



Blue Bioeconomy Forum

Report on the 25 June 2019 event

Contract reference: EASME/EMFF/2017/1.3.1.5./SI2.777939

Disclaimer: This document has been prepared for the European Commission however it reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

Table of Contents

Table of Contents

Table of Contents	2
1 Background	3
Goal of the event	3
Participants	3
2 Opening plenary session	4
3 World café	5
Licences and Permits	5
Novel food	6
Ecosystem services.....	6
Understanding finance & skills and qualifications.....	7
Funding mechanisms	8
Consumer acceptance	8
Side products	9
Production cost	10
Logistics + Seasonality.....	11
Researcher-industry dialogue + Research infrastructures	12
Access to data + Marine exploration	12
4 Afternoon sessions	14
European support for innovation session	14
Inspirational projects session	15
The role of regions session.....	16
Open science and open data session.....	17
One-on-one meetings	18
5 Closing plenary session	19
Assistance mechanism for blue investment	19
Bio-Based Industry Joint Undertaking (BBI-JU).....	19
European Algae Biomass Association (EABA)	20
Wrap-up of the day	20
Appendix A: Agenda.....	21
Appendix B: Participants list	23

1 Background

Goal of the event

The Blue Bioeconomy Forum (BBF) is a meeting place for industries, public agencies, financial organizations, researchers and civil society, working on or interested in the blue bioeconomy of the EU. On 25 June 2019, the BBF organised its second event (see Appendix A for the agenda). The goals of the event were to:

- Discuss BBF’s draft roadmap for the blue bioeconomy and receive input from the stakeholders on the ways forward (world café session in the morning, see chapter 3)
- Inspire and inform participants on blue bioeconomy related topics (parallel sessions and closing session in the afternoon, see chapters 4 and 5)
- Connect stakeholders working in the blue bioeconomy (during the breaks).

This report provides a summary of the main topics discussed in the morning and afternoon sessions.

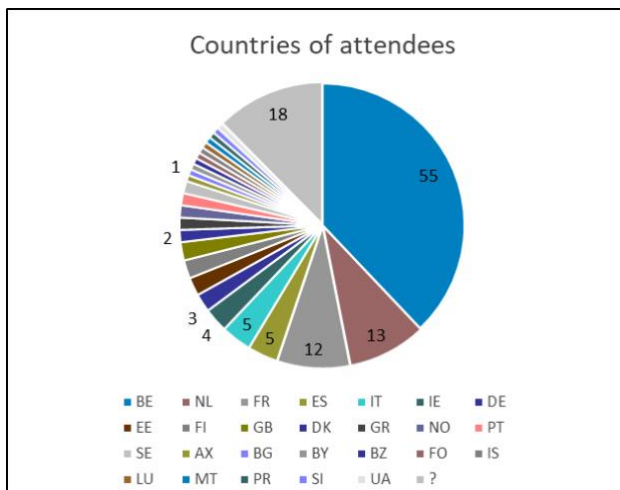


The input from stakeholders will be used to improve the draft roadmap, ensuring the ways forward mentioned in the roadmap match the needs of the stakeholders. The improved version will be open for consultation in the summer of 2019.

Additionally, several blue bioeconomy projects displayed their work and progress.

Participants

145 people attended the conference, we had a perfect number of participants to the world café in the morning (all tables were filled). See Appendix B for the list of participants.



As can be seen in Figure 1, just over a third from the participants, was from Belgium, where the conference was held (Brussels). The attendees came from 26 different countries. Furthermore, 58% of the attendees was female and 42% male.

Figure 1: Countries of attendees

2 Opening plenary session

The event was opened by Helena Vieira, professor at University of Lisbon and member of the Blue Bioeconomy Forum Steering Group. Prof. Vieira summarised the process leading to the development of the roadmap, with the work organised around 4 areas:

- Policy, environment and regulation
- Finance and business development
- Consumers and value chains
- Science, technology and innovation

One purpose of the day's event was to discuss, refine and improve the challenges and suggested ways forward which have been identified in these areas.

In his welcoming address, Commissioner Karmenu Vella (DG MARE) compared the Blue Bioeconomy to a genie in a bottle, waiting to break out. While oceans cover more than two-thirds of the planet, they are directly responsible for only 3% of global GDP. Referring to the updated Bioeconomy Strategy of the EU, Commissioner Vella emphasised that the development of the Blue Bioeconomy needs to take place transparently, collaboratively and sustainably. He reminded the forum of the need to avoid the mistakes of the past. For example, biobased products will not necessarily break down fast enough just because of their biological basis. He underlined the need to ensure that the Blue Bioeconomy respects the ecological boundaries of the planet.

Sieglinde Gruber, head of the Healthy Oceans & Seas department at DG Research and Innovation (R&I), pointed out that the new Bioeconomy Strategy of the EU fully embeds the blue economy. She reminded the BBF that sustainability is at the heart of the day's discussions and of the importance of understanding the ecological boundaries of the blue bioeconomy. Ms Gruber mentioned a number of ongoing and upcoming relevant initiatives in the EC, including a circular bioeconomy initiative, to be launched in 2020, which will finance projects and help de-risk private investment. She emphasised the great potential of the Blue Bioeconomy, which is yet to be unlocked, including for example, the algae sector. Ms Gruber highlighted the need to connect the different communities engaged in the BBF.

Julien Guerrier, Director of the European Agency for SMEs (EASME), portrayed the blue biotech sector as one of the most dynamic. He pointed out that the Blue Bioeconomy Forum is one of a number of projects and initiatives in this sector supported and/or managed by EASME. Mr. Guerrier emphasised the role of SMEs in bridging the gap between research and innovation. The EMFF has more than doubled funds to SMEs over the past two years.

3 World café

The participants were asked to discuss the major themes of the draft roadmap for the blue bioeconomy at 11 tables during three rounds. The tables had the following topics:

Licenses and Permits: Obtaining licenses and permits to set up activities is difficult for companies

Novel food: Novel food status and procedures are unclear for companies

Ecosystem services: Ecosystem services in the Blue Bioeconomy are not yet developed

Understanding finance & skills and qualifications: Blue bioeconomy projects and businesses lack understanding of investment landscape and how to present opportunities to potential investors. Human resources needs (skills and qualification) in the blue bioeconomy.

