



## Deliverable 6.2

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### The Blue Bioeconomy Regional Visions



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<b>Abstract</b>	The study used Communities of Practice (CoPs) to co-produce visions for the development of the blue bioeconomy in selected pilot regions. These visions will serve as the basis for formulating recommendations, action plans and identifying necessary actions for regional blue bioeconomy development. Each CoP developed and agreed on a unique regional 'blue bio vision', which aims to address key barriers and obstacles.
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## Acronyms

BBC	BlueBioClusters
CoP	Community of Practice
EC	European Commission
EU	European Union
GDP	Gross Domestic Product
GVA	Gross Value Added
MSP	Marine Spatial Planning
NGO	non-governmental organisation
PMBA	Pôle Mer Bretagne Atlantique
R&D	Research and Development
SMART	Specific, Measurable, Achievable, Relevant, Time-bound
SME	Small and medium-sized enterprises
SWOT	Strengths, Weaknesses, Opportunities, and Threats
UN	United Nations

## Executive Summary

Creating a vision for the blue bioeconomy is a strategic process that involves understanding the current landscape and setting ambitious yet achievable goals. This process can be facilitated by tools such as brainstorming, stakeholder engagement, SWOT analysis, scenario planning, and strategic planning. The resulting vision should be clear and motivating, guiding organizational actions and informing actionable strategies for sustainable progress in the blue bioeconomy. Blue Visions also give innovators, researchers and investors a guide to where to focus their resources in the coming years to maximise impact.

The study emphasises the use of Communities of Practice (CoPs) to co-create distinctive 'blue bio visions' for selected pilot regions. These visions, based on a mixed-method approach of scenario planning, action planning, and roadmap development, aim to tackle regional challenges and exploit opportunities. They provide a basis for specific recommendations and action plans, ensuring meaningful engagement with stakeholders, promoting innovation, and integrating resource management.

The CoPs aim to raise awareness, improve coordination, engage stakeholders, ensure the longevity of initiatives, drive innovation, and promote the coherent management of resources by developing these visions. Each region's vision focuses on overcoming specific barriers and seizing opportunities, drawing on successful strategies from across Europe to enhance skills development and guide the blue bioeconomy towards a sustainable future.

## Introduction

Creating a vision for the blue bioeconomy is a strategic process that involves understanding the current situation, setting future goals and planning steps to achieve these goals. This process can use tools such as brainstorming, stakeholder engagement and SWOT (Strengths, Weaknesses, Opportunities, and Threats) analysis to ensure that the vision is ambitious yet realistic (Collins & Porras, 1996). A clear, motivating vision statement guides organisational action and informs strategy development, translating abstract ideas into actionable plans.

In the context of the blue bioeconomy, different methods are used to envision the future and identify pathways to get there, such as scenario planning, strategic planning, action planning and roadmap development. This mixed approach aims to guide sustainable progress in the blue bioeconomy and inspire others to act appropriate to their circumstances. A visioning process helps to clarify the focus and can also be the basis for deriving jointly agreed SMART (specific, measurable, achievable, relevant, time-bound) goals towards which development should lead (Lukic et al., 2018).

The benefits of developing blue visions include:

**Raises awareness:** Highlight key issues and opportunities within the sector.

**Improve coordination:** Facilitates collaboration across government and sectors.

**Engaging stakeholders:** Ensures meaningful participation and promotes ownership of the vision.

**Ensure longevity:** Sets goals that transcend political timelines.

**Driving innovation:** Prepares for future maritime activities and technologies.

**Promotes integration:** Ensures coherent management of land and marine resources.

Nine Communities of Practice (CoPs) from different European regions (figure 1) are using a different strategy to create visions that will guide the development of the Blue Bioeconomy in their region. It is important to build trust and lasting relationships through CoPs that can co-create blue visions and help to revitalise local communities. These visions will form the basis of detailed action plans with SMART targets. These plans aim to address key challenges and capitalise on opportunities that are unique to each region, drawing on successful strategies from other regions to improve skills development and overcome barriers. Different approaches to CoPs provide a learning experience within the project and also for the wider community.



Figure 1. CoP regions in BlueBioClusters project.

## 1 Blue Vision of Flanders, Belgium

Flanders' population reached 6.8 million as of January 1, 2023, with a population growth of 1.13% or 75,931 inhabitants in 2022. It is one of the most densely populated regions globally, with 488 inhabitants per km<sup>2</sup> over an area of 13,625 km<sup>2</sup> (Statbel, 2024). The region boasts robust economic indicators, including a high employment rate of 78.5% and a low unemployment rate of 3.5% in 2020. In 2020, Flanders had a Gross Domestic Product (GDP) per inhabitant of EUR 34,183. This reflects an increase of EUR 4,000 per inhabitant since 2010, despite a slight decrease in real economic growth by 0.5% between 2014 and 2019. Flanders is known for its knowledge-intensive economy, characterized by high levels of innovation and human capital. The services sector constitutes about 73% of its GDP. Moreover, the Flemish economy is highly focused on exports, accounting for around 83% of Belgium's total export volume. This highlights its significant contribution to the national economy (OECD, 2022).

Aquatic organisms are produced or harvested in Flanders for food or raw materials in various value chains. However, there is a lack of high biomass availability for any specific aquatic organism; research projects are identifying application possibilities of marine bacteria, microalgae are produced in smaller quantities to utilize by-products from other industries, start-ups are exploring the use of macroalgae in diets, fishery landings remain modest due to limited marine areas, and aquaculture faces challenges in attracting investment.



Figure 2. CoP in the region of Flanders.

The activities within blue bioeconomy production and their application in biotechnology are diverse and fragmented, lacking a dominant entity in the value chain. The Flemish CoP resolved to select a group of individuals representing each sector involved in blue bioeconomy production. These sectors include aquaculture, micro- or macroalgae, fisheries, and those that utilize or could potentially utilize blue bio products, such as food, chemicals, and textiles. Since some parts of the value chains have their own CoP activities, which allow them to gain insights and establish connections with their stakeholders, we decided to limit the number of CoP participants to a maximum of 15 individuals, following recommendations from the BBC project meetings.

### **Strategies for Engaging Stakeholders and Gathering Input in the CoP**

To engage stakeholders and gather input for the CoP on Blue Bioeconomy production and its applications, a comprehensive strategy was implemented. The aim was to gain a better understanding of the current state of the industry and identify areas for improvement.

The strategy began with an assessment of the status quo of the Flemish blue bioeconomy value chains. This assessment was carried out through various activities, including a survey, attending conferences, meetings, and participating in vision trajectories across different sectors that are potentially integral to the blue bioeconomy. Most important trajectories were Visioning for offshore aquaculture in the Belgian part of the North Sea, Developing strategies with the Local Fisheries Group, Membership of the Strategic Steering Committee of Aquaculture and attending specific events such as the Flemish Aquaculture Symposium and Algaeday. During the summer of 2023 a survey was shared across different stakeholders from different parts of the value chain to gather input on blue bioeconomy value chains. The survey used personal mailings, sectoral newsletters, and banners at sectoral events as communication channels. Representatives were selected to be part of the CoP based on the networking conducted at these events and through the responses to the survey. The aim was to ensure a diverse and representative group of stakeholders engaged in the CoP. This followed the initial phase.

### ***Setting up a CoP***

In 2023, various sectoral stakeholders' meetings had taken place. To avoid stakeholders' fatigue, the decision was made to initiate the CoP for the blue bioeconomy only after the completion of these meetings.

The CoP started in February 2024 with its first meeting held at Marifish.Inc. The session began with a round-table introduction, followed by a detailed presentation on the BBC project. The presentation highlighted the objectives of the CoP interactions and outlined the various steps to be taken. Furthermore, the members were informed about some results from the survey on Blue bioeconomy in Flanders, which was launched in the summer of 2023. The 'Flanders Blue Vision' initiative is set to begin in March 2024 and end in September. During this time, CoP members will have access to a Word document summarizing the outcomes and inputs from both the Flemish blue bioeconomy survey and the CoP meeting. Members are encouraged to provide feedback until the end of September. The 'Flanders Blue Vision' document will be finalized at a second meeting in mid-October 2024. It is expected to be published in January 2025, which will be a significant milestone in the CoP's efforts.

### ***Identification of value chains***

The CoP's initial objective was to identify value chains. To achieve this, the Facilitation tool from the BlueBioClusters was used. Members voted to focus on fish, crustaceans, and macroalgae, which led to the formation of three groups (figure 3). Each group comprised of a mix of production, research, and application representatives. This approach ensured a comprehensive exploration of the selected value chains, leveraging the diverse expertise and perspectives of the CoP members.

Each group had to complete the Biomass Board (figure 4) for their chosen organism, which could be Fish, Crustaceans, or Macroalgae. The board should detail the various stages of value and connect the dots of the value chain with lines or arrows to map out the specific pathway. After the initial round, the groups were prompted to select one pathway for detailed discussion in the next part of the meeting. Each group presented their chosen biomass pathway to all CoP members. This facilitated a focused exploration of potential value chains. Subsequently, the CoP members were able to discuss the presented pathways in detail.



Figure 3. CoP members working in group with the Facilitation tool.

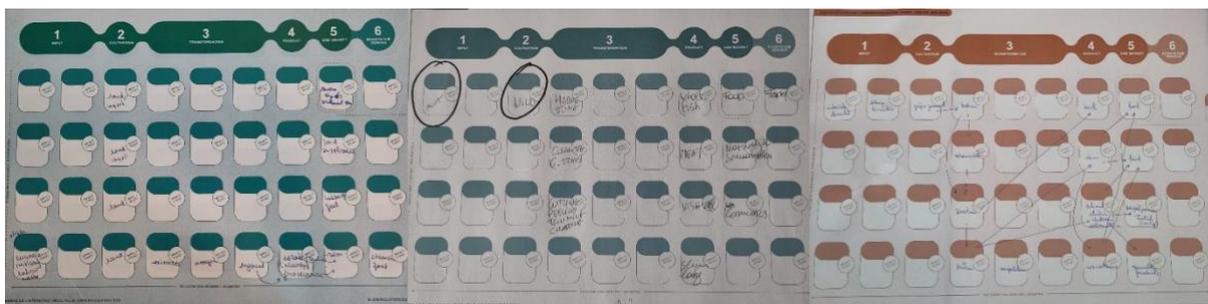


Figure 4. Filled in biomass boards for Fish (left), Crustaceans (center) and Macroalgae (right).

It is interesting to note that two out of the three biomass value chains presented involved wild capture of organisms, specifically fish and grey shrimp. In the value chain of the Macroalgae cultivation in closed systems was chosen.

### Impact points

Following the group presentations, an extensive discussion was held on different impact areas, focusing on economic, environmental, social, regulatory, technological and circularity impacts (figure 5).

