Information Classification: CONTROLLED

Cornwall and Isles of Scilly
Marine and Coastal Partnership

Seaweed Aquaculture Workshop Report

April 2024

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Abstract

As a result of recent marine license applications, the Cornwall & Isles of Scilly Marine and Coastal Partnership (MCP) were requested by the Cornwall and Isles of Scilly Local Nature Partnership (CIOSLNP) to create a briefing paper for seaweed aquaculture, detailing the opportunities, concerns and benefits of the industry for Cornwall and identifying next steps for developing an approach in our county. This report summarises the results of a MCP workshop which took place on the 25th March 2024. A series of recommendations are listed at the end of the report and include an urgent need for a Cornwall & Isles of Scilly marine aquaculture strategy and a gold-standard monitoring framework from application to end-of-life for Cornish seaweed aquaculture.

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1. Introduction

In the period between November 2023 and March 2024, a series of seaweed aquaculture licence applications were submitted to the Marine Management Organisation (MMO) in both Gerrans Bay on the south coast of Cornwall close to Falmouth, and Port Quin on the north coast near Padstow Harbour. These licence applications were in addition to a previously approved license for a seaweed farm site in Tregardock (not currently operating), close to the harbour of Port Isaac in North Cornwall.

Although many recognise the opportunities and challenges associated with seaweed aquaculture, the applications were poorly received by local communities due to a significant lack of stakeholder engagement, flagging the importance of community engagement and social support in the successful development and delivery of regional schemes. The applications also raised concerns with regional management bodies as they flagged the work to be done in developing the tools and frameworks to support the development of this sector in Cornwall to ensure it is done in a proactive and positive way which aids Cornwall's environment, economy and communities collectively.

In response to this, the Cornwall & Isles of Scilly Marine and Coastal Partnership (CIOSMCP)* were requested by the Cornwall and Isles of Scilly Local Nature Partnership (CIOSLNP)** to create a briefing paper for seaweed aquaculture, detailing the opportunities, concerns and benefits of the industry for Cornwall and identifying next steps for developing an approach in our county.

A seaweed aquaculture workshop was facilitated by MCP for members and our sub group – the Marine Liaison Group (MLG)*** - on Monday 25th March 2024. 49 members of the existing local marine partnerships attended to learn more about the challenges, risks and opportunities surrounding this emerging industry. The workshop was chaired by Philippa Hoskin, Nature Recovery Manager at Cornwall Council. An output of the workshop is the production of this report, which will both lay out the workshop discussion and create a series of recommendations for our LNP which will support a local strategic steer for current and future potential seaweed farm applicants and the regulator, Marine Management Organisation.

* The Cornwall and Isles of Scilly Marine and Coastal Partnership (MCP) brings together the key stakeholders to enable a collaborative and joined-up approach across the land-sea interface and out to 12 nautical miles and beyond. It works to support the delivery of the strategies and plans that seek to deliver marine nature recovery, resilience and sustainable development whilst working closely with business and local communities. Membership is open to any organisation involved in the conservation of marine and coastal biodiversity, either substantially or wholly in Cornwall.

**Cornwall and Isles of Scilly Local Nature Partnership (CIOSLNP) was established as a result of the Government's Natural Environment White Paper. The Partnership is working to maintain the special and unique environment of Cornwall and the Isles of Scilly, enabling joined-up action for the environment at a local, yet strategic, level. Their key aim is to achieve the most beneficial outcomes for the environment by enabling cross-working between complementary organisations, in a way that is suited to particular local characteristics and circumstances.

*** Marine Liaison Group (MLG) improves information exchange and coordination between organisations involved in marine and coastal conservation projects and programmes in Cornwall, and acts as a forum for general discussion of issues relevant to marine and coastal conservation in Cornwall to formulate action or joint position statements where specific issues are highlighted. The MLG is a subgroup of the MCP.

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+ Additional Comments – the additional comments in this report, highlighted in yellow, were provided via email by MCP members separate to the workshop and incorporated where feasible and appropriate.

2. Presentations

The workshop started with a series of three presentations delivered by;

- Peter Lawrence, Infrastructure, Coastal & Minerals Director, Marine, for the Crown Estate.
- Rob Passmore, CEO & Co-Founder Additive Earth.
- Wave Crookes and Laura Robinson, Directors of SeaGrown.