Funding mechanisms: Lack of funds and mechanisms to support blue bio projects and start-ups

Consumer acceptance: Lack of consumer acceptance of blue products

Side products: Lack of valorisation of side products from marine origin materials

Logistics + Seasonality: Difficulty in stable production of aquatic or marine biomass due to seasonality, and logistical challenges for aquatic or marine biomass processing

Production costs: High costs of blue production

Researcher-industry dialogue + Research infrastructures: Dialogue and sustainable cooperation between researchers and industry is needed. There is a lack, underuse and geographical discrepancy of research infrastructures

Access to data + Marine exploration: Lack of access to data, research results and data banks. Exploration of marine environment has technical challenges and high costs

A short summary per topic is provided below:

Licences and Permits

Generally the participants agreed with the actions proposed in the roadmap. The most important topic was the harmonisation of regulation. This should include two ways of harmonisation: harmonisation of rules and regulation between countries (currently, this makes international scale up difficult), and harmonisation of rules within countries (between different regulators, sometimes demanding conflicting things, also smoothing the difference between salt and sweet water). The Netherlands is starting up with a community of practice sharing information. The Scottish code of practice is an example of a more harmonised system.

Related are level playing field issues – especially related to products that can be imported from outside the EU that compete with EU products. There is a sense that imported goods are produced under less stringent industrial conditions than those required within the EU.

One stop shops help in overcoming the bureaucratic burden might reduce barriers for start-ups and SMEs. This could also include financial help. However, care should be given to the exact role of government: such activities may coincide with existing commercial services by intermediary organisations.

An additional measure suggested is the use of 'trial' licences, that are either easier to apply for or that allow for scaling up the activities once they have proven themselves.

In general, this falls under a more flexible approach to licencing for blue bioeconomy activities.

Timing

Generally, participants agree with the timing: many activities should take place as soon as possible. Changing regulation however takes time, so they do not expect that regulation will be changed in the first couple of years. Because of that, support in the shape of 'one stop shops' (a helpdesk to help entrepreneurs overcoming regulatory barriers and regulatory costs) is urgent.

Stakeholders

The participants agree with the stakeholders mentioned but miss the involvement of the general public (including NGO's). In all regulatory processes they should be involved to come to better regulation and greater acceptance of it.

Novel food

Participants agreed overall on the ways forward suggested by the roadmap. In addition to providing public funding for studies on strains toxicity, they suggested to also fund literature review to get an overview of what is known in Europe, but also beyond, so as to have all information available for companies. The possibility for the EC to fund research for the authorisation of blue biomass does however raise some concerns regarding possible conflicts of interest; the EC funding research that supports an authorisation process that they are in charge of. This first way forward needs to be started as soon as possible and completed within five years.

The same time period should be applied to the set-up of efficient support mechanisms for SMEs. Information is key, and especially user-friendly access to it. Participants were not aware of the novel food catalogue, although it is easily accessible online. Communication of information, on top of accuracy, is a prime concern.

Participants also mentioned some possible improvements for legislation: it should take into account the sustainability of novel food. The question of defining biomass was raised several times. Focusing on species instead of strains may be more appropriate for blue biomass (e.g. seaweeds), instead of following the approach inherited from the agricultural sector.

A fourth way forward could be added: increasing cooperation at the international level to learn from regions where blue "novel" foods are already mainstream, and to standardise the definition of foods at FAO level (and eventually WHO), in order to support the food transition in the EU (novel food have to be seen in the context of such a transition; see the Food 2030 Framework).

Ecosystem services

Participants agreed that even though the research community knows quite well what blue bioeconomy ecosystem services are available, industry and citizens don't. Hence, there is a need to take stock of different aspects of ecosystem services including: innovation in valorising ecosystem services; different ways of implementing ecosystem services on national and regional level keeping in mind that conditions vary significantly from sea basin to sea basin; projects and companies who are supporting or will/would support the upscale of ecosystem services.

Participants were also of the opinion that while focusing on ecosystem restoration there is also a need to define the interplay between different types of ecosystem services.

There was an agreement that one of the most important ways forward for ecosystem services is the need for cohesion (entirely missing at the moment) between the Common Agricultural Policy (CAP) and the Common Fisheries Policy (CFP). High level political support is needed to start talking about ecosystem service payment on a sea basin level not in opposition to but in addition to funding point source measures (i.e. building waste water treatment plants).

Participants did not necessarily think that there should be a dedicated ecosystem services strategy. However, if there is one or if there is a text on ecosystem services in another strategy it should focus on the general public, the industry and on the issue of longevity of ecosystem services.

With regards to implementation there is a need to monitor the impact of ecosystem services on the ecosystems and therefore an agreement on common indicators needs to be reached. It is also needed to clarify the implementation of ecosystem services to different actors as well as their potential role. Implementing ecosystem services is also associated with upscaling already existing innovation and a strong cooperation between industry and research.

Recent sources on ecosystem services include a report published by the Submariner Network and materials from the Ecosystem Services Partnership (ESP).

Understanding finance & skills and qualifications

Project managers and entrepreneurs most often have difficulties in assessing their future market and, as a matter of fact, in presenting data and figures to potential investors. Sometimes, inventors are too focused on their original idea and potential markets they identified at an early stage.

One participant underlined the need to enhance the Blue Economy Investment Platform (BEIP) with fi-compass, which is a platform for advisory services on financial instruments under the European Structural and Investment Funds. This platform already provides the agricultural sectors and the regional authorities with learning tools on how to find synergies between public and private funding.

To increase attractiveness towards private investors, it was proposed to design actions aimed at facilitating the access to infrastructures by companies. Accessing facilities is a way to reduce gaps because demonstrators and flagships are good means to raise interest of investors.

On skills, three main comments were made on the assessments:

- It is often difficult in the emerging industries like the blue bio-economy sector to find the right manager since a specific skillset is needed.
- On skills, too large a focus on technical skills should be avoided since other skills are needed.
- A study carried out in Brittany (by the Regional Council) on the needs of the Blue Bio-Economy sector showed that the needs were not very-high level expertise (MSc or PhD) but rather at MA level.

