



# 2022 Impact Report

OCEANIUM®

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# Introduction

## Welcome to OCEANIUM's first annual impact report!

OCEANIUM is first and foremost an impact-led business. We founded the business to enable the seaweed farming industry in the western hemisphere by applying game-changing technical and scientific know-how to extract maximum value from farmed seaweed. The products we're developing and making have wide-ranging uses for food, nutritional and materials markets. At scale, the ingredients have the potential to contribute to systemic change in these markets and enable the move away from resource intensive products.

We have a steadfast commitment to delivering impact within our own business, the wider value chain and for systemic change in food, materials and production systems.

We're in it for the long haul and know that we will not be able to achieve our targets overnight. Instead, we have a long-term plan that has identified the relevant UN Sustainable Development Goals and a program for managing them as OCEANIUM grows.

We might not always get it right the first time: we still have so much to learn, but we will be unwavering in being guided by science and data.

This is just the beginning, and we look forward to the journey ahead.

Karen Scofield Seal  
Chief Executive Officer and Co-Founder

Dr Charlie Bavington  
Chief Technology Officer and Co-Founder

# 2022 OCEANIUM Impact Snapshot

**45%**  
Of the  
OCEANIUM  
team are women

**60%**  
OCEANIUM's  
seaweed  
suppliers were  
women-led or  
women on  
leadership team

**8**  
New jobs  
created across  
R&D,  
engineering and  
corporate  
functions

**1<sup>st</sup>**  
OCEANIUM  
product sale of  
fiber for food

Renewable  
energy used in  
OCEANIUM HQ

**4**  
Grant-funded  
R&D projects as  
either sole  
grantee or  
consortium  
partner



# Our Product and Process Approach

We know that sustainable products mean nothing without sustainable production methods. Our product mix is a very intentional result of our unique cascade biorefinery process, based on green chemistry principles. We want to maximize the value of the seaweed by extracting as much as possible, leaving as little waste behind as we can. We are identifying methods to valorize 100% of the seaweed input and will integrate valorization processes into our facilities as we progress.

In 2022, we used a rented pilot facility with no water recycling capabilities meaning that we have not been able to recover the water in processing this year. However, our own facilities will be designed to recycle the water throughout the biorefinery process. Our intention is to have little to no freshwater inputs aside from an initial quantity at inception of the plant. We will also implement a waste-water management strategy.



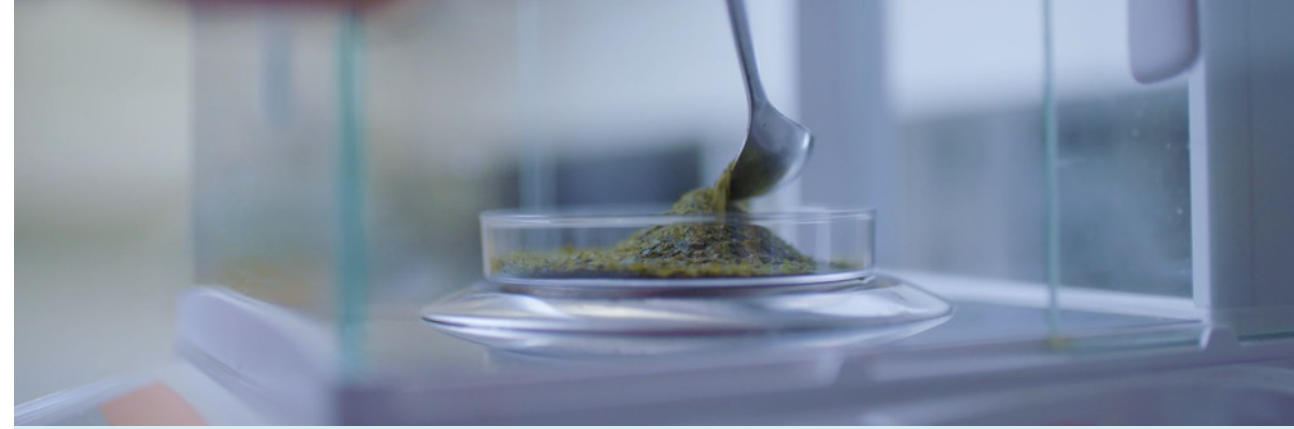
# Our products and business model address key problems

## Food security

Our current land-based food system has high inefficiencies and susceptibility to extreme weather caused by anthropogenic climate change, drought conditions and soil erosion.<sup>1</sup> As one example, it is estimated that 30% and 50% of maize and bean growing areas in Africa respectively will go out of production on current emissions trajectory.<sup>2</sup> By making the market for the seaweed farming industry, we enable seaweed farmers to get infrastructures into the water so seaweed can be a vital part of future food systems around the world.