**Fisheries:** It was noted that the focus is on the harvesting of wild fish, mainly for the 'fresh fish' market. In Flanders, the volume of fish landed is low, making it unsuitable for various production lines, such as frozen fish. The fish is mostly



Figure 5. Impact points around the value chains.

sold whole because there is not enough biomass to extract value from the non-edible parts. Targeted species include sole and plaice, although concerns have been raised about their wild stocks and ecological impacts.

*Grey shrimp:* The high demand for grey shrimp in Belgium was highlighted, with Flanders having its own fleet, albeit smaller than the Dutch fleet, which also processes most of the captured/harvested grey shrimp catch. The potential to increase local landings and processing in Flanders could boost employment but is currently hampered by concerns about dwindling wild stocks. Grey shrimp farming has been proposed, but remains at the research stage, with limited potential for significant production or raw material extraction for sectors such as feed or chemicals. However, farming could reduce the environmental impact compared to wild capture.

*Macroalgae:* Offshore cultivation is currently at the research stage and land-based production in Belgium faces stiff competition from Asian imports. Despite the unique selling point of purity, strict and costly food safety regulations based on the analysis of wild macroalgae pose a challenge. A call for regulatory adaptation to facilitate land-based cultivation was discussed.

### **General remarks**

In the final session of the CoP, a comprehensive review of the three biomass value chains was conducted, identifying common opportunities and challenges. It was noted that there is a potential mismatch between the low productivity of blue biomass in Flanders and the high volume demands of certain application sectors. Ongoing interactions and projects aim to improve production or optimise the identification of specific blue compounds, focusing on their unique properties rather than volume.

The discussion highlighted that Belgium's strict implementation of EU legislation may be hindering investment and development of local aquaculture. Despite the potential of certain aquatic species to contribute to a new, environmentally friendly food value chain, Novel Food regulations are slowing down the exploitation of their potential in Flanders and possibly in Europe. Consumer popularity and the challenge of attracting investors, who are often looking for short-term returns, whereas aquaculture investments can take more than 10 years to pay off, were identified as additional constraints. There was a consensus that fisheries (fish and crustaceans) would continue to dominate the local marine food supply, despite concerns about the variability of wild stocks and the negative environmental impacts of fishing. The possibility of moving towards aquaculture as an alternative was discussed, recognising ongoing efforts to mitigate ecological concerns. It was also noted that Flanders may not have the capacity to meet the raw material requirements of other local industries, which are increasingly relying on imports. This trend was confirmed by the Flemish blue bioeconomy survey, which indicated that imports are the main source of blue bioeconomy raw materials. However, the survey also showed the expectation that the dependence on imports will decrease in the future.

## ***The Flemish Blue Vision***

The CoP meeting was a first step towards the development of Blue Vision, which is expected to be finalised before the end of the project. The discussions provided initial insights into the challenges and potential actions to improve blue bio-production. However, the summary of these discussions has not yet been validated with the CoP members but will inform future steps in the development of the Flemish Blue Vision.

A critical observation was the need for broader input beyond the producer sector. While producers have deep insights into their segment of the value chain, the focus on immediate issues may limit the exploration of long-term opportunities. The involvement of non-producer members of the CoP highlighted current bottlenecks but also the need to broaden the dialogue to promote forward-looking strategies.

The Flemish Blue Vision aims to catalyse the growth of Flanders' blue bioeconomy, addressing the challenges of matching low blue biomass productivity with high industrial demand and navigating stringent regulations that currently stifle innovation in aquaculture and algae cultivation. This initiative aims to leverage Flanders' economic strengths and dense population to promote sustainable marine and aquatic production. Through the establishment of a CoP, the vision brings together stakeholders from different sectors to share knowledge, identify value chains and discuss sustainable practices and technological innovations. The aim is to increase local production, reduce import dependency and position Flanders as a leader in the blue bioeconomy, focusing on collaborative efforts and regulatory adaptations to unlock long-term opportunities in fisheries, aquaculture, and algae cultivation.

In essence, the Flemish Blue Vision will be a strategic paper for policymakers to use to address current limitations with suggestions like promoting sustainable practices, encouraging innovation, and facilitating collaboration between stakeholders. It recognizes the crucial role of the blue bioeconomy in the future of Flanders. It aims to create a resilient, diversified and sustainable economic sector that can meet the demands of different industries while addressing environmental concerns. Through this vision, Flanders aims not only to strengthen its local economy, but also to make a significant contribution to the wider goals of environmental sustainability and economic resilience in the face of global challenges.

## 2 Blue Vision of Saaremaa, Estonia

The municipality of Saaremaa is the largest in Estonia in terms of both area and population, with 32,129 inhabitants and 2,718 km<sup>2</sup>, accounting for 2.3% of the country's total population. This westernmost municipality has maintained a stable population over the past decade. In terms of the economic landscape, Saaremaa has a diversified economy with 2,756 companies contributing to labour taxes in the second quarter of 2022. The construction and wholesale and retail trade sectors emerge as the largest employers, with 649 and 509 employees respectively, indicating a spread of wealth and employment opportunities across different industries. Despite this diversity, challenges such as low wages and value added per employee persist, especially in the leading sectors in terms of turnover and employment.

Saaremaa's economy faces the inherent challenges of island life, including remoteness, market insularity, sparse population and environmental fragility. However, the region is exploring innovative avenues such as the cultivation of exotic crops such as grapes, taking advantage of its mild winters. While the island has seen a decline in employment in large companies over the past five years, the labour market remains resilient with minimal bankruptcies, allowing for effective job reallocation. However, finding well-paid and suitable employment remains a challenge, making Saaremaa less attractive despite the abundance of jobs.

The path to economic breakthrough in Saaremaa depends on harnessing the skills, courage and intelligence of its people. Critical to this endeavour is an educational network, research and learning environment that not only supports the local economy, but also facilitates the rapid transfer of global knowledge to businesses and attracts young professionals. This approach aims to overcome the natural disadvantages of island economies by fostering innovation and resilience, ensuring Saaremaa's growth and sustainability in the face of its unique challenges.



Figure 6. CoP at Saaremaa.

### **Blue bioeconomy at Saaremaa**

Recognised as an emerging blue growth hub in the Estonian Maritime Spatial Plan, the municipality of Saaremaa is working to make more effective use of its maritime resources, skills and activities for the future. Blue bioeconomy, which includes the cultivation of algae, shellfish, fish and other aquatic life, and the valorisation of their derivatives, finds a favourable environment in Saaremaa, thanks to its established

research and business infrastructure and a marine environment characterised by saltier waters ideal for the cultivation of raw materials. Despite the cleaner state of the Baltic Sea due to reduced toxic substances, eutrophication remains a challenge. Addressing this through innovative value chains that convert excess nutrients into valuable resources could be crucial. However, progress in this sector is hampered by high capital and knowledge barriers, a lack of tailored investment policies, complex legislation, a lack of skilled labour and the overarching issue of nutrient pollution. Overcoming these challenges will require a concerted effort to foster innovation, streamline regulations and cultivate expertise, positioning Saaremaa as a leader in the sustainable exploitation of blue bioeconomy potential (Saaremaa vald, 2022).

### Creating blue visions

The process of creating a Blue Vision for Saaremaa, Estonia began with the formation of a CoP. This group brought together around ten local stakeholders from government bodies, SMEs, NGOs, academia, and industry experts. The aim of this collaborative effort was to encourage dialogue and share innovative ideas to strengthen the region's blue bioeconomy.

The CoP organized a seminar to raise awareness among the community and stakeholders. The seminar featured insights from local blue bioeconomy enterprises and discussed the sector's future challenges and prospects. The event included presentations, a panel discussion, and a workshop that encouraged participants to project the future of Saaremaa's blue economy over the next two decades, identify challenges, and brainstorm potential solutions. The seminar attracted a diverse audience of approximately 100 individuals, including pensioners and students, demonstrating the community's keen interest in advancing the blue bioeconomy (figure 7).

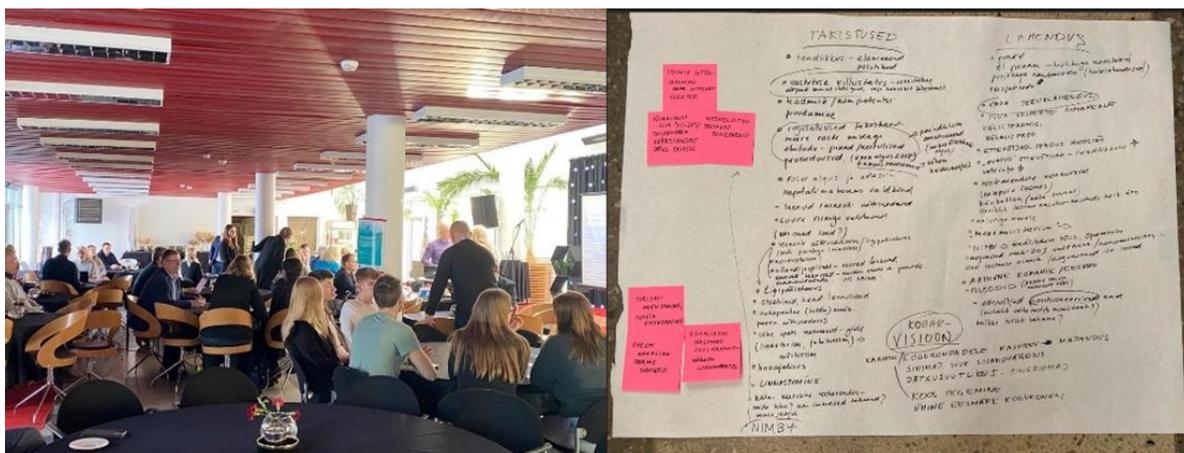


Figure 7. Photos from the blue bioeconomy seminar.

During the second CoP meeting, further progress was made towards refining and building consensus around a shared vision (figure 8). The gathering focused on the insights gained from the community seminar and consolidated them into a unified blue vision for Saaremaa by 2035. It emphasised the crucial role of collaborative and collective efforts in developing a sustainable blue bioeconomy for the region.



Figure 8. Photos from 2<sup>nd</sup> CoP Meeting.

The vision for 2035 aims to establish a sustainable blue bioeconomy that supports communities, promotes circular economy, ecosystem benefits, carbon neutrality, nature conservation, and tourism, while encouraging knowledge transfer, education, innovation, and local purchasing power. This comprehensive framework sets the stage for Saaremaa's sustainable development, leveraging its blue bioeconomy as a cornerstone for future growth and environmental stewardship.

VISION 2035 as agreed by CoP is "to create a sustainable blue bioeconomy that supports communities, promotes circular economy, ecosystem benefits, carbon neutrality, nature conservation, and tourism, while encouraging knowledge transfer, education, innovation, and local purchasing power."