Proposals were made for the ways forward:

- A mapping of needs in terms of expertise and skills of companies and of the sector as a whole is necessary to identify the 3-4 most important needs at short term and to design an action plan.
- Training people is important but training the trainers is as important.
- Companies that participate in the projects could provide mentoring (in addition to financial support). Business angels and venture capitalists should enhance

their commitment and propose a vision and an ambition to companies they have invested in.

- Erasmus+ is a good means to improve skills and qualifications. New initiative with new priorities could be defined to cover the Blue Bioeconomy sector.
- "Reverse mentoring" where old people learn from young people is a key driver in this sector.
- Digitalisation is important for the sector since it provides new processes within companies.
- Mobility between the research sector and industry is a way to bring qualifications closer and to increase fluidity in the chain money used to carry out research – research outcomes that can generate money.
- Supporting clusters at a local level is a good way to enhance collective skills.

Funding mechanisms

Participants engaged in discussions around the ways forward concerning funding mechanisms for the blue bioeconomy. With respect to the establishment of investment funds, it was acknowledged that the details on the funding mechanisms to possibly be incorporated in the EC's Blue Economy Assistance Mechanism were still undecided. Participants generally supported the need for dedicated investment funding mechanisms with some observations that financing constraints for startups and SMEs reflected in part an accessibility issue (linking thus to the previous challenge and ways forward).

A number of suggestions to complement the establishment of funds were made during discussions and received broad support from participants at the table:

- Develop possibilities for the use of blended finance to support innovation and development of the sector.
- Ensure that any funds to be established are managed by private (as opposed to public) fund managers.
- Promote co-investment by regional and local authorities with support from EMFF and ESFRI.
- Leverage non-bioeconomy funding, for example, from the tech sector. Along these lines, the EIT should introduce and recognize bioeconomy as a separate thematic area.
- Public funding support from national and local authorities could be channeled through co-innovation vouchers.
- Networks of innovation hubs, possibly with even a blue bioeconomy focus, could support overcoming funding constraints, by clustering public-private research activities and fostering communities of practice.

Consumer acceptance

The participants were invited to discuss about the ways forward on consumer acceptance and exchange their views on aspects that could be improved/modified and new suggestions that should be included in the roadmap.

Regarding the **need to improve understanding and raise awareness** to the consumers on the value/utility of blue biomass-based products, the participants emphasised several aspects:

- First, it was mentioned that the dialogue should be two-way. Participants recognise indeed that it is important to raise awareness to the consumers about the value/utility of blue products, but it is also important to hear and understand what their needs/expectations are. Consumers have several concerns (i.e price, sustainability, health...). Consumers (end -users) should not only be the ones taking part in this dialogue, retailers are also key.
- Another important aspect that was discussed is “How and by whom the communication to consumers should be conducted”. The participants felt that among the key actors that should be involved in improving understanding of consumers, one should also have the civil society, consumer associations and also involve ambassadors such as “chefs” for food products. It was also mentioned that specific attention should be made into how the messages are communicated. What is the appropriate use of wording to avoid misunderstanding? (e.g. what wording to use between discard, waste, biomass residuals, side-products?). What key facts should be communicated? How to avoid the repercussions of fake-news? The participants also mentioned that a good communication should inform consumers on where food comes from (traceability) and highlight sustainability aspects. Another level where communication can be targeted is at schools, educating from early age on values and sustainable products from blue resources.

Regarding the **design of supportive regional policies in the blue sector** (i.e. local fairs to bring together producers and consumers) the participants mentioned that the blue bioeconomy needs more interventionist measures to help bringing blue products to the consumers. The sector is innovation intensive and products with potential struggle to find consumers because there are too high risks in developing them. When asked to elaborate about what measures could be proposed, the participants mentioned:

- Fiscal policies/incentives to support production and cheaper prices for the consumers.
- Subsidies that could boost the sector (e.g. example of renewable energy against fossil fuels). An illustrative example was given with a recent discovery of a Lobster shell that can be used for creating an end product of biodegradable plastic. To be competitive with traditional plastics, the development of these products should be supported until it becomes an alternative and sustainable mainstream product.

Side products

The participants agree on the importance of the development of side products. In general, there was consensus that the nature of side products is different. By-products from processing, discards, by-catch and “waste streams” are generally in other development, and legislative stages.

Enforcement was debated to full extent. However, half of the attendees stated that enforcement will not stimulate the development of side product use. Enforcement of CFL aspects is only suitable to drive by-product use if there is clarity on the legal and post-legal debate.

The majority of the participants agreed that provision of clarity is the most important aspect. Clarity on legal aspects, in terms of discards, and by-product use, novel foods, recall procedures for by- and side products and traceability were considered of high relevance. If clarity can be given, the development of business and market applications will follow. Currently, the lack of a clear legal framework inhibits the financing and business perspectives.

Research and infrastructure are confirmed as important issues. They are seen to support local development processes. Pilots created in one region can be used as good examples for other regions. This cross-regional learning should be given more attention. Research on continuity, stability and quality of side streams is needed. Market places or trade platforms need to be developed to suit this purpose. Next to side streams one should not forget about research of underused sources such as krill, non-fished fish sources, underused stocks.

Upscaling of proven technology requires investment in terms of research and to cope with product availability, stability, variability, and the right location (sourcing from multiple-sources). Mixing different companies, or initiatives in a value chain (blue clusters) could help to strengthen cross sectoral links.

One issue that was considered missing in the debate is the interlinkage between different sectors, how to combine the seafood sector with other relevant sectors.



Production cost

The discussion with conference participants on production costs showed that presented suggestions on ways forward can address various cost-related challenges in 'blue' companies, regardless of their size, technological maturity, geographic location and sectors in which they operate. The topic of production costs is multifaceted, as there is a strong link to regulatory procedures, infrastructure, support from the local ecosystem and many other factors. Hence, the project team should assess to what extent the ways forward from other thematic groups can contribute to reduction of production costs.

Building of clusters of blue production in the EU with biorefineries and other production/research facilities has been voted as a priority by the majority of participants. The clusters of production are expected to reduce logistical, transportation, biomass processing costs, to stimulate co-sharing of facilities, valorisation of side products and collaboration with research organizations and other companies active in

the blue bioeconomy sector. The provision of public investment in silos and biorefinery facilities for stabilisation of input into processing industries was considered a viable alternative to building of clusters of blue production. However, the latter option was less preferred, due to more limited scale.