<sup>1</sup> IPCC (2022) [Sixth Assessment Report: Food and Water](#)

<sup>2</sup> Global Center for Adaptation



### Benefits of [OCEAN HEALTH® food ingredients](#) and [OCEAN ACTIVES® nutraceuticals](#):

- Raw material is a low input crop compared to many land-based crops
- Alternative protein source<sup>3</sup>
- One-for-one methylcellulose replacement
- Nutritional benefits – a source of dietary fiber, vitamins and minerals, fatty acids
- Potential future pharmaceutical benefits to be explored including upcoming Wageningen University research as part of the [PRECODE project](#) on gut-brain health, studying whether prebiotics as well as our OCEAN ACTIVES® Beta-glucan can help mitigate cognitive decline and diseases such as Alzheimer's

<sup>3</sup> O'Connor et al (2020) [Extraction of Protein from Four Different Seaweeds Using Three Different Physical Pre-Treatment Strategies](#)





## Resource use

There are numerous and well cited problems with current global resource utilization. The extraction and processing of natural resources accounts for more than 90% of biodiversity loss and water stress.<sup>4</sup> Based on the current trajectory, by 2050, plastic will take up 10-13% of the world's total carbon budget.<sup>5</sup> The development of OCEANIUM's materials is progressing apace and our work currently indicates potential environmental benefits including:

- Replacing and displacing fossil fuel-derived materials
- Potential industrial and home compostability offering viable alternatives to single-use plastics with bio-based water-soluble formulations
- Accelerated industrial compostability of other bio-based polymers in bio-based composites
- Non-toxic ink and coating alternatives
- Ability to offer material substrate separation which would enable better textile recycling and support more circular materials

On carbon sequestration of seaweed, the scientific research is ongoing and is at an early stage. OCEANIUM's focus on CO<sub>2</sub> will be the replacement and displacement of emissions and other resources through the application of our products and our desire to deliver a carbon neutral biorefinery process.<sup>6</sup> Additionally, we align with the common position that environmental impact should not focus on CO<sub>2</sub> alone.

<sup>4</sup> Ellen MacArthur Foundation (2021), [The Nature Imperative: How the circular economy tackles biodiversity loss](#)

<sup>5</sup> Ellen MacArthur Foundation, [A UN Treaty on Plastic Pollution](#)

<sup>6</sup> Hasselström and Thomas (2022), [A critical review of the life cycle climate impact in seaweed value chains to support carbon accounting and blue carbon financing](#)



# Our Seaweed Supply

One of our key missions is to support the growth of the sustainably farmed seaweed industry in the western hemisphere. We currently use farmed seaweed and are exploring the use of seaweed that has occurred naturally as an invasive species or an algal bloom. With our initial focus on brown seaweeds, the main species we use is *Saccharina latissima* (sugar kelp), found in cold Atlantic waters and we have also tested *Alaria esculente* (winged kelp).

In 2022, we further diversified our seaweed species research and have begun testing a green species, *Ulva sp.* (sea lettuce) as part of our InnovateUK Smart 3 grant on protein extraction.

In 2022, we purchased seaweed from five suppliers in the Faroe Islands, Norway, Scotland, France and Portugal. In previous years we have also sourced from Ireland.