### 3 Blue Vision of Brittany, France

Brittany is a region located in north-western France, covering an area of 34,023 km<sup>2</sup> with a population of around 4.83 million in 2021. Its coastline stretches for 2,700 kilometres and features superb sandy beaches, cliffs, and hidden islands. Brittany is bordered on the east by Normandy and the Loire Valley. The region is known for its rich history and cultural distinctiveness. Despite its small size, Brittany is a diverse region. The north and west coasts, which are exposed to the force of the North Atlantic, are rugged and rocky, with beautiful sandy coves and beaches. The south coast, facing the Bay of Biscay, is flatter, milder, and has several large sandy beaches. On the south coast, there are numerous inlets, including La Trinité sur Mer. These inlets were once used as ports and commercial harbours, but are now more commonly frequented by yachtsmen, with the fishing industry in decline.

Brittany is divided into four departments:

**Finistère**, capital Quimper, is known for its rugged terrain and granite moorland. Its coast features picturesque fishing ports such as Douarnenez and Concarneau, while Brest, its largest city, serves as a major naval port.

**Côtes d'Armor**, capital Saint Brieuc. Previously known as 'Côtes du Nord,' this department features a stunning rocky coastline with several small islands, including the Emerald and Pink Granite coasts.

**Morbihan**, capital Vannes. Situated on the southern coast, Morbihan is renowned for its temperate climate, sandy beaches, and fishing ports. Its economy is diverse, encompassing fishing, boatbuilding, agriculture, and tourism.

**Ille et Vilaine**, capital Rennes, is mainly an agricultural region that produces cereals, apples, and dairy products.

Brittany has a strong connection to the sea, considering it a crucial driver for economic, social, and environmental progress. The region has abundant marine resources and a leading position in marine sciences and technologies, supported by a robust network of public and private stakeholders in research, development, and innovation. With expertise covering the entire maritime value chain, Brittany excels in fisheries, shellfish farming, marine biotechnologies, and is a pioneer in seaweed farming. However, the players involved still need to improve their synergies and join forces to



Figure 9. CoP in Brittany.

increase the attractiveness and impact of Breton skills and Brittany's contribution to European policies on the management of marine resources.

## **Blue Visions – CoP France**

Pôle Mer Bretagne Atlantique (PMBA) has identified the stakeholders necessary to develop a blue bioeconomy vision for the region. These stakeholders include researchers, professors, umbrella organizations for aquaculture and fisheries professionals, industries, SMEs, startups, and public institutions. In January 2023, the Stakeholder Committee of the French Research Institute for Exploitation of the Sea held its first meeting. Throughout the year, several bilateral meetings were organized with stakeholders to present the BBC project, the objective of the CoP, and the Blue Visions for the region.

The goal was to create a CoP to develop the Blue Visions for the economic development of the region in the field of blue bioeconomy. Forming the group was challenging because not all actors were interested in participating in such initiatives. In the past, these initiatives had little impact on the region due to the lack of concrete actions.

Furthermore, certain actors were preoccupied with other obligations, such as fundraising for SMEs or startups, and meeting production deadlines for certain producers. Additionally, there was a significant shift in human resources within the public sector, resulting in a lack of follow-up and interest.

The PMBA decided to implement a new strategy by organising an open event called Ocean BtoB, which is a well-known annual business convention in the innovation ecosystem of Brittany. This event seemed to be a good option to bring together the different actors. Therefore, a workshop was organised for the BBC project and the CoP in France (figure 10). In the end, 15 participants attended and discussed the use of marine biological resources and how to approach different markets.



Figure 10. CoP workshop in Brittany.

### **Main challenges**

- To enhance the competitiveness of the Brittany industry in the European and global markets.
- To structure, strengthen, and promote sustainable macro- and micro-algae, fisheries, aquaculture, and marine waste treatment.
- To pursue ecosystem-based management of coastal and deep-sea fisheries, as well as demersal fisheries, in the context of climate change.

*Operational objectives identified to enhance blue bioeconomy in Brittany*

- Develop and strengthen infrastructure and pilot platforms to manage the life cycle of marine species.
- Create innovative systems for environmental protection and species selectivity.
- Support projects and RDI programmes aimed at understanding and exploiting marine bio-resources.
- Invest in R&D to advance multi-trophic aquaculture technologies with a focus on zero waste and alternative nutrients (insects, microalgae, algae).
- Promote the digitalisation of seafood distribution channels.
- Draft and disseminate a position paper outlining Brittany's strategy for marine bioresources and biotechnologies with a view to European recognition.
- Encourage collaboration between industry and academia through chairs and joint laboratories and ensure broad and educational dissemination of results to stakeholders.

*Elements of Blue Vision*

- Position Brittany among the leading regions in international and European competition and build a region that sets global standards.
- Strengthen Brittany's businesses and scientific skills in the sector and attract new ones.

All participants agreed to be contacted again for further meetings on this topic. PMBA will organise another event or meeting and use the facilitation tool developed in the project to promote discussions on value chains and economic development.

## 4 Blue Vision of Iceland

On the third quarter of 2023, Iceland's population was estimated over 396,000. Despite being one of the least densely populated countries in the world, with about 4 inhabitants per km<sup>2</sup> across a land area of 103,000 km<sup>2</sup>, Iceland boasts strong economic performance indicators. The nation enjoys a quite high employment rate 77.1% and the unemployment rate 3.7% in 2022. GDP of Iceland increased by 4.1% in volume with nominal level estimated at 4.279 billion ISK in 2023. In the fourth quarter, the growth of the economy slowed down, but the increase in GDP was 0.6% compared with the same quarter of the previous year (Statistics Iceland, 2024). Iceland's economy is well-known for its emphasis on renewable energy, tourism, fisheries, and advanced technologies, contributing to its innovative and knowledge-intensive economic landscape. Furthermore, Iceland's economy is notably reliant on exports, including seafood and aluminium, which play a crucial role in its economic structure, reflecting its importance not only to its own economy but also to its trade relationships (Statistics Iceland, 2024).



The Icelandic economy has been historically and is still driven the by the fisheries sector and increasingly the growing blue economy and blue bioeconomy. The major value chains driving the growth of the blue bioeconomy are from fisheries, primarily whitefish fisheries such as Atlantic cod and Haddock, small pelagic fisheries such as capelin and herring and aquaculture of salmonids. These value chains are reflected in national statics for marine exports and in the aquaculture production statistics from Statistics Iceland (figure 12).

*Figure 11. CoP in Iceland.*

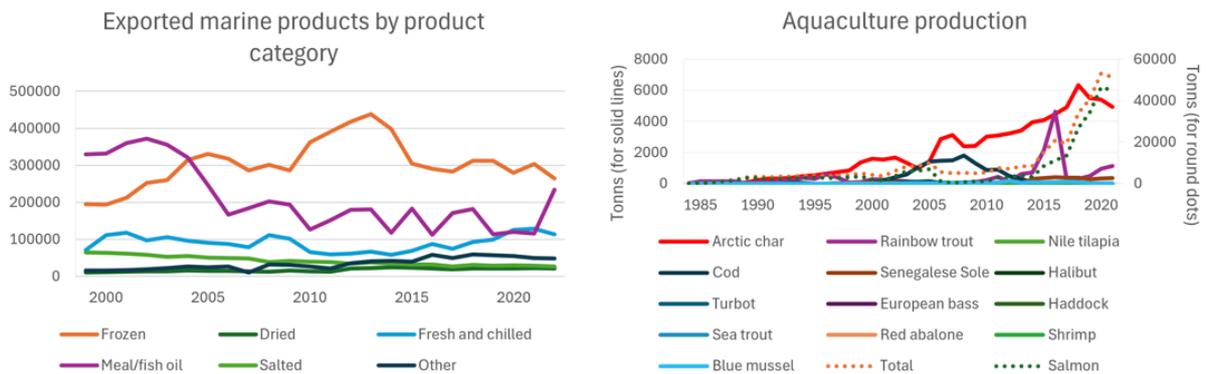


Figure 12. Exported marine products by product category and aquaculture production since 1984 in Iceland (Statistics Iceland, 2024).

Iceland’s blue bioeconomy is dominated by value creation from both primary aquatic products and full utilization of secondary value chains. The Iceland Ocean Cluster acts to foster collaboration and activities that promote and support new innovations in full utilization and the blue bioeconomy. And this has led to a huge array of novel products for the blue bioeconomy that create value from parts of the seafood that used to be wasted but are now used in food, feed, textiles, nutraceuticals, cosmetics and even biomedical products. This has increased the value of a single cod from \$12 to a potential value of \$5000. The Iceland Ocean Cluster has dubbed a program named 100% Fish. The 100% Fish Project, initiated by the Iceland Ocean Cluster, aims to motivate the seafood industry and its communities to maximize the use of every fish caught. The project focuses on enhancing the value of each fish, fostering new business ventures, expanding job opportunities, and minimizing waste (figure 13).

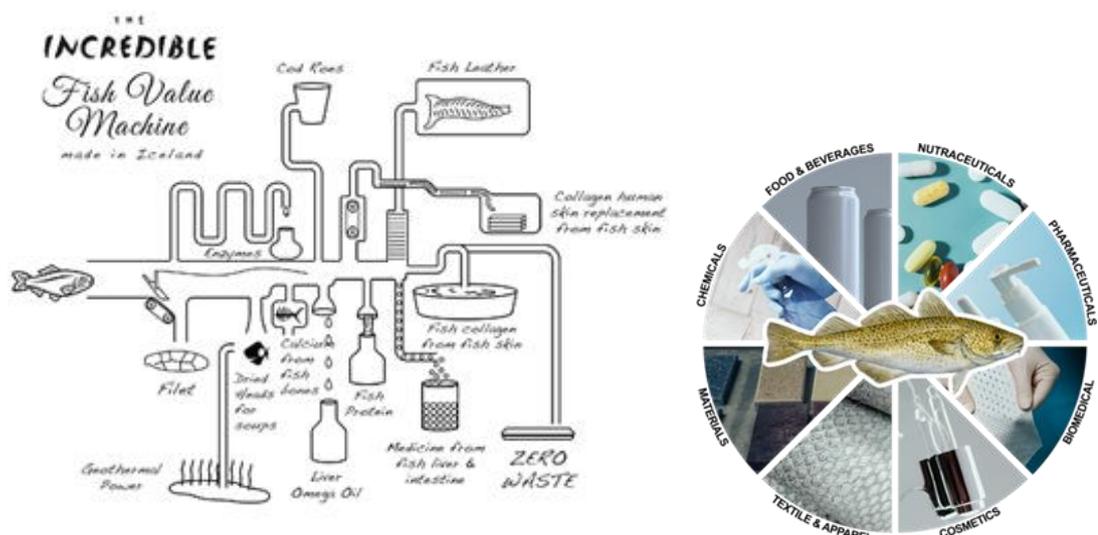


Figure 13. Overview of a variety of high-value products including supplements, proteins, cosmetics, and pharmaceuticals, utilizing various parts of the fish that has been developed by Icelandic companies within the Icelandic Ocean Cluster (<https://sjavarklasinn.is>).