The idea on provision of partial coverage of R&D costs was well received by conference participants. However, the discussion on the type of financial instrument revealed a difficulty to select the most appropriate instrument. Several participants emphasised that the research support should be provided in most needed areas of the 'blue' sector. The development of compounds for biomass drying or salt extraction was considered as a good example where the partial coverage of R&D costs can be justified.

Despite that most conference participants agreed that SMEs need additional support to succeed in the 'blue' sector, it is difficult to establish what kind of support should be offered. Some participants argued that SMEs need assistance during the pilot or scale-up phase, an advice for diversification of portfolio or for accessing available financial resources from the regional, national or EC programmes. More experienced, bigger companies in the 'blue' sector could act as advisories to SMEs, helping to apply for funding, to suggest how to diversify portfolio or to adjust the business model. Such practice already exists in several European countries, however, business culture and size of the 'blue' industry in a country play a key role in ensuring success of such practices. Ultimately, the conference participants agreed that there is a need for business advisory support to SMEs. In addition, an advocacy group of 'blue' SMEs is needed to increase their voice at national and the EU levels and to advance their interests.

Among new ideas that were suggested is the creation of the 'blue' biomass market in the EU. Several conference participants stated that it would help to compare prices of biomass, to know how much is being produced in a specific region and how much biomass is available per season. Such a market would allow to better predict costs and profits of companies and to identify business partners. Potentially, this could also attract more investors to the 'blue' sector. Other discussed ideas are related to existing regulatory barriers – to reduce costs on red tape, to develop a support mechanism to pay for analysis of product documentation. One conference participant suggested to reward SMEs, based on environmental impact assessment.

Logistics + Seasonality

The focus of the discussion was the logistics related challenges among which the seasonality was of a particular focus. While the participants were supportive of the all listed ways forward, responsible actors and the timelines, they highlighted the following:

- Along with promoting the research on indicated areas the stakeholders stressed the need for research on climate change on marine resources as part of the research of seasonality impact, as well as to facilitate the research on process optimisation along with harvesting optimisation. Discussants also pointed to a need for programmes for biotechnological cultivation of various aquatic breeding stocks. The timing indicated in the roadmap should be changed to post 2020 as the decisions on the research programmes and financing specific topics is fixed for the earlier years.
- Slow transfer of knowledge from research to market is an overall problem in Europe. It is a challenge in the blue bioeconomy areas as well. Research to market need to be an important part R&I support programmes. Lessons can be learnt from the mentorship based entrepreneurship support model used in the Submariner network, and Blue Bio Value acceleration programme.

- The role of all actors: EU and national public bodies, industrial players and research community has been underlined, but their collaborative actions in promoting R&I are believed to bring higher impact.
- In securing investment of for silos, biorefineries, as well as for pilot plants, the importance of private investors has been stressed. The role of the state is to create incentives for private investors, as well as secure co-financing of the facilities. Access to such infrastructure is especially important for SMEs.
- Along with promoting open data platforms, it is also important to promote open science principles.
- Reinforce attention on the logistical challenges that are faced by fishers due to the obligation to bring the by-catch on shore. Storing by-catch is putting additional burden on fishers. Some solutions are offered by practices and rules adopted in Norway.

Researcher-industry dialogue + Research infrastructures

Research-industry dialogue was indicated as very important (all participants agreed). Participants strongly agreed with the challenge “develop measures to incentivise researchers / companies” and suggested some possible routes. For innovation, co-design of research with industry was strongly suggested, but academic freedom to discover new things for long term goals remains of utmost importance. Furthermore, the metrics of success for researchers and companies (not only in publications) should be recalled. High level goals from policy makers for research and industry to work together under some global goals was named. For the challenge “launch exchange programs for students in industry” it was suggested to include researchers here as well. Also tools to stimulate people from industry to work in academic settings could be developed and implemented. As an example it was stated that in e.g. Denmark some universities already have a high amount of PhD students involved in industrial cooperation projects. The participants did not have additions to the ways forward.

Due to the available time, research infrastructures (RI) received less attention. For “Mapping: optimize use of research infrastructure” it was confirmed that already a number of initiatives are running. Build on existing platforms such as EuroOcean, European Maritime Board, EMBRIC. “Reduce gaps in qualified people” was seen as an item (e.g. in Iceland) but not discussed in detail. Participants agreed on the importance of “Build a European Blue Bioeconomy research infrastructure” and again suggested to build on existing initiatives / cases of best practice such as e.g. Baltic Blue Biotech Alliance, Blue Bio Alliance and its Blue Demo network (in Portugal). (Financial) incentives are needed to use existing RI. Although not discussed in detail, several people indicated research infrastructure is available but we need to use it better.

Access to data + Marine exploration

The general conclusion was that there are enough databases, but they should be used in another way. Now these databases contain lists of data sets and it is the hope that with smart technologies (algorithms, reverse science, deep learning and artificial intelligence) more information can be obtained. There is also a need for reliable data. The EMODnet could be a good starting point, although, the awareness and visibility of this database should be improved. For commercial data new tools must be developed (e.g. data pods and/or licences for data sharing). Here it is important that it is clear what is beneficial for the company to share their data. Furthermore, there is a desire to have “failure data (e.g. data from unsuccessful experiments)” and raw data to be

included. This will help scientists and companies in their research. It was also mentioned to integrate national databases, SEADATANET and results from EU-projects.

More data is needed for marine exploration and in addition the data should be combined (e.g. EITRawMaterials). Important is that the data is well coordinated, and the data should be reliable. Using the available data already a virtual ocean can be modelled.

4 Afternoon sessions

European support for innovation session

Enterprise Europe Network (EEN)

Mr. Makis Tikfesis presented the EEN to familiarise participants with available business support across the EU. The EEN is the world's largest support network for SMEs with international ambitions. The organisation aims to boost growth and jobs in the EU, it is co-financed under the COSME programme and has over 180 million EUR in funding. More than 3,000 local experts and 600 partners are based in 60 countries to support local and regional ecosystems.

Within the broad range of EEN services for growth-oriented SMEs are facilitation/creation of international partnerships (partnership database, brokerage events, company missions), advisory support (advice on EU laws and standards, market intelligence, IPR expertise) and innovation support (access to finance and funding, innovation management services, technology transfer).

