and most active in convening actors around a Blue Economy agenda in the Highlands & Islands. The struggle is how, and in what way, to construct a shared vision and stimulate innovation synergies across industrial silos and a large territory.

## Discussion: Innovation opportunities and support needs

**Evolution and market opportunities:** Offshore renewables will be a huge growth sector for the Highlands & Islands. At first, growth will occur around installing and scaling offshore energy infrastructure, which will require a rapid increase in manufacturing, servicing, and installation capabilities. Over time, there are ambitions to link in more advanced manufacturing, and green hydrogen processing and transport, potentially creating opportunities for firms engaged in service vessel design and operation, and particularly robotic and autonomous platforms and monitoring systems. Aquaculture will remain a significant contributor to regional GVA. Market opportunities will be in areas of animal welfare, remote maintenance and monitoring. Marine engineering is poised to grow as a sector to support these two industries, while marine biotechnology will be integral to ensuring the sustainability of operations and creatively managing waste materials.

**Resilience:** Although several of these industries are poised for growth, they each face challenges. Labour markets are uncertain and skills shortages remain a significant risk to development. The housing market, and related demographic changes, are a key factor in understanding evolving risks. First, the increase in remote work and higher demand for homes in picturesque coastal areas are raising home prices and making attracting workers more challenging. This will likely require more, and quite rapid development, to house labour demand. Secondly, as more people have migrated to the area in search of more attractive places to live and work, resistance to offshore development is rising. It is already becoming more difficult to approve new farming operations and the increase in activities related to scaling offshore wind may also create local conflicts.

Areas of potential support and intervention:

- Establish and execute a cluster strategy, or several: Blue Economy activity in the Highlands & Islands area could be coordinated and constructed around a cluster strategy. However, there is probably no one “right” way to do that. One option would be for HIE to lead a consortium of stakeholders from across industries to devise collective goals and strategies to address common challenges. These might include skills shortages, housing development, managing the impact of growth (and potential resistance), and ensuring that growth is inclusive. There are potential benefits to increasing inter-industry links, possibly around adapting enabling technologies such as robotics, automation, satellite infrastructure, and data analysis tools to different activities in the maritime environment. However, the legacy of the MAXiMAR process left some stakeholders in the area wary of attempts to bring industries together or treat them equally. Some have suggested that focusing on narrower, more localised, and industry-specific clusters may be a more effective approach. Any effort to work across industrial boundaries will have to overcome this reluctance.
- Skills: This report has established that skills are likely to be a constraint to growth. Several efforts are currently underway to assess labour needs and devise strategies to attract and retain talent. These should be supported and encouraged to share findings more broadly to inform a coordinated response. Efforts should also be increased in linking business, education and training stakeholders, and relevant departments in the devolved and national administrations to support labour strategies and ease migration and immigration where appropriate.
- Housing: Growth and growth pressures are likely to be very unevenly distributed across the area. Some communities will experience greater pressures than others. While expanding housing stocks to accommodate a larger workforce will be vital, this should be executed in collaboration with existing communities and with sensitivity to the community character, natural beauty of the area, and impacts on existing industries (such as tourism).
- Balancing industry, sustainability, and natural amenities: Most of the industries that anchor the Blue Economy in the Highlands & Islands are there because of the unique maritime natural advantages of the area. While the area would benefit greatly from growth, it is

- important to take factors such as sustainability and social licence into consideration.
- Capturing the value of growth: Both offshore energy and aquaculture are, as currently configured, largely extractive industries. That these are dominated by large multinationals and consortia creates advantages in attracting investment and to support rapid scaling. While some benefits will always accrue to local supply chains there is a risk that the benefits of growth - both material and in terms of innovation advances - are realised elsewhere. These industries have already stimulated the development of a constellation of businesses but there is potential to create a larger critical mass of firms at the cutting edge of innovation. This will likely be facilitated by more aggressive identification and support of emerging firms, support to do collaborative R&D with the large multinationals, and strategies to mitigate the disadvantages of remoteness and facilitate access to global markets so that firms can grow locally.
  - Support cutting edge research: While remote, there are many research centres, institutes, and institutions doing cutting edge research, offering important testing facilities and infrastructure, and supporting business development. These would benefit from funding to expand their capacities and particularly to support their impact on local business development.

**Reflections:** While how to best coordinate the Blue Economy in the Highlands & Islands remains an open question, it is clear that the area has a strong foundation to grow various Blue Economy industries. Targeted investment could help to overcome challenges - particularly related to skills - and create conditions to ensure that the benefits of growth are effectively captured in order to fuel the development of local innovation systems. Ensuring that growth is equitable, sustainable, and widely supported will be at the forefront of any place-based strategy (or strategies).

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## Research note

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## About the Innovation Caucus

The Innovation Caucus supports sustainable innovation-led growth by promoting engagement between the social sciences and the innovation ecosystem. Our members are leading academics from across the social science community, who are engaged in different aspects of innovation research. We connect the social sciences, Innovate UK and the Economic and Social Research Council (ESRC), by providing research insights to inform policy and practice. Professor Tim Vorley is the Academic Lead. The initiative is funded and co-developed by the ESRC and Innovate UK, part of UK Research and Innovation (UKRI). The support of the funders is acknowledged. The views expressed in this piece are those of the authors and do not necessarily represent those of the funders.