## Iceland's Blue Visions CoP

The Iceland Ocean Cluster has a broad membership in the blue economy, including both new startups and established international companies. Members and collaborators from across the blue economy were invited to the first CoP event, which was designed as an informal Christmas get-together with a light lunch, drinks, and an open room layout (figure 14). Although many participants were already acquainted, the event provided a unique opportunity for networking and learning about the BBC project, as well as discussing their roles in shaping the future of Iceland's blue bioeconomy. The session aimed to establish a foundation for future discussions, introduce a diverse mix of people, and build trust. Innovative startups in the blue economy presented their pitches and discussed their annual highlights and challenges. The meeting facilitated a collective discussion of these challenges and laid a solid foundation for the next CoP meeting. The next meeting will invite the same group for an imaginative and interactive session on the future of the blue bioeconomy. If necessary, we will make additional efforts to include more stakeholders in future meetings, such as members of the research community.



Figure 14. First meeting of Iceland's Blue Visions CoP.

After the first CoP in December 2023, attending participants were invited to optional one-on-one meetings with the Iceland Ocean Cluster team to explore better collaboration ideas and support possibilities for these companies, especially in their biggest blue challenges.

### Capturing Blue Visions and challenges

Companies were given these one to one opportunities to discuss and highlight some of the biggest challenges that their blue industry is facing and these were turned into clear challenges that will be addressed in the bootcamps of the Iceland Ocean Cluster as part of the BBC project work and with domestic sponsorship from the industry – rolled into and Iceland Ocean Cluster program called Verbúð (A Verbúð is the Icelandic word for the fishing huts that line the shores and provide storage and even historically accommodation for fishermen) (figure 15).



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Figure 15. QR code for Verbúð project of the Icelandic Ocean Cluster

(<https://icelandoceancluster.digi.phy.it/verb>)

***Challenges and needs identified:***

- Solutions that lead to increased quality, storage and preservation for value creation of fish meal protein.
- A user-friendly decision-making tool that would support management teams in fish processing to identify low-hanging fruit within their current production and next steps toward full utilization.
- Exciting and innovative ideas to reduce energy consumption in fishmeal factories.
- Creating complete 3D models was costly and time-consuming, so their use cases are still unexplored. Access to 3D models of vessels can, for example, enable experts to assist remotely and maybe even enable measurements that have previously been impossible to carry out.

These challenges and needs will be advertised across the Nordic countries and companies, and entrepreneurs will have the opportunity to apply to Verúð and address these real-world blue challenges through this combined bootcamp and incubation program to address needs of CoP and grow Iceland's Blue Vision.

***Initial Blue Vision for Iceland***

Iceland's blue vision is to drive its economy forward through the sustainable growth of its fisheries sector and the emerging blue economy and bioeconomy, leveraging both technology, along with innovative uses of seafood resources across traditional and emerging value chains to create high-value products and foster collaboration, thereby transforming the industry towards full sustainability, and significantly increased economic value.

## 5 Blue Vision of Klaipėda Region, Lithuania

Lithuania is organised into ten counties, with Klaipėda Region located in Western part of Lithuania. Klaipėda Region is the third smallest geographically region in the country (5,222 km<sup>2</sup>), but it is the third in terms of population size (369,194 inhabitants in the beginning of 2024) and density after Vilnius and Kaunas Regions. The region comprises seven municipalities and several large cities. The city of Klaipėda is home



Figure 16. CoP in Klaipėda.

to Lithuania's only seaport, which is the northernmost ice-free port on the eastern coast of the Baltic Sea.

Up to 45% of the value added in Klaipėda Region is generated by the traditional sectors of logistics and manufacturing, which take advantage of the favourable status of Klaipėda seaport. Tourism is another important sector for the region, with the resort towns of Palanga and Neringa which are major tourist destinations not just in a region but in entire Lithuania as well. As stated in Klaipėda Region Development Plan for 2022-2030, Klaipėda Region is located

in a strategically convenient geographical position. It is the most important transport hub of the country, connecting the West and the East. Due to its unique geographical position, the region is one of the economically strongest regions of the country and is strategically attractive for investments, development of important strategic objects and business development.

The Klaipėda Region's economic development is guided by a unique approach in Lithuania that utilizes a specialization strategy. In 2021, all municipalities within the region adopted the 'Klaipėda Region Specialisation Strategy 2030,' which was further endorsed by the Klaipėda Region Development Council in 2022. This strategic document is important because it outlines the collaborative efforts and measures agreed upon by regional governance, the business sector, local communities, and the spheres of science and education (figure 17). The strategy was formulated after a comprehensive

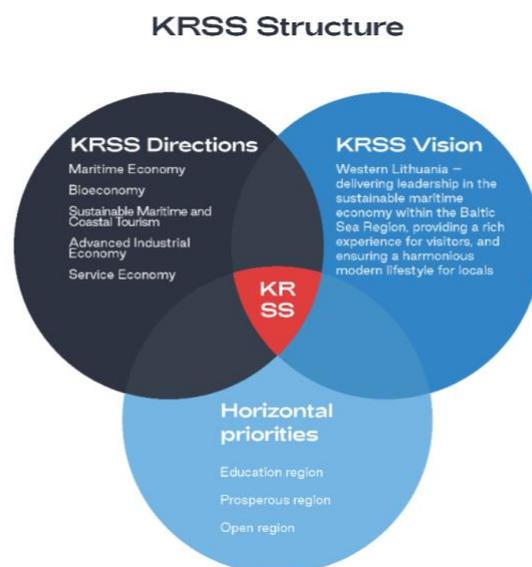


Figure 17. The structure of Klaipėda Region Specialisation Strategy 2030.

analysis of the region's growth opportunities, potential, prevailing and forthcoming trends, as well as both national and international thematic policies. The strategy outlines five key directions for economic development, with the bioeconomy being highlighted as a primary focus. This includes both the blue and green sectors (Klaipėda Region Development Council, 2021).

In Lithuania, the blue bioeconomy is a small sub-sector of the Lithuanian bioeconomy, mostly concentrated in the Klaipėda Region. It has a very small share in turnover and GDP (0.1%), but it has recently experienced rapid growth in labour productivity and an average increase in turnover and exports. The potential for aquaculture development in Lithuania is increasing due to the growing demand for fish and other aquatic products. The potential for the development of aquaculture in Lithuania has increased due to the forecasted rapid increase in demand for fish and other aquatic products worldwide. Aquaculture can help meet this demand as fish catch is expected to decrease by 2025, while the production of aquaculture products is expected to increase by 34.2% compared to 2015. Additionally, controlling the quality of fish resources in open water has become increasingly challenging. Aquaculture in Lithuania has led to an increase in valuable fish species in ponds and the farming of fish in closed systems. This method has rapidly developed worldwide and is simpler than pond aquaculture (Lithuanian Ministry of Economy and Innovation, 2017).

Meanwhile, commercial fishing, which is specific to the coastal region, faces significant challenges. The recreational fishermen's radical demand to ban commercial fishing, as reflected in the Program of the Government of the Republic of Lithuania (LR Seimas, 2020), is incompatible with modern, sustainable, and balanced management of fisheries resources and the UN principles of sustainable development. It is important to consider the interests of other economic sectors, such as tourism, catering, food processing, and trade industries.

Science-based solutions are crucial for coastal regions. Developing new technologies and biological solutions in aquaculture and deploying circular economy principles in the use of fisheries resources are closely related to biotechnology. Blue biotechnology is in its embryonic stage in Klaipėda Region and Lithuania. Due to its potential, the development of blue biotechnologies and other branches of the blue bioeconomy is one of the most important strategic priorities for the development of both Klaipėda City and Klaipėda Region. Sustainable management of marine resources through the development of aquaculture and blue biotechnology is also one of the strategic research directions for Klaipėda University. The Klaipėda Region has been identified as the Blue Region, one of the regional value propositions in the Klaipėda Region Positioning Strategy (Klaipėda Region - Blue Region: a distinctive character of the region formed by a mix of varied cultures, open to discovery and new experiences) developed in 2022.

However, although the Klaipėda Region possesses R&D competences and infrastructure, as well as a growing aquaculture sector and geothermal resources that

are favourable for the development of the blue bioeconomy, the region faces many challenges in realising the Bioeconomy direction. One of these challenges is the lack of a national bioeconomy strategy, which is mostly included in other national strategic frameworks, as indicated in the EC report on Bioeconomy strategy development in EU regions (2022). Another challenge is the lack of data and the fact that the relevant ecosystem is still under development in the region. To address these issues, the 'axial' II.1.1.1 Measure was planned, which involves the establishment and operation of the Klaipėda Region Bioeconomy Council. The council will be composed of representatives from local government, business, science, and the non-governmental sector, as outlined in the activity plan for the direction of Bioeconomy. The establishment of a blue bioeconomy CoP in the region is expected to facilitate the formation of the Klaipėda Region Bioeconomy Council and provide a platform for collecting and sharing existing good practices in the blue bioeconomy in the region.

### ***Establishment of CoP in Klaipėda Region***

During the regional conference 'Marine and Coastal Research - 2023' held on 19-21 April 2023 in Klaipėda Region, the objectives of BlueBioCluster and its alignment with the specialisation strategy, particularly in the field of Bioeconomy, were presented and discussed.



In May 2023, the first general gathering of CoPs in Klaipėda Region was held. The event was attended by 21 participants, including representatives from the fishery industry, local municipality, regional administrations, higher education institutions, regional environment protection agency, private companies, and Klaipėda City investment agency (figure 18). During the meeting, the BlueBioClusters project, the Klaipėda Region Specialisation Strategy 2030, and Estonia's experience in developing a regional blue bioeconomy vision were presented.



Figure 18. CoP meeting in Klaipėda.

During the event, participants engaged in a moderated discussion regarding the obstacles hindering the development of the blue bioeconomy in the Klaipėda Region. The main outcomes of the discussion are summarised below:

1. There is a lack of understanding among relevant regional actors regarding the scope of the blue bioeconomy.
2. The fishery sector is facing numerous restrictions.

3. Although some organisations and companies may be attributable to the blue bioeconomy sector, they may not identify themselves as such, causing them to miss out on potential opportunities. This highlights the need for further education on the topic.

Additionally, active participation and cooperation between science institutions and the business sector could facilitate the commercialisation of the blue bioeconomy sector in the Klaipėda Region and create more added value.

External experts also identified these problems during the development of regional specialisation. After the meeting, it was decided that the blue vision within the framework of BlueBioClusters would not be created from scratch in the Klaipėda Region. Instead, it would be an integral part of achieving the results planned in the Klaipėda Region Specialisation Strategy and addressing the challenges highlighted during the first general meeting of CoPs.