Maritime industry is one of 17 key sectors of the organisation, and it is most relevant for the BBF. Based on research of EEN, 85% of SMEs are satisfied with the services of the organisation, SMEs that use the Network grow on average by 3% higher than those that do not. Among other interesting results of the organisation:

- 11,000 companies have signed business, technology or research partnerships.
- 90,000 companies attended international brokerage events and company missions.
- 1.7 million people participated in events.
- 70,000 targeted business meetings every year.
- 600,000 questions on the EU-issues have been answered.



Inspirational projects session

Hortimare

Mr. Haik van Exel presented the work of Hortimare. The company produces high quality starting material for seaweed farmers in Europe. In addition, the company advises and supports international seaweed farmers and stakeholders in the industry to develop and realise upscaling of seaweed in the (Western) world. Hortimare has close collaborations with international institutes, universities, technology companies, governmental institutions and other stakeholders in order to valorise the seaweed chain. The company is convinced that seaweed will play an important role in solving a number of climate challenges.

The company identified several major developments in the seaweed industry:

- Seaweed is becoming a supportive industry to the current agricultural industry.
- There is a strong collaboration throughout the value chain.
- The industry is benefiting from technical learning in agriculture and fishery sectors.
- Many start-up seaweed companies are undergoing the scale-up phase.
- A lot of research has been publicly funded in the past. Currently, front runner companies are investing in applied research.

Mr. Van Exel presented major challenges that the seaweed industry is facing. Among the missing components/factors for the development of the industry are:

- Production and delivery of high quality seedlings which can outcompete fouling organisms at sea (should be achieved within one year);
- Robust direct seeding technology for predictable harvest;
- Certifiable quality standards throughout the chain;
- Biological knowledge about diseases and impact of large-scale seaweed farming;
- Clarity about geographic limits (gene flow and local genetic diversity);
- Development of cost efficient and integrated logistics;
- Cost efficient and effective processing of harvested material.

Mr. Van Exel also emphasized that production of seaweed is becoming more expensive, therefore digital technologies are needed to reduce costs. Technology is already available at the European market. The import of foreign technologies is not always suitable for the EU market, as foreign (for example, Asian) production methods are different.

D-factory

Professor Patricia Harvey presented the project Dunaliella-based algae biorefinery (the D-Factory). The project received 10 m€ grant from the EU, it involved 14 partners from 11 industries. The D-Factory aims to set a world benchmark for a sustainable CO₂ algae biorefinery. The D-Factory is based on biomass from the halotolerant microalga *Dunaliella Salina*. The biorefinery elements are integrated and optimised using sustainability assessments. The biorefinery elements include:

1. Biomass: New strains are being cultivated in lakes, raceways and photobioreactors.
2. Bioprocessing: Key biomass processing technologies are being applied to the biomass.

Professor Harvey presented challenges that the project team faced:

- Seasonality and pests;
- Harvest of fragile cells (no cell wall), very salty water;
- Processing – matching scales, algal biomass behavior;
- Medicine licenses (nutraceutical supplements with claimable health benefits need a medicine license);
- Registration, evaluation, authorisation and restriction of chemicals;
- Feed and novel foods regulations;
- Investor perceptions – ‘farming’ is risky; production of nutraceuticals, food and feed is a long-term process;

Extracted high value compounds such as 9-cis-beta-carotene improves mobility and lifespan of *Drosophila* (fruit fly). Clinical trials and claims are needed to attract investors. Among the ways forward Professor Harvey mentioned technologies (for scale-up, increase of productivity and sustainability), and the development of market (new tasty products should be developed with great health benefits, legislative approvals should be facilitated).

Irish Mussel Seed Company & Aqualicense

Kate Dempsey presented an inspirational story of her family that for generations has been active in the marine sector and of her aspirations to change the way fishing is done in Ireland. The challenges that she faced while working in the mussel seed company are:

- Male oriented business (perception of women in this industry);
- Licensing (it takes too long and is difficult to obtain a license);
- Uncertain outcomes despite investment of time and resources;
- Access to investment.

Ms. Dempsey emphasised that successful development of aquaculture can alleviate hunger and poverty. Aquaculture is the world’s fastest growing food sector, but it is being driven by only a few countries. In some cases, the growth of this sector led to negative environmental effects.

Sea4US

Pedro Lima presented the biopharmaceutical company Sea4Us, which discovers new marine leads for unmet clinical needs. Around 21% of the world’s population suffer from chronic pain. In the US, 116 people die every day from opioid-related overdoses, 42.249 people die from opioid overdosing.

Sea4Us developed a solution – the company developed the compounds that act specifically in key molecular targets away from the brain, thereby abolishing neuronal hyperexcitability. The company combines Marine Biology and Neurophysiology in development of their products. According to Mr. Lima, marine compounds are better due to huge eco-diversity, natural qualities of biomass. The discovery and development process is long and costly, however, the result is rewarding for the company and its patients/clients.

The role of regions session

The first speaker was Damien Perisse from The Conference of Peripheral Maritime Regions (CPMR). The CPMR brings together some 160 Regions from 25 States from the European Union and beyond (some of these regions are also part of geographical commissions). Their main purpose is to facilitate synergies between regions, including

maritime policies and investment. During his presentation, Mr Perisse pointed out three examples of regional synergies in the field of blue bioeconomy which has been developed in the last years:

- First of all, the CPMR works on the analysis and mapping of blue growth which has been integrated in smart specialisation strategies. This analysis focused on food, nutrition and health because of their strong synergy potential. The mapping was non-exhaustive and only took into account the regions who were identified within the smart specialisation strategy framework, meaning that more regions are actually involved in the process.
- The CPMR also looks to increase interregional partnerships in Europe. For this purpose, partnerships have already been concluded with EMBRC, PP2, H2020 by working on regions' support to investments in blue biotechnologies via the EU Cohesion Policy.
- Finally, Mr. Perisse emphasised the recent collaboration (2018) with DG MARE and regional experts on how the Blue Invest platform could best work in synergy with the regions to lead to blue growth by granting access to capital and financial engineering.