A summary of their talks is provided below. Presentation slides can be found in Appendix A

Peter Lawrence, Crown Estate

The Crown Estate are currently reviewing how they can unlock the potential of the seabed to support the nations transition to a resilient, sustainable and decarbonised future. This includes our coastline and coastal communities. PL presented on the CE intent with the seaweed aquaculture sector and their 5/10 year plan, moving towards the consideration of the inshore coastal environment and what market segments they should be supporting plus what the economic potential can be. CE has had a role in the aquaculture space through the licencing process, and are working with academic bodies, government, and consultants to understand that role further, such as Aquaculture Enterprise Zones. Research led by the University of Plymouth to map aquaculture potential in UK will be published April 2024, looking at spatial evidence to consider location suitability and informing how we position aquaculture within the Crown's licencing area.

Rob Passmore, Additive Earth

Introduction to Additive Earth – their aims and ambition to accelerate how society addresses the climate and ecological emergency. Additive Earth have created a portfolio of thematic areas to accelerate change, including the exploration of an Aquaculture Enterprise Zone (AEZ) model for England and Wales. RP highlighted the many ecological services and economic benefits of seaweed aquaculture and flagged the potential for the UK to capture 14% of this new EU market, which could result in a billion-dollar economy for the UK. However, there are challenges, with licencing, lack of offtake agreements, complex social licencing, and lack of UK based supply chain. AEZ are a placed based model across England and Wales to look at sustainable aquaculture, identifying 10 zones by 2030, and 20 by 2050. Additive Earth are also looking at seaweed biorefinery to ensure the full utilisation of seaweed biomass.

Wave Crookes & Laura Robinson, Seagrown

Seagrown are a Scarborough based company, delivering ocean health through their experience and science around seaweed aquaculture. They are a fully integrated company, with partners including Durham, Lincolnshire and Yorkshire Wildlife Trust and with support from Defra. Together they are looking at coastal resilience, biodiversity and social license. To support social licence, the partnership has created a visitor centre and facilitate weekly talks, video streaming, and events resulting in thousands of people learning about the benefits of seaweed farms. WC then went on to highlight the challenges of longline seaweed farming which is often expensive

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and labour intensive, with the potential for entanglement amongst some of the issues. Seagrown has created a system, Kelpedo, a new approach to farmed seaweed, which does not include longlines but a modular system with a small and flexible footprint and which can co-locate with other industries. More information can be found here SeaGrown - Wild Ocean Seaweed Farming.

2.1. Presentation Q & A Summary

- **What is the relation between Crown Estate aquaculture potential site mapping and MMO potential area data layers?** This refers to the Explore Marine Plan linking to the Strategic Areas of Sustainable Aquaculture in the South West Marine Plan Technical Annex. See The South West Marine Plans Documents - GOV.UK (www.gov.uk) . Data from this review fed into the areas identified: Identification of areas of aquaculture potential in English waters (MMO1184) - GOV.UK (www.gov.uk) . The relationship of this with the Crown Estate work to be confirmed by PL.
- **What is the infrastructure to support future seaweed farming on shore? What is the onshore processing this market might require, and what ports might support it, if and when it develops?** This is part of what Additive Earth is looking at. Components includes port infrastructure being able to bridge the significant amount of wet biomass – you have to stabilise seaweed quickly (drying or freezing etc.) before transferring for bio-refining. Looking at possibility of bio-refinery being within the southwest and stabilization process being done shore-side at dock/port.
  One other barrier is boat coding – Additive Earth keen for existing fishers to view seaweed as a secondary revenue stream as it is intermittent how often you would need big boat support. But commercial boat coding prevents this at the moment. Work is needed to lower these barriers.
- **Kelpedo designs seems positive, but what are the differences in biomass produced?** It is hard to draw a comparison but thought to be comparable or slightly below a similar length of longline at present.
- **Has an assessment been done to compare total carbon storage opportunity of growing kelp and harvesting, vs in investing in restoration activities?** No clear answer provided.
- **Profit feasibility is in question – this is an emerging industry doing well abroad and in Scotland, but in English waters it is unproven. Has that profit feasibility been done in England to reassure us that it is an industry to commit to?** PL highlighted that WWF are investigating this. From website '*WWF's global landscape scan of the seaweed sector identified three key strategies to increase production in these new geographies: (1) facilitating access to capital, (2) strengthening public acceptance for ocean farming, and (3) building new products/markets for farmed biomass. Our aquaculture impact investment strategy directly leverages the content knowledge and market insights needed to invest in businesses working on the leading edge of sustainable ocean farming.* '
- **What baseline surveys were done by The Crown Estate, Additive Earth and Seagrown to assess any marine ecosystem impacts by seaweed farms positive or negative.** Seagrown responded that the area they use was surveyed prior to the seaweed farm and low in biodiversity. Since