# What does enabling a sustainable seaweed industry mean for us?

## Values-led value chain

At our central point in the value chain – between B2B customers and farmers – we want to work together with both our upstream and downstream partners to develop an inspirational value chain that serves as a world-class industry example. These are some of the steps we are starting to introduce and will develop even more:

- Traceability and provenance of our products – batch tracing
- Sustainable and responsible commitments signed by farmers
- Annual audits, including on environmental, social and economic factors; food safety and health and safety
- Values-alignment as a pillar of our partnership decision-making matrix. We will work with partners and potential customers who are equally committed to people health and planet health
- Only working with licensed farmers



## Funding and partnerships

Long term agreements and deposits offered for smaller farmers to help offer more certainty and support capital intensive outlays for equipment and farming infrastructure. In the future, we aim to establish biorefineries that have shared ownership structures so coastal communities directly benefit from the whole value chain.

## Species and diversification

While our biorefinery has been designed for extracting maximum value from brown seaweed species (predominantly sugar kelp), we have begun testing other species. This is to ensure long-term, stable supply, avoid over-reliance on one species and enable us to be nimble in working with partners and farmers around the world where greens and reds are more common.



## Wild harvest and farming methods in the seaweed industry

It is important to distinguish different wild harvest methods, particularly between regulated hand harvesting activities which, according to their licenses, must be conducted sustainably and at intervals which allows the seaweed to grow back, versus certain highly extractive and mechanical methods which churn the seabed to extract the whole plant leaving little opportunity for regeneration. We also believe in the preservation of systems like kelp forests and refer to the important points in this article, ['Threats and knowledge gaps for ecosystem services provided by kelp forests: a Northeast Atlantic perspective'](#) for guidance.

Traditional hand harvesting has been established in a number of countries for many years and provides jobs in coastal communities. These are very often regulated activities and some farmers are engaged in both regulated hand harvesting and cultivation. We recognise and respect the importance of hand harvesting in the seaweed industry and that many in this part of the industry do so within their licenses and regulations and avoid over-harvesting.

OCEANIUM focuses on cultivated, farmed seaweed to support the growth of the nascent seaweed farming industry in the western hemisphere, based on evidence that seaweed farming can support diversification in aquaculture, meet demand and has the potential to offer environmental, social and economic benefits when scaled responsibly. Our research is also looking at opportunities to use invasive algal blooms.

OCEANIUM is absolutely committed to responsible development and scaling and will continue to be guided by the growing body of scientific research on how we source seaweed.



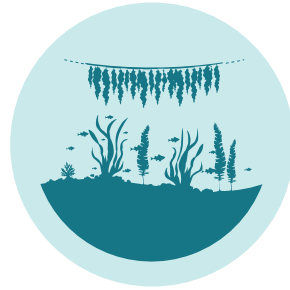
## Why seaweed? Environmental, economic and social benefits



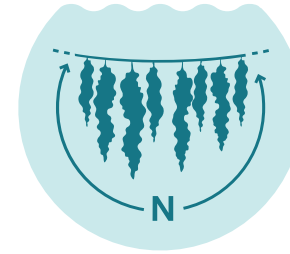
Contributes to  
food security



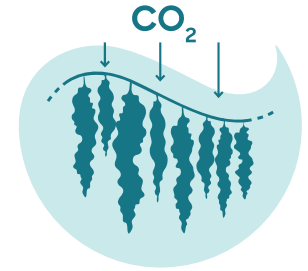
Replaces resource  
intensive products



Protects seabed and  
biodiversity



Absorbs nitrogen  
and phosphorus



Absorbs CO<sub>2</sub>



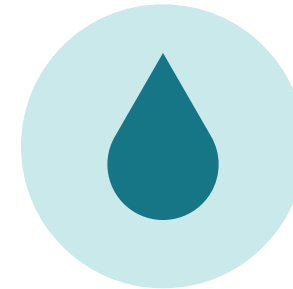
Creates jobs



No deforestation



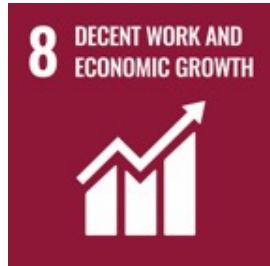
No fertilizer



No freshwater to  
grow

# Measuring and Reporting Impact

The United Nations Sustainable Development Goals (SDGs) are our bellwethers for impact. Given our early stage of development in pilot phase, we are not yet in a position to provide detailed quantitative analysis across all the targets we have identified as relevant.