The second speaker was Annie Audic from the Region Bretagne who presented the current state of development of the Blue Bioeconomy sector in Brittany. This region has a strong regional blue innovation ecosystem valuing marine biomass and blue biotechnologies. They have mapped which technologies and competences are available in the region and have taken on an active role by:

- Defining the right financial tools and schemes to support the ecosystem in order to structure it with the already available core competencies and technologies.
- Ms Audic underlined the need to support the emergence of pilot and structuring projects to further encourage the development of the regional ecosystems.
- At last, she insisted on the facilitating cooperation by including the regions in the governance cycle at EU-level. She emphasised the need to adopt a bottom-up approach from the territories to the institutions.

The third and last speaker of this session was Iban Cancio from the Basque Country who presented the development of the Basque Bio-Region, comprising regional innovation ecosystems in marine bioeconomy and EMBRC. The Basque autonomous regions are part of a smart specialisation strategy Basque-Navarre-Aquitaine. The focus of the Basque region is to bring marine biotech as well as marine ecosystems and food to a new economic level. From this strategy onwards, the priority of the Basque region comprises the development of advanced manufacturing, human health and energy (e.g. for example, an unused nuclear facility will be converted to a new aquaculture facility). Mr Cancio mentioned that it is important to create a business club based on market pull and technology push in the different regions and echoed Ms Audic's call to accept a bottom-up approach, because of the driving and dynamic potential of the regions.

The key message of this session after the presentations and short discussion is that bottom-up actions by the regions are important and should be used for further development of the blue bioeconomy in the EU.

Open science and open data session

The first speaker was Andrea Grisilla from the European Open Science Cloud (EOSC) who presented the different definitions for open science.

According to the Open Science Policy Platform, Open science is research that is collaborative, transparent and reproducible and whose outputs are publicly available. Mr Grisilla emphasised open Science is altering the current paradigm of conducting research because of its disruptive dimensions such as open access, open data/materials, open source/open methods, open evaluation, open education and citizen science. The EU defined Open Science policies in April 2016 and 600 M€ are available to setup the Open Science cloud. In March 2018, the EOSC roadmap was implemented. Now they are waiting for user users/stakeholders that provide information for setting up the system.

The second and last speaker was Kate Larkin who presented EMODnet. It is a platform gathering open source marine data, data products and web services to deliver findable, accessible, interoperable and reusable (for the acronym "FAIR") data in support of the blue bioeconomy and wider society.

EMODnet has a central portal that provides a single point of access to 7 thematic portals namely bathymetry, geology, seabed habitats, physics, chemistry, biology and human activities. EMODnet is unlocking the knowledge in marine data and observations. As Ms Larkin stated, the key is the users' feedback. There is less of a need to improve ocean observations; the big challenge is to unify the available data sources and portals.

One-on-one meetings

Participants were able to schedule one-on-one meetings, using B2match. 60 participants signed up for the one-on-one meetings and a total of 39 meetings were scheduled.



5 Closing plenary session

Assistance mechanism for blue investment

Daniela Cedola, PwC BlueInvest Platform

The assistance mechanism launched by the EC will run from 2019 to 2022. It will address the challenges related to investment gap as many SME don't find funding for their new products and business models. It will address problems around bringing research results to the market and transforming researchers into entrepreneurs.

The instrument will have a number of support elements including creating an online blue invest community, holding events, offering match-making opportunities, access to contacts, content, articles through the European Maritime Forum website, workshops in hubs in regions of Europe, assistance to SMEs and their projects who will receive 10 days of coaching on BP, pitching, entrepreneurship skill for scientists, etc. Working with EEN, incubators and accelerators is envisaged for these activities. Also, SMEs will be connected to investment/grant calls, an "investment vehicle" funded by the European Investment Fund which also connects to private investors. Thus, the project will cover the full cycle of "coaching to investment" for SMEs. Furthermore, a project pipeline will be built and showcased to investors.

Bio-Based Industry Joint Undertaking (BBI-JU)

Thomas Vyzikas, BBI-JU

Most focus of the BBI-JU is on agriculture and forestry, but it also supported eight projects on aquatic biomass with a budget of 6 mln EUR.

BBI-JU is a public-private partnership between EC (RTD, AGRI, GROW) and industry. It has supported initiatives with the total budget of 3.7 bln EUR where 2.7 bln EUR comes from the industry. The Strategic Innovation and Research Agenda (SIRA) identifies research, demonstration and deployment activities to be carried out by the Joint Technology Initiative on Bio-based industries, or BBI Initiative. First adopted in 2013 and updated in 2017 it sets actions designed to deliver tangible and increasingly ambitious results by 2020 and by 2030. BBI-JU through its projects is expected to create 470,000 jobs by 2030, where 80% jobs will be in rural and coastal areas.



European Algae Biomass Association (EABA)

Jean Paul Cadoret, president of EABA

There is an obvious need for algae biomass actors to gather into an association. EABA exists since 2009, starting with 7 members while it now has 150 members including universities, companies, SMEs, individuals, observer members (stakeholders promoting algae R&I) and sponsors. It runs annual meetings and thematic meetings e.g. on novel food, types of algae, etc. The objectives are to put algae biomass researcher and entrepreneurs together, make them visible, bring in young companies and entrepreneurs, build links between business, research, public and reach environmental, social, economic impacts. It has several committees, including an industry committee and academic committee.

Wrap-up of the day

Andreas Ligtoet, BBF project manager, Technopolis Group

Andreas Ligtoet thanked everybody and confirmed that the BBF team will keep the participants in the loop for further development of the roadmap. It was also noted that providing clarity is one of the first, major tasks in finalisation of the roadmap.

The closing session followed by networking drinks.

Appendix A: Agenda

Registration and welcome coffee

9.00 - 9.30

Opening plenary session

9.30 - 10.15

- Commissioner Karmenu Vella: Environment, Maritime Affairs and Fisheries
- Sieglinde Gruber: Head of Unit Healthy Oceans & Seas, DG Research and Innovation
- Julien Guerrier: Director of EASME

World café

10.15 - 12.15

Presenting and discussing parts of the roadmap at different tables.