### ***Creating Blue Vision for the Klaipėda Region***

Vision of Klaipėda Region is: *Western Lithuania – delivering leadership in the sustainable maritime economy within the Baltic Sea Region, providing a rich experience for visitors, and ensuring a harmonious modern lifestyle for locals.*

The Blue Vision for the Klaipėda Region is derived from the common regional vision, with a focus on and detailed elaboration of the first part. The Klaipėda Region is a Lithuanian coastal region that aims to lead the blue economy nationally. This strategy highlights the region's dedication to utilizing its coastal assets to drive economic growth, improve local livelihoods, and protect the marine environment. The goal is to establish the Klaipėda Region as a vibrant and sustainable coastal community.

The upcoming CoPs will begin working on elaborating and implementing the Blue Vision through the actions outlined in the KRSS, namely:

- The Klaipėda Region (blue) bioeconomy council will be established, composed of local authorities, businesses, academia, and the non-governmental sector.
- Development of the regional Blue Bioeconomy Cluster
- Development of the modern Blue Bioeconomy Competence Centre (aligned with the Strategic development priorities of Klaipėda University)

Furthermore, to provide a more detailed definition of what constitutes 'national leadership in the blue economy' and to identify its key areas of focus.

## 6 Blue Vision of Møre & Romsdal, Norway

Møre & Romsdal, located in the northwest of Norway, is a county known for its beautiful coastal and fjord landscapes. It has a population of around 132,000 and its major cities include Ålesund, Molde, and Kristiansund. The county covers an area of 15,121 km<sup>2</sup> and benefits from a mild climate, even in winter, due to its proximity to the Atlantic Ocean and the Gulf Stream. The county has a diverse landscape, including high mountains, green hillsides, beaches, and deep fjords.

Historically, the county's proximity to the ocean has been vital, with fishing, shipping, and shipbuilding being key industries, alongside modern oil and gas exploration. Notably, the Ormen Lange gas field, discovered in 1997, is a significant contributor to the region's economy, with its gas exported to Europe. County is well-known for its shipbuilding, ship design, and maritime equipment production.

Møre og Romsdal is Norway's leading fishery county by export value, producing significantly more fish than the entire Norwegian population can consume. The county is also recognised for its furniture industry, as well as food production, including dairy, meat, and Valldal's jam industry.

Tourism is a rapidly expanding industry in West Norway, with popular attractions such as Trollstigen, the Atlantic Road, Geiranger, and Ålesund drawing visitors for their natural beauty and cultural events, such as Moldejazz. The inclusion of Geiranger Fjord in UNESCO's World Heritage List further emphasizes the county's global appeal (West Norway, 2024).



Figure 19. CoP in Møre & Romsdal.

### **Blue bioeconomy in Møre & Romsdal**

The blue and blue bioeconomy actors in Møre og Romsdal play a significant role in the region, taking advantage of natural resources such as the coast. The region also has a strong tradition of fisheries and other blue industries, passing on skills and an entrepreneurial spirit from generation to generation at a young age. The marine industry comprises internationally oriented companies involved in fisheries, farming, processing, ingredients, and associated equipment and services. Both new and traditional seafood products have significant potential in new markets worldwide, Møre og Romsdal has an advantage in terms of blue growth, as actors from the entire value chain are present in the region, from fisheries to processing and product development. This has been crucial for the regional blue industry and has been highlighted as a key factor for blue growth in the region. The growth of the aquaculture industry focuses on improving fish health by reducing salmon lice and virus-related diseases. Developing

aquaculture facilities, both at sea and on land, along with associated operations and maintenance services, is also crucial. The 'Samarbeid for vekst' regional research and innovation strategy for 2021-2024 highlights the importance of these activities.

Increases have been observed in two sectors from 2008-2023: 1) slaughtering, processing, and conservation of fish and other fish products, and 2) production of fish (food), mollusks, crustaceans, and echinoderms in sea- and coast-based aquaculture. This information highlights the dynamic nature of the blue economy in Møre og Romsdal, indicating areas of robust development and potential opportunities for further exploration and investment.

### ***CoP work in Norway***

A regional CoP for Ålesund was established in Norway, consisting of eleven local stakeholders from blue industry, research, academia, and the public sector/municipality. These individuals were invited due to their expertise and demonstrated interest and engagement in blue regional growth. Diversity in background and the size and type of business is crucial in a representative regional CoP. The presence of policy makers and public actors in the CoP adds significant value and can increase impact.

The initial CoP meeting took place in June 2023 in connection with the annual cluster gathering. The CoP advisory board was then convened in February 2024 for a workshop to provide input towards a collective blue vision. The objective of the second CoP meeting was to generate ideas and key points to be included in the regional blue vision.

To provide a common basis for discussion and tangible data and reference points, the first part of the meeting consisted of presentations. These presentations provided the necessary context, definitions (e.g. what is a vision), up-to-date numbers, and the current state of blue biotechnology in the region, as well as information on blue biotechnology trends in 2024 and examples of bio strategies. Question-stops during the presentation allowed for reflection and sharing of insights and opinions before formulating the vision.

The organizing team analysed and summarised the outcomes of the first CoP workshop (figure 20). They focused on the challenges, benefits, and potential solutions relevant to developing a regional blue vision. This analysis was revisited at the outset of the meeting with the CoP advisory board to refresh key insights. A summary sheet, encapsulating the main points from the last session, was printed and shared with all CoP members present. This document provided a basis for discussion, promoting dialogue and further investigation based on the results of the previous meeting.

Residual raw material	Technology	Competence
<p><b>+</b></p> <ul style="list-style-type: none"> <li>Local access to raw material</li> <li>Locality</li> <li>Utilisation of local resources</li> <li>Jobs in the districts</li> </ul>	<p><b>+</b></p> <ul style="list-style-type: none"> <li>Process development</li> <li>Innovator spirit</li> </ul>	<p><b>+</b></p> <ul style="list-style-type: none"> <li>Recruitment</li> <li>New technology</li> <li>More knowledge than before on the marine industry along the whole value chain</li> </ul>
<p></p> <ul style="list-style-type: none"> <li>Increase value of existing sources of raw material like macro algae, mussels and fish</li> </ul>	<p></p> <ul style="list-style-type: none"> <li>Technology transfer</li> <li>Better utilisation of resources</li> <li>All-year-round production</li> <li>New species</li> </ul>	<p></p> <ul style="list-style-type: none"> <li>Long tradition in utilising raw materials</li> <li>Increased collaboration</li> <li>Local competence</li> </ul>
<p></p> <ul style="list-style-type: none"> <li>Capital</li> <li>Research studies</li> <li>Project management</li> <li>From feed- to food-grade</li> <li>Performing onboard sea fleet</li> <li>Etablerte verdikjeder og kultur</li> </ul>	<p></p> <ul style="list-style-type: none"> <li>Economy and profitability</li> <li>Competition</li> <li>Willingness to take risks</li> <li>Regulatory conditions and legislations</li> </ul>	<p></p> <ul style="list-style-type: none"> <li>Time/resources for industry actors</li> <li>Special competence</li> <li>Keeping our competence</li> <li>Many small actors</li> <li>Commercialisation</li> </ul>
<p></p> <ul style="list-style-type: none"> <li>High quality food-grade product</li> <li>Markets willing to pay</li> <li>Technology</li> <li>AI</li> <li>Camera</li> </ul>	<p></p> <ul style="list-style-type: none"> <li>Competence development</li> <li>Cross-branch collaboration</li> <li>Competence transfer</li> </ul>	<p></p> <ul style="list-style-type: none"> <li>Collaboration on specific areas directed by clusters</li> </ul>

Figure 20. Summary sheet from the June 2023 CoP Advisory Board workshop. The symbols on the sheet represent positive elements, possibilities, obstacles, and challenge, respectively.

To obtain a variety of viewpoints, insights, and information, two biotechnology specialists (figure 21) from Northern Norway were consulted. This inquiry focused on the Tromsø region, which is renowned for its lively biotechnology scene, including research institutes, a university, and successful spinouts. The experts, who are prominent figures in the marine industry and the biotech cluster, were asked to provide their opinions on the key factors that contribute to the development of a successful blue biotechnology hub. The responses were presented to the advisory board of the CoP to contribute to the foundation for collective discussion.

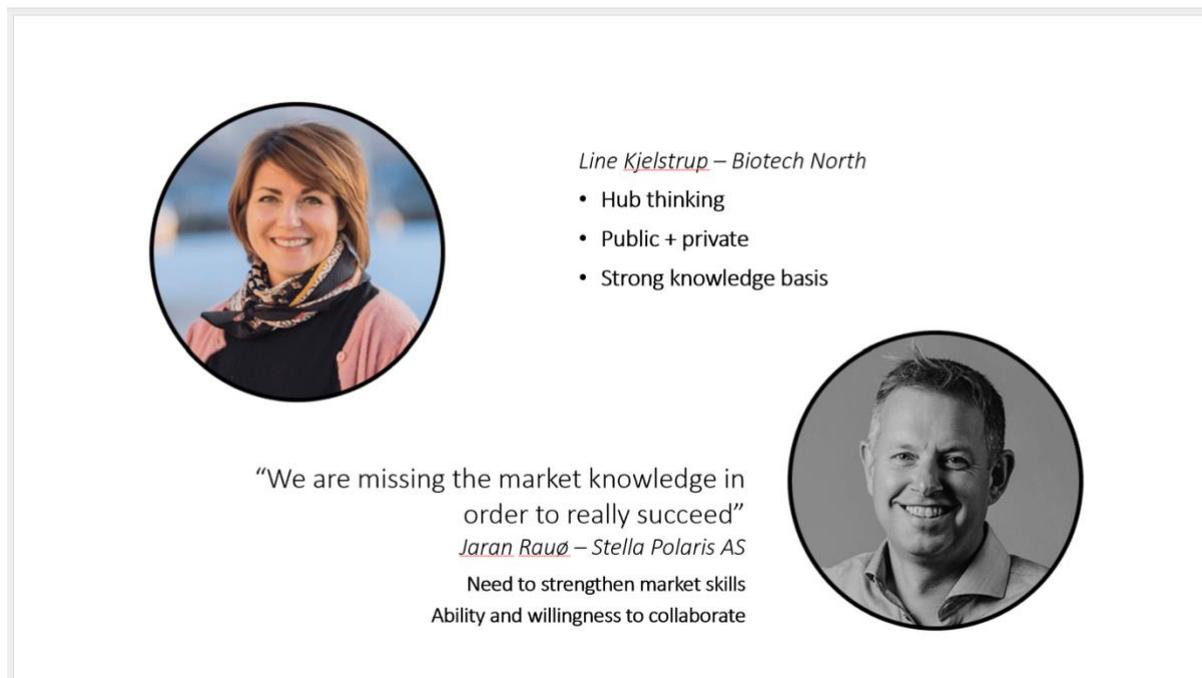


Figure 21. Seeking advice from other biotech regions. To achieve success in blue growth, it is important to foster close collaboration between academia, industry, research institutes, and public and private sectors. We can learn from the factors that contributed to the success of other regions. It emphasizes the importance of learning from outside the region as a possible input towards creating a final blue vision.