Our impact measurement methodology has been inspired by three key standards:

## The GRI's Sector Standards on Agriculture, Aquaculture and Fisheries

These will remain a target for OCEANIUM as we develop; given their extensiveness and detail, OCEANIUM is not at the stage to address them in their entirety. They remain aspirational and provide a structure for us to work towards.

## The Ocean Impact Navigator

This was launched by the coalition of 1000 Ocean Startups lead by Systemiq and others during the UN Ocean Conference in June 2022. It is intended as a clear methodology for investors investing in ocean-based startup solutions. With 6 key impact areas, and 30 clear KPIs that distinguish between qualitative and quantitative – this is a useful tool for a company of our size to reference against. We have started collecting data on some of these and they have been referenced in the 2022 reporting table below.

## IRIS+

This methodology continues to provide inspiration for our theory of change.

Our measurement and reporting could change in the future to reflect updates to emergent industry standards and frameworks.



# Our reporting agenda over the years – a staggered approach

We know we are not yet in a position to measure everything all at once. That's why we plan to introduce additional targets as we scale and are able to provide meaningful reporting in line with our expansion.

SDGs are made up of specific targets as outlined by the UN. Not all targets in the goals are relevant to OCEANIUM. 2022 targets include a mix of SDGs 2, 5, 8, 9 and 14. The relevant targets may also change as our business develops. Below is a summary of the targets we measure and plan to introduce over the years.

	2022	2024	2027
Number of targets measured (28 total)	13	13 + 6 NEW	19 + 9 NEW
SDG targets	See tables below	2.4 2.5 9.3 12.1 12.2 12.4	5a 8.1 9.1 9.2 12.5 12.6 14.1 14.4 14.7



## 2022 targets, activities and outputs – SDG 2: Zero Hunger

SDG targets	OCEANIUM's vision for 2030	2022 activities	Outputs (metrics used where possible based on Ocean Impact Navigator)
2.1 By 2030, end hunger and ensure access by all people, in particular the poor and people in vulnerable situations, including infants, to safe, nutritious and sufficient food all year round.	Aid sustainable and affordable food production	- Fiber in production; samples provided to customers	- First product sale
2.3 By 2030, double the agricultural productivity and incomes of small-scale food producers, in particular women, indigenous peoples, family farmers, pastoralists and fishers, including through secure and equal access to land, other productive resources and inputs, knowledge, financial services, markets and opportunities for value addition and non-farm employment.	Support small scale farmers	- Seaweed sourced from 5 suppliers in 2022 - Deposits and long-term contracts offered	- Number of smallholder farmers purchased from: 5 (3 female-led)

# 2022 targets, activities and outputs – SDG 5: Gender Equality

SDG targets	OCEANIUM’s vision for 2030	2022 activities	Outputs (metrics used where possible based on Ocean Impact Navigator)
5.1 End all forms of discrimination against all women and girls everywhere	Equal pay, non-discriminatory, fair paying jobs for the industry	- Gender pay gap review conducted	- Share of employees that are women: 45%
5.5 Ensure women’s full and effective participation and equal opportunities for leadership at all levels of decision-making in political, economic and public life	Equal pay, non-discriminatory, fair paying jobs for the industry	<ul style="list-style-type: none"> <li>- Encourage team member representation in decision making bodies; career growth opportunities to support women in team to take on leadership roles</li> <li>- Sourcing from female-led farmers</li> </ul>	<ul style="list-style-type: none"> <li>- Share of employees that are women: 45%</li> <li>- (Additional metrics include 30% female investors or female-led institutional investors)</li> </ul>