10.50 - 11.10 coffee break

Topics:

Licenses and Permits: obtaining licenses and permits to set up activities is difficult for companies

Novel food: Novel food status and procedures are unclear for companies

Ecosystem services: Ecosystem services in the Blue Bioeconomy are not yet developed

Understanding finance & skills and qualifications: Human resources needs (skills and qualification) in the Blue Bioeconomy. Blue bio projects and businesses lack understanding of investment landscape and how to present opportunities to potential investors

Funding mechanisms: Lack of funds and mechanisms to support blue bio projects and start-ups

Consumer acceptance: Lack of consumer acceptance of blue products

Side products: Lack of valorisation of side products from marine origin materials

Logistics + Seasonality: Difficulty in stable production of aquatic or marine biomass due to seasonality, and logistical challenges for aquatic or marine biomass processing

Production costs: High costs of blue production

Researcher-industry dialogue + Research infrastructures: Dialogue and sustainable cooperation between researchers and industry is needed. There is a lack, underuse and geographical discrepancy of research infrastructures

Access to data + Marine exploration: Lack of access to data, research results and data banks. Exploration of marine environment has technical challenges and high costs

Lunch

12.15 - 13.30

Afternoon sessions

13.30 - 15.00

In parallel, one-on-one meetings can be scheduled.

Room A

13.30 - 14.00 European support for innovation

- Ted Eriksson: European Innovation Council and EIC Accelerator (SME Instrument)
- Makis Tikfesis: Enterprise Europe Network (EEN) innovation support services and business support for internationalization

14.15 – 15.00 Inspirational projects/ success stories

- Haik van Exel: Hortimare, supplier of high-quality starting material to enable seaweed farmers to harvest good yields
- Patricia Harvey: D-factory, developing a commercial scale biorefinery process, setting new standards in sustainable algal biomass processing
- Kate Dempsey: Irish Mussel Seed Company, an innovative aquaculture venture to sustainably harvest mussel seed offshore in the Irish Sea
- Pedro Lima: Sea4US, a biopharmaceutical company focused on the discovery and development of new pharmaceutical drugs based on novel marine compounds for unmet clinical needs

Room B

13.30 – 14.00 The role of regions in the development of the blue bio-economy in Europe

- Damien Périssé: Conference of Peripheral Maritime Regions (CPMR)
- Annie Audic: Région Bretagne
- Iban Cancio: Basque Country

14.15 – 15.00 Open science & the impact on the Blue bioeconomy

- Andrea Grisilla: European Open Science Cloud (EOSC)
- Kate Larkin: European Marine Observation and Data Network (EMODnet)

Coffee break

15.00 – 15.20

In parallel, one-on-one meetings can be scheduled.

Closing plenary session

15.20 – 16.15

- Daniela Cedola (PwC, BlueInvest Platform)
- Thomas Vyzikas (BBI-JU): Bio-Based Industry Joint Undertaking
- Jean Paul Cadoret (EABA): European Algae Biomass Association
- Andreas Ligtoet (Technopolis Group): Wrap-up of the day

Networking + drinks

16.15 - 17.30

In parallel, one-on-one meetings were scheduled.

Appendix B: Participants list

Title	Last name	First name	Organization
Dr	ARVANITI	Efthalia	SUBMARINER Network for Blue Growth EEIG
Dr	AUCHTERLONIE	Neil	IFFO The Marine Ingredients Organisation
Mrs	AUDIC	Annie	Conseil régional de bretagne
Mrs	BAKKELUND	Elisabeth Blix	The Research Council of Norway/NORCORE
Mr	BALDUCCHI	Jean-François	ATLANPOLE
Mrs	BANG-BERTHELSEN	Iben	DTU National Food Institute
Prof	BARBOSA	Maria	Wageningen University
Mr	BARRETT	Axel	BioplasticsNews.com
Dr	BJORNSDOTTIR	Bryndis	Matis
Ms	BOLE	Kristina	European Commission
Mr	BOU MIRA	Pablo	Fundació Bosch i Gimpera
Mr	BRIERE	Axel	mussella
Dr	BROCK	Elisabet	KosterAlg
Mr	BRUDEVOLL	Anders	JPI Oceans
Dr	BRUGGEMAN	Geert	Nutrition Sciences N.V.
Mr	BUYTENDIJK	Nico	Netherlands Enterprise Agency
Dr	CADORET	Jean-Paul	Greensea
Prof	CANCIO	Ibon	EMBRC-ERIC and University of the Basque Country
Ms	CARON-STREHLOW	Alexandra	DG MARE
Mrs	CEDOLA	Daniela	PwC
Dr	CHIRICO	Alessandra	Chirico Consulting
Ms	COLLINS	Catherine	Meta Group
Ms	COLLINS	Jane	ABS-int
Dr	DALTON	Gordon	MaREI ERI, University College Cork
Dr	DE RAEDEMAECKER	Fien	Flanders Marine Institute
Ms	DEMPSEY	Kate	Aqualicense
Ms	DENIS	Isabelle	FAO Liaison office Brussels
Mr	DETHARE	Philippe	SUEZ
Mr	DI LODOVICO	Francesco	The European House - Ambrosetti
Dr	DI PAOLA	Luisa	Università Campus Biomedico
Dr	DIAS	Joana	DG MARE
Dr	DORANOVA	Asel	Blue Bioeconomy Forum - Technopolis Group

Dr	EATON	Derek	Blue Bioeconomy Forum
Mr	ELIZONDO	Luis	Basque Government
Mr	EPARVIER	Patrick	Technopolis Group
Ms	FARSTAD	Martine	South Norway European Office
Ms	FATIMA	Kaneez	EC DG MARE
Mr	FAVREL	Vincent	European Commission - EASME
Dr	FERNANDEZ GUTIERREZ	Maria	European Commission
Dr	FERRARO	Angelo	National Technical University of Athens
Mr	FERREIRO REY	Francisco Javier	Galician Innovation Agency
Mrs	FOUQUET	Cécile	Aquaculture Advisory Council
Mrs	GALLAGHER	Ann	Aqualicense
Mr	GARCIA DE ARBOLEYA	Gonzalo	REA
Dr	GOMEZ PRIETO	Javier	European Commission, JRC
Mrs	GORET LE GUEN	Morgane	Délégation Permanente de la Bretagne Europe
Mr	GREGERSEN	Olavur	Ocean Rainforest
Mr	GRISILLA	Andrea	European Open Science Cloud
Mrs	GRUBER	Sieglinde	DG Research and Innovation
Mrs	GUILLEVIC	Laure	Pays de la Loire Europe
Mr	GUILLOU	Xavier	DG MARE
Mrs	GUZNAJEVA	Tatjana	Technopolis Group
Prof	HARVEY	Patricia	University of Greenwich
Mrs	HEEBØLL	Ida	Greater Copenhagen EU Office
Prof	HEYMANS	Sheila	European Marine Board
Dr	HOSTENS	Kris	Flanders research institute for agriculture, fisheries and food
Ms	IGLESIAS	Marta	DG RTD
Ms	ISHIWA	Aki	Region Emilia-Romagna
Mrs	JAGOT	Charlotte	Easme
Mrs	JOLLER-VAHTER	Liina	University of Tartu / Power Algae Ltd
Mr	JULIEN	Guerrier	EASME
Dr	KAUSE	Antti	Natural Resources Institute Finland (Luke)
Mrs	KIVILO	Reili	Ministry of Rural Affairs
Mrs	KONSTANTINOU	Zoi	European Commission DG MARE
Mrs	KULISH	Anna	SDM Partners
Ms	KWIATKOWSKI	Claire	OCTA