### **Creating blue visions**

To ensure we have a clear understanding of our current position, it is important to gather updated information. Therefore, during the discussion on the blue vision, statistics on blue jobs in the Ålesund region were presented as a tangible point of discussion. Members of the CoP from the public sector led this discussion and presented and discussed the numbers on blue jobs in the region. Additionally, we briefly reviewed the regional research and innovation strategy (2021-2024). The county municipality is renewing its strategy, and the CoP aims to contribute to this process. This session is valuable as it will generate input for the regional strategy, which will impact further regional planning.

Following a ten-minute break, the meeting participants were given twelve minutes to draft their vision while keeping the presentation content in mind. Afterwards, each participant presented their draft and received feedback. Throughout the discussion, one of the organizers took notes on a Miro collaborative board that had been prepared beforehand. The Miro board displayed empty sticky notes for collecting ideas, along with a blank line for vision ideas. It was shown to the participants on a large screen as they discussed. Organizers asked questions to keep the discussions on track, while also allowing the participants to choose the direction.

The raw results of the meeting are in the format of the Miro board, ready for processing into a more concrete vision. The following bullet points outline the elements that the CoP advisory board wishes to include in their vision. These elements pertain to skills

that need improvement or maintenance. The meeting input was grouped into topics related to sustainable and diverse blue bioeconomy. The emphasis is on building on blue traditions and industrial experience and creating synergies across different sectors. The aim is to foster economic growth for future generations by maximizing the value of local resources.

- "Tradisjon" – Tradition
- "Arbeide ilag: akademia, industri, klynge.." - Collaborating together: academia, industry, clusters...
- "Lære fra verden" - Learning from the world
- "ernæring" - nutrition
- "Sirkularitet" - Circularity
- "Utnyttelse råstoff" - Utilization of resources
- "Nye markeder" - New markets
- "Næringskjeden" - The food chain
- "Det Norske råstoffet (lokalt?)" - Norwegian resources, local
- "Blå bioøkonomi" - Blue bioeconomy
- "Å ta i bruk den nye teknologien" - Adopting new technologies
- "Nye bruksområder" - New applications
- "Ta i bruk nye artar" - Utilising new species
- "industri-tenkesett" - Industrial mindset
- "Plass til alle, små og store (mangfold i økosystem)" - Room for everyone, small and large (diversity in the ecosystem)

The finalisation of a clearly defined collective vision will be refined and agreed upon during the upcoming CoP meeting scheduled for April 2024.

## 7 Blue Vision of Peniche, Portugal



Figure 22. CoPs in Peniche.

Peniche, located on the western coast of Portugal, is celebrated for its stunning coastal landscapes and rich maritime heritage. With a population of approximately 28,000 (01/2023) and spanning an area of around 77.55 km<sup>2</sup>, Peniche demonstrates resilience and adaptability in key sectors such as tourism, fishing, and maritime activities. Although detailed current economic data for Peniche is not available, its economy has shown a positive trend over the years, supported by the growth in tourism and traditional industries.

In Portugal, Peniche was selected for implementation of the activities under BBC project such as, establish of CoP, co-creation workshops, foster matchmaking opportunities in blue bioeconomy and blue vision workshops that aims to support a blue vision strategy for the region and promote a sustainable transition in activities related with blue bioeconomy exploitation. Peniche has a centuries-old tradition when it comes to its inhabitants' relationship with the sea. The name itself derives from the Latin word peninsula (paene + insula) which literally means "almost island". With this designation in mind, its exposure to the sea and the importance of this blue natural capital for its development as a region are understood. Over time and especially in the 20<sup>th</sup> century, fishing activities have seen a profound transformation where traditional vessels and capture techniques give way to modern and productive purse seine fishing. This transition boosted the development of many economic activities related to fishing that are still present in the region today, including port management, shipbuilding, processing of frozen and fresh fish, salt farming, the canning industry and the production of fish oils and flour. Therefore, since then these activities have been intrinsically linked to improving the quality of life of its inhabitants and represent a significant source of income for the region and its inhabitants.

Nowadays the region has a more diverse range of stakeholders using the sea as a resource such as: incubators, academia, R&D centres, can industry, feed, fish processing, non-profit organizations, recreational/sports/tourism activities.

Firstly, all ecosystem was mapped, and preparation meetings were done to engage stakeholders for CoP Peniche showing the potential of being part of focused group to support region in their transition for a more sustainable use of the sea and presenting BBC goals and activities under regional valorisation and development of relevant

value chains through sustainability. Around 30 meetings (in person) and more than 80 emails (in some cases more than 1 email per institution) were sent to introduce the project and make the 1st contact with target audience that included research community, industry, business partners, innovators, local authorities, regional authorities, civil society, citizens, specific end users' communities, policy makers, students, startups/SME, local associations.

The first CoP event held on October 2023, the “Blue Vision” workshop, marked the beginning of work that the BlueBio Alliance intends to do over the next 2 years within the scope of the BBC project and, which above all everything, lasts beyond the time of the project as a continuous, cohesive and innovative look at the Peniche region (figure 23). The event was attended by 20 participants and was initiated with an inspirational presentation on (1) Smart Ocean Hub – a project in the region that is being developed to meet the need for collaborative efforts towards a future in which benefits can be reaped from the ocean while simultaneously contributing to its sustainability; and (2) ProRemar Project, a R&D project that uses marine resources (seaweed and under evaluated fish species) for alternative food products.



Figure 23. The first CoP event. Left to right: Sérgio Leandro Diretor School of Tourism and Maritime Technology (Peniche) - Polytechnic Institute of Leiria & Scientific Coordinator of Smart Ocean - Marine Science and Technology Park (Peniche, Portugal) presenting SMART OCEAN | Filipa R. Pinto, Researcher at MARE - Marine and Environmental Sciences Centre presenting ProReMar project.

The audience was challenged to think about the region answering two questions:

1) *Challenges for strengthening the blue economy in Peniche:*

- Sustainable use of marine and ocean resources;
- Reduction of Marine Pollution;
- Bioremediation - Water decontamination;
- Throwing of algae;
- Waste from the agar-agar industry (Gelidium);
- Dispersion of fishing net waste throughout the port area;
- Excessive nautical tourism;
- Poverty of the local population and purchasing power;
- Resistance to change;
- Investment Financing Available in the long term.

2) Identify the two main value chains in the region (based on bioresource use):

- Fish;
- Macroalgae.

Between the events planned matchmaking activities to foster collaborations were made to foster relations and ignite the collaborative work in the region to tackle challenges and promote work to be developed within the scope of this theme in Peniche through the CoP.

The 2<sup>nd</sup> event was held in December 2023, defined as a workshop Value Chain Facilitation Tool and counted with 24 participants (figure 24). The event started with a presentation of an R&D project, SeaShield, developed in the region and focused on one of the most important value chains previously selected, with a packaging solution coming from the use of macroalgae. This presentation was very important to raise the questions and curiosity of the audience and very important to show a possible and novel application already underway with input resources from the Peniche region and innovative ways to use biomass.



Figure 24. The 2<sup>nd</sup> CoP event. Left to right: Mariana Paupério, Project Manager at BlueBio Alliance presenting CoP working plan for the session; | Sérgio Leandro Diretor School of Tourism and Maritime Technology (Peniche) - Polytechnic Institute of Leiria & Scientific Coordinator of of Smart Ocean - Marine Science and Technology Park (Peniche, Portugal) presenting SMART OCEAN | Ana Augusto, Researcher at MARE - Marine and Environmental Sciences Centre presenting SeaShield – Eco-Innovative Marine Solutions for Food

The aim was to follow up on the previous session and explore in depth what the most relevant value chains can bring solutions to some of the region's obstacles and challenges through a tool provided by the BBC **'Inter-active visual value chain facilitation tool'** with practical application to those identified: fish and macroalgae (figure 25).



Figure 25. Inter-active visual value chain facilitation tool.

This tool used value chains and biomass inputs and allowed participants to evaluate social aspects, economic, environmental and regulatory impact factors and assess the availability or absence of technology. The aim was to provide a vision for the valorisation of by-products with economic potential from the fisheries sector in order to explore the economic potential of the region.

The result is a reflection of the different stakeholders involved in the fish and macroalgae value chains, with potential for future collaborations and partnerships to be strengthened bilaterally between CoP events.

Furthermore, the 3<sup>rd</sup> event planned for May 2024 will bring more tools and co-creation activities and reflections to help identify opportunities to integrate elements into a circular value chain concept, promoting the circularity of economic activities between the CoP Peniche.

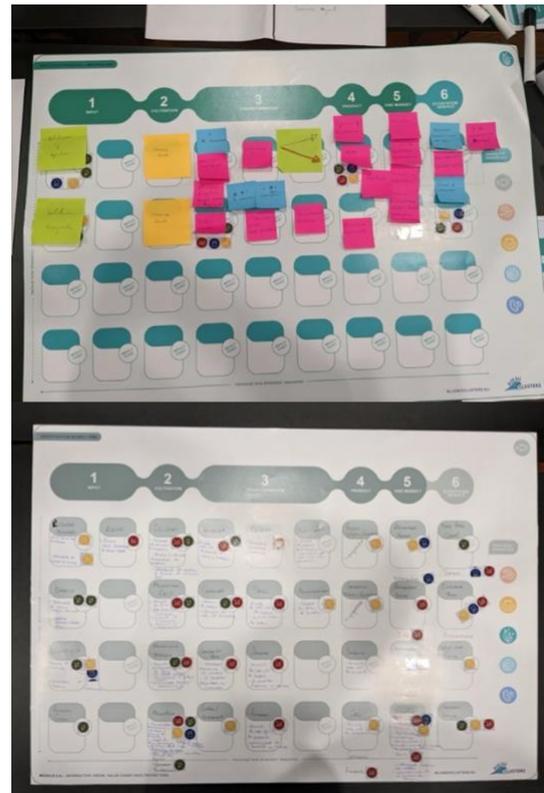


Figure 26. Final result on Inter-active visual value chain facilitation tool in Macroalgae (above) and Fish (below).

### ***Initial Blue Vision for Peniche, Portugal***

Envision a sustainable and innovative maritime economy, deeply rooted in its historical bond with the sea, transitioning towards sustainable practices across key value chains like fish and macroalgae, and fostering collaborative growth. Through community collaboration, workshops, and innovative projects, it seeks to protect marine resources while boosting local prosperity.