## 2022 targets, activities and outputs – SDG 8: Decent Work and Economic Growth

SDG targets	OCEANIUM's vision for 2030	2022 activities	Outputs (metrics used where possible based on Ocean Impact Navigator)
<b>8.4</b> Improve progressively, through 2030, global resource efficiency in consumption and production and endeavour to decouple economic growth from environmental degradation, in accordance with the 10-year framework of programmes on sustainable consumption and production, with developed countries taking the lead	Ensure all our production is sustainable and carbon neutral	<ul style="list-style-type: none"> <li>- Recycling policy in all offices</li> <li>- Green energy in HQ</li> <li>- Water recycling procedures researched and opportunities identified</li> </ul>	<ul style="list-style-type: none"> <li>- Data currently unavailable due to no sales of materials; data for nutrient pollution mitigation currently unavailable</li> </ul>
<b>8.5</b> By 2030, achieve full and productive employment and decent work for all women and men, including for young people and persons with disabilities, and equal pay for work of equal value	Equal pay, non-discriminatory, fair paying jobs for the industry	<ul style="list-style-type: none"> <li>- Diverse and inclusive hiring practices followed</li> <li>- Living wage paid</li> <li>- Employee feedback survey started</li> <li>- Training budget</li> </ul>	<ul style="list-style-type: none"> <li>- Number of jobs created: 8 permanent/contracted</li> </ul>
<b>8.6</b> By 2020, substantially reduce the proportion of youth not in employment, education or training	Equal pay, non-discriminatory, fair paying jobs for the industry	<ul style="list-style-type: none"> <li>- Students hired for RH4/RH5; collaborations with universities</li> </ul>	<ul style="list-style-type: none"> <li>- Number of jobs created: 8 permanent/contracted</li> </ul>
<b>8.7</b> Take immediate and effective measures to eradicate forced labour, end modern slavery and human trafficking and secure the prohibition and elimination of the worst forms of child labour, including recruitment and use of child soldiers, and by 2025 end child labour in all its forms	Equal pay, non-discriminatory, fair paying jobs for the industry	<ul style="list-style-type: none"> <li>- Diverse and inclusive hiring practices followed</li> <li>- Included in OCEANIUM hiring practices and in supplier requirements</li> </ul>	<ul style="list-style-type: none"> <li>- (No Ocean Navigator metrics)</li> </ul>
<b>8.8</b> Protect labour rights and promote safe and secure working environments for all workers, including migrant workers, in particular women migrants, and those in precarious employment	Equal pay, non-discriminatory, fair paying jobs for the industry	<ul style="list-style-type: none"> <li>- Included in OCEANIUM hiring practices and in supplier requirements</li> <li>- Ongoing health and safety with no material injuries during processing</li> <li>- Launch of employee assistance programme including access to mental and physical health support</li> </ul>	<ul style="list-style-type: none"> <li>- (No Ocean Navigator metrics)</li> </ul>



## 2022 targets, activities and outputs – SDG 9: Industry, Innovation and Infrastructure

SDG targets	OCEANIUM's vision for 2030	2022 activities	Outputs (metrics used where possible based on Ocean Impact Navigator)
9.4 By 2030, upgrade infrastructure and retrofit industries to make them sustainable, with increased resource-use efficiency and greater adoption of clean and environmentally sound technologies and industrial processes, with all countries taking action in accordance with their respective capabilities	Ensure all our production is sustainable and carbon neutral	<ul style="list-style-type: none"> <li>- Exploring environmentally friendly production methods</li> </ul>	<ul style="list-style-type: none"> <li>- Data currently unavailable due to no sales of materials; data for nutrient pollution mitigation currently unavailable</li> </ul>
9.5 Enhance scientific research, upgrade the technological capabilities of industrial sectors in all countries, in particular developing countries, including, by 2030, encouraging innovation and substantially increasing the number of research and development workers per 1 million people and public and private research and development spending	Science-based innovation and production methods	<ul style="list-style-type: none"> <li>- Ongoing participation in R&amp;D projects and applications for further</li> <li>- Partnerships with universities and PhD student on materials research</li> </ul>	<ul style="list-style-type: none"> <li>- Part of four grant-funded projects including three as sole grantees; additional projects with partners across products to develop applications and formulation development</li> </ul>

# 2022 targets, activities and outputs – SDG 14: Life Below Water

SDG targets	OCEANIUM’s vision for 2030	2022 activities	Outputs (metrics used where possible based on Ocean Impact Navigator)
14.2 By 2020, sustainably manage and protect marine and coastal ecosystems to avoid significant adverse impacts, including by strengthening their resilience, and take action for their restoration in order to achieve healthy and productive oceans	Be leaders in buying farmed seaweed for growth of seaweed farming for communities and marine ecosystems/biodiversity	- Seaweed supplier requirements documentation outlines responsibilities of suppliers	- Data currently unavailable
14.3 Minimize and address the impacts of ocean acidification, including through enhanced scientific cooperation at all levels	Be leaders in buying farmed seaweed for growth of seaweed farming for communities and marine ecosystems/biodiversity	- Scaled up purchase of farmed seaweed	- Data currently unavailable