Dr	LARKIN	Kate	EMODnet
Mr	LAURICH	Laurent	Technopolis Group
Ms	LE GALLOU	Margaux	Technopolis Group
Dr	LERICOLAIS	Gilles	Ifremer
Mrs	LEROY	Josiane	Vlaamse gemeenschapsonderwijs
Dr	LIGTVOET	Andreas	Blue Bioeconomy Forum / Technopolis Group
Prof	LIMA	Pedro	Sea4Us
Mr	LIZASO OLMOS	Miguel	DG RTD
Ms	LLORENTE	Pilar	BBI JU
Mr	LOMBRAIL	Charles	Scinan S.A.S.
Ms	MABILIA	Valentina	European Commission DG MARE
Mrs	MAGNES	Noëllie	Representation of Nouvelle-Aquitaine
Mr	MAGNUSSON	Johan	Swedish Board of Agriculture
Mr	MAIER	Frédéric	Technopolis Group
Ms	MANEIRO FRANCO	Elena	Innovation and Business Development
Mrs	MASCART	Kamila	UGent
Dr	MOGUEDET	Philippe	IFREMER
Ms	MOLDOVAN	Simona	AITEX
Dr	MOREIRA-SILVA	Joana	CIIMAR
Mrs	MUNOZ	Victoria	Cecoforma
Mr	MURULA	Hardi	Association of Local Authorities of Ida-Viru County
Mr	NIELSEN	Christian	Bruscript Media
Ms	NUOTIO COULON	Saara	Turku-Southwest Finland EU Office
Ms	OESINGHAUS	Johanna	Hanse Office
Ms	OLESYA	Gavryluk	Platform4Business
Ms	PALMU	Anniina	West Finland European Office
Mr	PANJTAR	Rudi	Cluster Factories of the future
Mrs	PERRIN	Marion	EBN
Mrs	PETRALLI	Nila	European Commission
Dr	PFEIL	Hanno	Evonik Industries
Dr	POELMAN	Marnix	Wageningen UR
Ms	PUOLAMAA	Maila	EC DG GROW
Ms	QUESADA	Monica	DG MARE
Ms	RAAIJMAKERS	Eline	Technopolis Group
Dr	RANJBAR	Reza	CPI

Mr	REDD	Tom	JPI Oceans
Mr	REIS SANTOS	Pedro	EBCD
M	RÉVEILLON	Kévin	Onetec Event Technology
Mr	RIGAUD	Arthur	FARNET Support Unit
Mr	RUSLAN	Zhechkov	Technopolis Group
Ms	RUSSO	Manya	AquaBioTech Group
Ms	SAES	Lisanne	Technopolis Group
Ms	SANZ SANCENA	Patricia	COMMISSION
Mrs	SCHEIDEGGER	Nathalie	Ministry of Agriculture, Nature and Food Quality
Ms	SCHOLTEN	Linda	EFFoST
Ms	SCHOUMACHER	Cindy	European Commission, DG RTD
Mrs	SCHULTZ-ZEHDEN	Angela	SUBMARINER Network for Blue Growth EEIG
Mrs	SCHWARZ	Honorine	Occitanie Europe
Mr	SERANGELI	Claudio	AGC 98 S.r.l.
Mr	SGARBI	Federico	Brittany Region European Office
Dr	SIJTSMA	Lolke	Wageningen Food & Biobased Research
Ms	SKWARA	Sylwia	Pomorskie Regional EU Office in Brussels
Mrs	SOLOVYEVA	Yuliia	SDM Partners
Dr	SOUSONI	Despoina	ERCEA
Dr	SUURONEN	Petri	Natural Resources Institute Finland (Luke)
Mrs	SYMONS	Despina	EBCD
Dr	TELES	Iago	AlgaePARC/Wageningen University
Ms	TRANBERG	Anna	European Regions Research and Innovation Network
Mr	TRÓND	Gilli	University of Southern Denmark
Mr	VALENTINI	Stefano	ART-ER
Dr	VAN DEN BROEK	Lambertus	Wageningen Food & Biobased Research
M	VAN DER VEEN	Geert	Technopolis Group
Mr	VAN EXEL	Haik	Hortimare
Mr	VAN LEEUWEN	John	Seaweed Harvest
Mrs	VAN WEERT	Yara	Ministry of Agriculture, Nature and Food Quality
Mr	VARGA	Henry	iCircle Consulting
Ms	VARGA	Viktoria	EUROPEAN COMMISSION
M	VATSOV	Mihail	EUROPEAN COMMISSION
Ms	VECE	Margherita	AQUIMER
Mr	VELLA	Karmeneu	DG Environment, Maritime affairs and fisheries

Mr	VERDELHO	Vitor	EABA
Dr	VIEIRA	Helena	Blue Bioeconomy Forum Steering Group
Dr	VYZIKAS	Thomas	BBI JU
Ms	WALRAVEN	Maye	InnovaFeed
Ms	WEBER	Andrea	European Commission DG MARE
Dr	WHITAKER	Ragnhild	Nofima
Ms	WILLEMS	Amber	European Commission
Mrs	ZURHEIDE	Josefine	Helmholtz Association