## 8 Blue Vision of Scotland, United Kingdom

Scotland's population is currently 5,436,600 according to the 2022 census, an increase of 141,200 or 2.7% since the 2011 census. However, overall population growth is slowing. In terms of the last quarter of 2023, Scotland's GDP fell by 0.6%. Overall, GDP in 2023 is 0.2% higher than in 2022. It is worth noting that this figure does not include offshore oil and gas extraction. This takes place in waters around Scotland and the main base for this industry is in Aberdeen, but figures for oil and gas are included in the headline figures for the UK. Real time figures are produced from 4 economic



Figure 27. CoP for Scotland.

activities: Agriculture, forestry and fishing; Construction; Manufacturing; and Services. Overall, much of the Blue Bioeconomy is concentrated in agriculture, forestry and fishing. More than three quarters of the Scottish economy is in services (77%). Manufacturing accounts for 16%, construction for 6% and agriculture, forestry and fishing for 2%. Figure 28 details the high level industries, but only within manufacturing and services (Scotland's GDP, 2023).

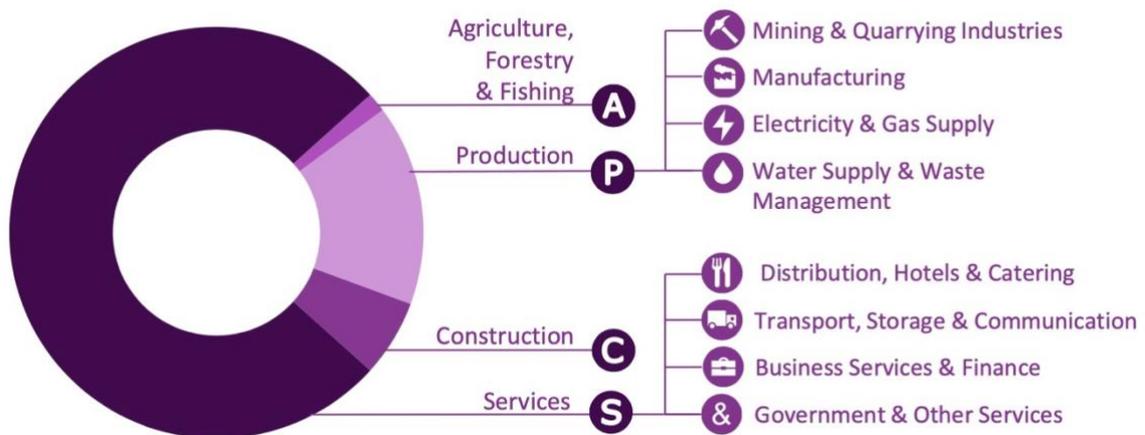


Figure 28. High level industry breakdown of industry sectors withing production and services, but this is lacking for agriculture, forestry and fishing, and construction (Scotland's GDP, 2023).

The Marine Economy in 2021 according to Scottish Government figures is valued at £4 billion, but this does include oil and gas. Of this it is estimated that aquaculture is responsible for £362million Gross Value Added (GVA) employing 2,391 people. It can be difficult separating figures on how important the Blue Bioeconomy is to Scotland

as it is reported as part of the Marine Economy (Scotland’s Marine Economic Statistics, 2020). This makes CoP difficult in terms of either interviewing or having the correct stakeholders in a room together. Plus, the makeup of certain CoPs sees the Blue Bioeconomy as a “niche”. Added to this are policy documents produced over the last 2 years leading to stakeholder fatigue. These documents include the Scottish Government Blue Economy Vision for Scotland and Understanding from 2022, Potential scale of Scottish seaweed-based industries: research paper from 2022 and the one of Scotland’s Enterprise agencies, Highlands and Islands Enterprise (HIE), Growing the Scottish Seaweed Sector- Scotland’s Producers and Processors from 2023. Stakeholders may question the need to participate in yet another project when they have already contributed to other CoPs and contributed to the landscape of the blue bioeconomy in Scotland. This sentiment is particularly prevalent given the publication of a blue vision for both macro and microalgae by the Algal Bioenergy Special Interest Group in 2013. The vision was developed through a CoP that involved industry and academia in facilitated workshops, with the main recommendations presented in figure 29.

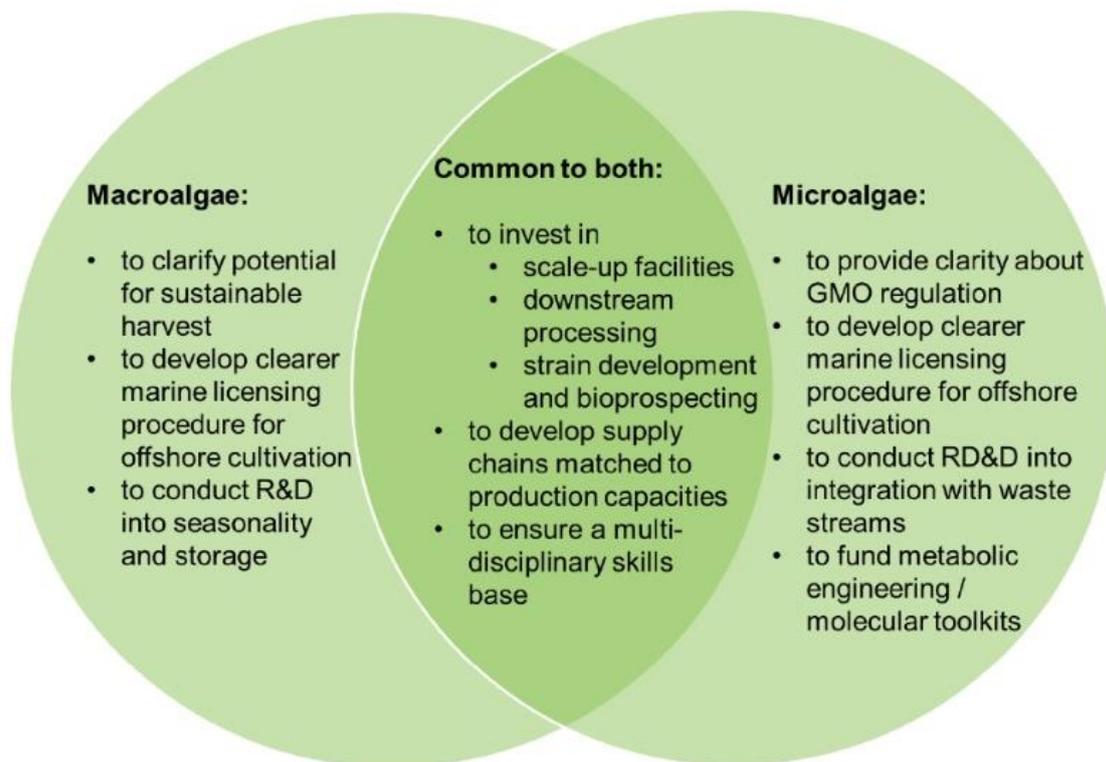


Figure 29. Recommendations from a UK Roadmap for Algal Technologies (Schlarb-Ridley & Parker, 2013) commissioned by the Algal Bioenergy Special Interest Group (ABSIG)

### An Established Cop with Scotland

The Scottish Bioeconomy Forum is a CoP that is particularly relevant to the BBC. As a CoP it was established in 2018 as an offshoot from the Scottish Industrial Biotechnology Innovation Centre (IBioIC), and currently has approximately 40 members from industry, academia and Scottish Government departments. The group

meets quarterly, either online or in person. There are only two individuals representing the Blue Bioeconomy, one of whom is from SAMS, a partner in the BBC project. The Blue Bioeconomy is considered to be an integral part of the overall Scottish Bioeconomy. The remit of this CoP is still evolving, and the most recent in-person meeting was held in Glasgow in March 2024, which included an update from SeaFood Scotland. Established in 1999, this is the national trade and marketing body for the Scottish Seafood Industry. They are currently exploring ways to manage the industry's biobased waste. During the meeting, it was noted that some companies, such as CuanTec, are already utilizing this type of waste by transforming shellfish waste into compostable packaging. However, there is a need to develop additional solutions and drive the Blue Bioeconomy industry from a Scottish perspective.

### What next in Scotland

Micro and small to medium-sized enterprises (SMEs) engage with CoP meetings voluntarily, without any remuneration. The format of the CoP can vary from online consultations with experts, one-to-one meetings held in conjunction with industry events, or as a side meeting to a major conference. The primary motivation for SMEs to participate is the potential for securing funding opportunities. As part of the BBC Bootcamp for the Nordic regions in Scotland, a meeting or CoP will be scheduled to include examples from the seaweed industry. This event is set to take place before the end of May 2024. The seaweed industry is relatively new and underdeveloped. The Scottish Seaweed Industry Association (SSIA), the main industry body, and the regional enterprise agency, HIE, will participate. As previously mentioned, ABSIG has already worked on a vision for both macro and microalgae for the entire UK. This will serve as a starting point for developing a blue vision for Scotland in the area of macroalgae. It is important to test whether the research and industry areas suggested in the original vision (figure 30) are still valid, as well as to determine what the new vision should entail, without altering the core message.

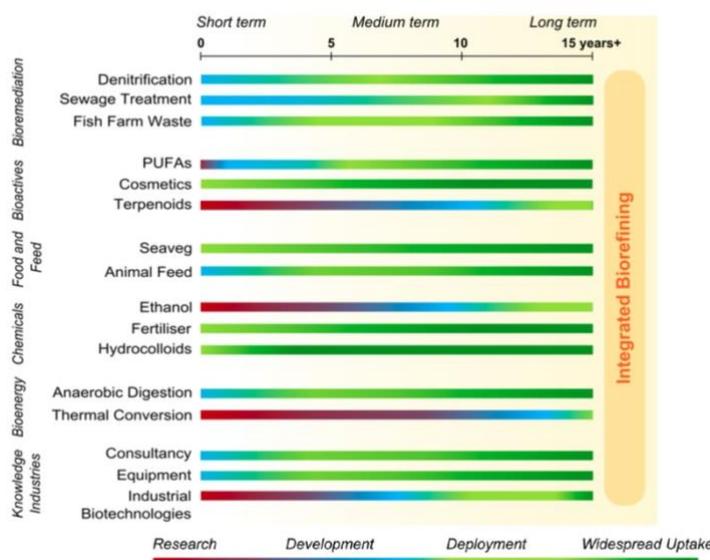


Figure 30. Indicative timescales to commercialisation for macro and micro algae products and processes (Schlarb-Ridley & Parker, 2013).