# Our People

OCEANIUM is developing a world-class team who bring amazing expertise, experience and, most of all, passion to what we do. We want to make sure that OCEANIUM is a fulfilling place to work and so a significant amount of focus in 2022 has been on ensuring OCEANIUM addresses targets on providing quality jobs and employment as a workplace and does so without discrimination.

In 2022 we hired team members for the roles below:

Business Development Director

Senior Process Engineer

Food Scientist

R&D Manager

Corporate Affairs and Marketing Associate

QMS Manager (contract)

Research Associates x 2

We also brought on board 11 temporary team members for summer processing in engineering and R&D functions with many of these roles being taken by university students.





A number of steps we have taken, in addition to statutory practices, include:

- Extensive health and safety implementation in the workplace including risk assessments and employee feedback mechanism
- The launch of an annual employee survey: 2022 results showed that 100% of respondents (17/20) were connected to OCEANIUM's mission
- £750 annual training allowance for each member of staff
- Flexible holiday policy
- Establishment of an employee engagement committee
- Structured annual performance review
- OCEANIUM is a signatory to the [Scottish Business Pledge](#)



- Provision of external coach for employee professional development as well as team coaching and team building program
- Launch of an employee assistance program for mental, physical and emotional wellbeing
- Temporary employment offered to students during holidays – living wage paid
- Partnerships with universities and PhD students to offer placement opportunities



# Our Values

## SUSTAINABILITY



We are an impact business – it's part of everything we do and every decision we make.

But sustainability means building for longevity and the future. We're in it for the long haul and here to make systemic change.

## EXCELLENCE



We always try our best and look for opportunities to continuously improve.

We are proud of our position of leadership in the industry and seek to drive high standards.

## INNOVATION



We work collaboratively and openly in the team and with partners. We encourage and thrive on creativity. We are flexible and ready for anything.

## INTEGRITY



We hold each other accountable and trust one other.

We celebrate everyone's successes.

We report on our work honestly and transparently.

We're science-backed and data-based.

## FAIRNESS



We listen and learn from each other. We appreciate our differences.

We treat people with respect and kindness.

We communicate clearly.

# Areas for Improvement and Looking Ahead

**Develop our data sets for more quantitative reporting.** In 2022 we have not been in a position to capture sufficient data on our processing (emissions, energy use, waste) due to being in rented facilities during our pilot phase, which makes consistent information difficult. We will improve data collection in 2023 onwards as we develop our own facilities.

**Testing of our products.** We want to ensure that our products truly benefit people's health and contribute to improved diets and nutrition. We will expand *in vitro* and *in vivo* testing to support health claims.

**Even more focus on our team.** While we know that we tend to punch above our weight on HR structures given our size, we also know that there is more we can do to improve clarity for our team on career development potential. We also want to provide more opportunities for paid work experience for young people.

**Conducting Life Cycle Assessments (LCA).** We will be completing an LCAs for products in 2023 and will also use the LCAs to identify areas for improvement in our process. We also want to work with partners to develop an industry-wide, open source LCA model.

**Formalizing more sustainable supply chains.** We will expand our work with farmers, suppliers and customers to develop an ambitious and sustainable value chain. We will continue to target partners based on their own commitments to systemic change.

**Greater data collection, synthesis and management of the potential impact of seaweed farms** would support stronger reporting on 14.2 and 14.3. We want to see the industry scale responsibly and will continue to be involved in the dialogue of the localized environmental, social and economic impacts of seaweed at scale.



# Conclusion

2022 has been an incredibly productive year in the face of a challenging macroeconomic background. There is always more to do, and we have identified areas where we can continue to make improvements. We are so proud of our work, the pioneering products we are developing and the dedication of our amazing team to Kelp The World®.

Thank you to all of our supporters who are on this journey with us.



# Kelp The World®



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