## 9 Blue Vision of Västra Götaland Sweden

In December 2023, Västra Götaland's population reached approximately 1.7 million, marking a growth around 8000 inhabitants in 2023 (Statistics Sweden, 2024). The region showcases strong economic performance, highlighted by an employment rate



Figure 31 CoP in Västra Götaland

of 68.1% and a relatively low unemployment rate of 8.5% in February 2024 (Statistics Sweden, 2024). Sweden's GDP increased by 6.1 percent in volume terms in 2021. Västra Götaland and Stockholm counties contributed to half of the total increase of Sweden's GDP that increased 6.1% in volume terms in 2021. These two counties accounted for 32 and 16% of the country's GDP. In 2021, Västra Götaland reported a GDP per capita of approximately SEK 517,000 that was slightly below national average SEK 527,000. (Statistics Sweden, 2023)

Västra Götaland is renowned for its diverse economy, with significant contributions from industries such as manufacturing, healthcare, and education, alongside a robust services sector which makes up a large portion of its GDP (Swedish Agency for Economic and Regional Growth, 2021). Furthermore, the region is a vital hub for Swedish exports, significantly contributing to the country's overall export volume and underscoring its crucial role in the national economy (OECD, 2023).

Västra Götaland stands out as an important place in biomarine industries in Sweden. Not only because the West Coast is a strong arena for marine research and innovation, but also because a large proportion of the country's biomarine companies and professionals are in the region. It has been estimated that more than 40% of all employment opportunities and revenues from the biomarine industry sector in Sweden, primarily the seafood sector, are generated in Västra Götaland. There is also a strong entrepreneurial spirit with many start-up companies, especially in cultivation/aquaculture. The connection to academia is also a strength with several spin-off companies from research projects and research institutes. However, many companies are small, and the largest turnover still occurs within the traditional fishing industry and within some larger blue processing companies. Forming CoPs with blue bioeconomy actors within the BBC project had the advantage that many of the actors had already begun meeting in collaborative platforms that were developing from other regional initiatives since 2020 – Projekt: Collaborative Platform for the biomarine industries, 2020-2023. At least 30 companies, 5 innovation support actors and 3 universities participated in the established collaboration structure. The BBC project activities in

2022-until now, have been more focused on structuring the group further according to their interests and increasing their level of collaboration.



*Figure 32 December 2022, CoP Blue Innovation Support actors in West Sweden (a follow-up CoP was held in December 2023).*

One CoP consists of blue innovation support actors that offer development support in different ways to support Startups and SMEs within the regional blue bioeconomy (figure 32). This includes state funded loan and financing organisations, universities, business development offices from coastal municipalities, startup service providers, business associations, science park and regional business development offices. There was a defined need to coordinate these actors in initiatives and activities to increase knowledge sharing and collaborate more effectively in providing the necessary support to blue companies and gathering information about needs from the different companies and industries that actors connect with through the different organisations. The collaboration platform for the blue bio marine industries is a CoP that will continue to meet for cooperation and knowledge transfer between the various actors based on identified needs among small and medium-sized companies in the industry.

One of the collaborative activities that resulted from this CoP was that a smaller group of business development support actors from the CoP coordinated a common “booth” at the Nordic Seafood Summit in January 2024 to provide direct consultation on programs and financing for blue Startups and SMEs during the event. The benefit for all actors involved was the increased visibility to specifically blue bio startups and SMEs and being able to present a “system” of actors with different offerings. Under the exhibit name “Blue Growth” the group were able to coordinate and communicate directly with blue businesses showcasing the regional ecosystem of financial and business development support actors in collaboration. Each actor represented a different offering to blue startups and SMEs for finance and business development

support (ex. incubation, business loans, investor, export finance, business establishment) The event in total had approx. 800 visitors in total over 2 days.

The second CoP was specifically formed with macroalgae farmers to address their needs for growth and innovation. There are approximately 12 companies involved along with innovation actors, universities and authorities that initially came together to collaborate in formulating regulations and standards for macroalgae development for the food sector in Sweden. This CoP has now formalized into a network of macroalgae farmers with the interest to collaborate in branch development projects. The spirit of collaboration among the farmers is good and there is a willingness to work together in this forum to address common hinders and challenges where innovation and collaboration are needed to solve them. Meetings were held in the spring and fall of 2023.

There is a need for a shared vision to unite and position the region in the Blue Bioeconomy (to attract investments, partnerships and workforce) and to move towards a productive and resilient local ecosystem now and in the future. Through discussion in the CoPs and talking with the actors, there was a common understanding that the regional blue bioeconomy is gaining interest and many parallel initiatives and ideas from the public and private sectors for its development were happening in different forums. The Blue Vision Workshop (figure 33) was therefore focused on gathering all the actors from both CoPs as well as other actors representing the different stakeholder groups in the regional blue bio economy to strengthen development in the region and create a "Future Vision of the Blue Bio Economy in Västra Götaland region" that everyone could contribute to and join forces to work towards.

The workshop was organized in collaboration with the Västra Götaland Regional County and brought together around thirty different stakeholders representing: politics, research, business/industry, innovation support actors, industry organizations, startups, future blue "skills" – youth and technology suppliers. As a warm-up, the regional Head of the department for research, development and education presented the current regional development strategy (VGR 2030) and what roll the blue bioeconomy has. Then was presented a work that Innovatum Science Park had been engaged in, known as "SILLicon Valley". It's a hypothesis that extends into the future regarding how the development of various biomarine hubs in Västra Götaland may appear in the coming years.



Figure 33. The Blue Vision Workshop in the Västra Götaland region.

With inspiration from the researcher and futurist Andrew Merrie from Planethon, the "Three Horizons Framework tool" to craft a collective vision for the future of the Blue Bioeconomy in the Västra Götaland region was utilized. "What we decide in the next fifty years will impact the next 10,000 years on our planet" - Andrew Merrie, Planethon Groups engaged in creating an inspiring and motivating narrative about a hopeful future – which is crucial for driving the change that's required! In this exercise, the stories were allowed to reflect our dreams, our creativity, and the potential of society and the development of the blue bioeconomy through a passive construction.



Figure 34. Workshop exercise.

Common elements of the stories were clustered and discussed:

- The sea is essential – the new oil is in the water.
- Sustainable and circular utilization of ocean resources is a profitable necessity.
- Symbiotic solutions are a part of the business sector, as is sea-based production.
- Vibrant coastal communities have been created.
- A wide variety of diverse, sustainable, nutritious seafood, which benefits the planet, is consumed.
- Self-sufficiency and local sourcing are the new norm.
- VGR is the obvious place to commence a blue growth journey.
- Clearer governance of the sea, which reinforces sustainable industries, has been achieved.

With the support of a graphic facilitator, all the input for Future Vision was captured, providing direct documentation of the workshop outputs live and maintaining an open and creative dialogue (figure 36).



Figure 35. Participants at the Blue Vision Workshop in September 2023.

A final vision statement was not generated at this workshop; however, elements were captured that will be used in the continued work with the vision. Further input was also provided through a survey of participant feedback.

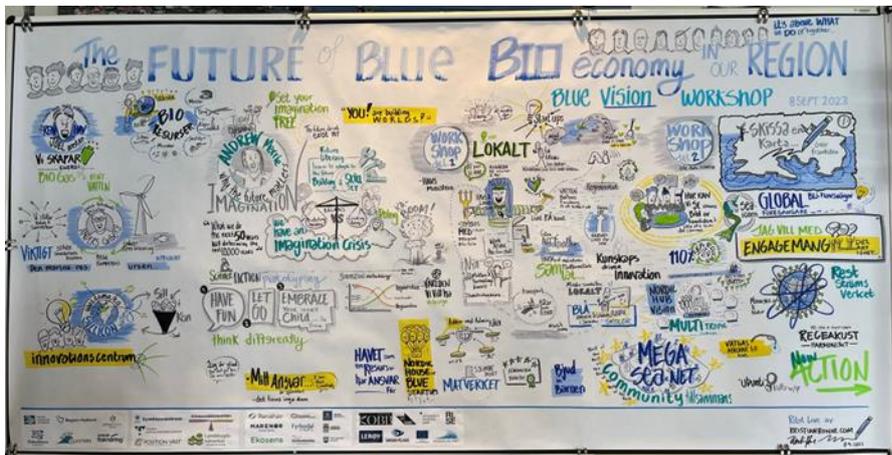


Figure 36. Graphically captured Future Vision.

Since the workshop, discussions and communications of these elements have been continued in and among the CoPs, and plans have been made to revisit the exercise with a larger stakeholder group. This is to take the next step

and, together with the county's next regional planning period for Regional Development Strategy (VGR2030), develop a more concrete vision statement for the blue bioeconomy.

### Input to the vision of the Blue Bioeconomy in Västra Götaland

- A functioning maritime synergy, where the cultivation of extractive species, fishing, tourism, and energy production are interconnected, including the processing of bioresources.
- The sea is utilized vertically.
- Physical planning (MSP) is carried out for cultivation in corridors.
- A vibrant coastal community where households and industries are both circular and in symbiosis – a new economy the "Secular Economy" - where sustainable resource utilization is prioritized.

- A food system is established where blue protein dominates the plate in conjunction with green, but our view on food, in general, is broadened – a little of many things is eaten instead of a lot of a few – diversified seafood!
- An innovation system that provides opportunities for top-notch blue startups.
- VGR is recognized as the obvious place to kickstart the growth journey. A system of hubs – e.g., "Restströmsverket" and Nordic Innovation House – can support the continuous development of new seafood, materials, and medicines as well as assist in business development. The future Seacorns are envisioned (ocean unicorns, startups with high valuation within 5 years).
- Stronger governance and management of ocean resources to avoid the tragedy of the commons. At the same time, blue businesses can coexist and thrive. It is politics that must drive the transformation, not the business sector.

## Summary

The report on Blue Visions offers a detailed summary of the initiatives and strategies developed under the BBC project to promote the growth of the blue bioeconomy in different regions. It highlights the significance of creating a vision for sustainable maritime and coastal development. The text outlines a structured process for creating a clear and compelling vision, referencing various methodologies and authors. The goal is to align efforts and foster a shared sense of purpose. The report details the use of Communities of Practice (CoPs) in co-producing visions for blue bioeconomy development across nine pilot regions. Each region adopted a unique approach to craft a guiding vision for their respective areas.

The report provides insights into the challenges and opportunities in various European regions. Each section describes the current state of the blue bioeconomy, identifies key value chains, and discusses collaborative efforts to engage stakeholders, map ecosystems, and develop actionable blue vision strategies through workshops, surveys, and CoP meetings. For instance, in Flanders, the focus is on aquatic organisms' production for food and raw materials across fragmented value chains, while Iceland's strategy revolves around the full utilization of seafood resources to enhance economic value sustainably. Meanwhile, Västra Götaland highlights its strengths in marine research, innovation, and the entrepreneurial spirit among startups in aquaculture. Each of these cases offers valuable lessons.

Blue Visions also addresses the need for sustainable use of marine and ocean resources, reducing marine pollution, and promoting circular economy practices. The text discusses the establishment of Communities of Practice (CoPs), facilitating stakeholder engagement, and implementing innovative projects and workshops to promote sustainable transitions in blue bioeconomy exploitation.

The report on Blue Visions is a fundamental piece for creating regional blue bioeconomy development action plans. It offers a clear path towards sustainable maritime and coastal development by leveraging the unique strengths and addressing the specific challenges of each region.

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