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establishment there has been weekly monitoring looking at water quality, re-colonisation rates of seaweed, eDNA, bird and marine mammal observations. There have been positive results across the board with an increase in biodiversity.
    - Additional comments+: Is this biodiversity increase sustained throughout the lifecycle of the farm? Or does it peak and reduce with the seasonality that I understand from reading the MMO application for the Gerrans Bay seaweed farm would occur when the kelp is harvested and then lines reseeded. Also, what happens when the farm is decommissioned?
        - It appears that more research is required to properly assess and quantify the potential biodiversity benefits or impacts. See the following paper for additional information: Farms and forests: evaluating the biodiversity benefits of kelp aquaculture
- **Have any Aquaculture Enterprise Zones been identified or committed to?** The strategy is at the concept stage, but there is strong interest from multiple LEPs and LPAs around the UK for piloting the model.
- **Have Seagrown encountered any negativity from communities to their activities? Is Kelpedo better accepted locally, or is it more about early engagement and 'education'?** The seaweed farm is well received and supported. Some negative social media commentary has been experienced, but general the outreach activities have helped.
- **How progressed are proposals for co-location of aquaculture with offshore wind farms?**
  Seagrown flagged there has been lots of interest and active work towards this - they hope their trials will be imminent.
- **Could you clarify the timeframes for release of the aquaculture suitability mapping layers please? Will they be publicly available? Can they be used now by MMO to inform existing seaweed farm applications to ensure they are in the most appropriate locations?** Crown Estate are hopeful for summer publication. MMO already have suitability layers (as part of work they commissioned to support marine plan development) which should in theory be helping them to determine licence applications at present.

3. Mentimeter Summary of Results

Attendees took part in a Mentimeter survey looking at the opportunities and challenges of seaweed aquaculture in Cornwall, followed by discussion. See below the questions asked and a summary of results. The full Mentimeter results can be found in Appendix B.

Proposal(s) and Barrier(s)

3.1 What do you feel could be the benefits and opportunities of seaweed aquaculture in Cornwall?

- Sustainable alternative to other products such as plastics (eco-products) and sustainable soybean replacement for cattle feed.
- Carbon sequestration.
- Supporting local economy:

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    - Providing jobs and up-skilling opportunities.
    - New innovative business opportunities (long-term, growing industry).
    - Potential for community/co-operative led new businesses.
- Water quality improvements:
    - More research is required.
- Coastal protection – slow erosion, flood protection (area specific).
- Prevent other potentially more destructive activities in area (such as dredging):
    - Removal of damaging fishing practices from some inshore areas to protect sensitive habitats e.g. maerl.
- Potential to support marine life:
    - Providing shelter; eco-blocks for mooring system; fish nurseries
    - Potential to increase biodiversity in certain areas.
- Co-location with other infrastructure e.g. offshore energy.
- Re-invigorate smaller port and harbour activity that has lost much of their traditional fishing fleet:
    - Diversification of fishing industry.
    - Regeneration of local Harbours and Ports.
- Support the move to a low fossil-fuel economy.
- A chance to demonstrate strategic planning with other marine sectors to avoid risk of displacement.
- Sustainable food production.

3.2 What could be the issues and challenges of seaweed aquaculture in Cornwall?

- The current marine planning and licensing process is not suitable:
    - Fishing is not a statutory stakeholder, so is not consulted in the early / strategic stages.
    - Licences are being given for very long-time scales without evidence that there will be no impact.
    - Lack of join up between CE, MMO, NE about balance of environmental, economic and social benefits and impacts both nationally and locally.
- Lack of scientific baselines and data:
    - No proper assessment of ecosystems impacts.
    - No real data on negative or positive impacts.
    - Long-term impacts on wildlife and environment are unknown.
    - Is Cornwall suitable for seaweed aquaculture?
- Lack of necessary infrastructure:
    - Shoreside.
    - Is equipment made to handle big storm events?
- Economic costs could outweigh the benefits.
- Potential to have a negative impact on existing industries and users:

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    - Inshore fishing sector.
    - Tourism and recreation.
    - Impact on surfing.
    - Restricting use of shared space i.e. sailing, fishing, rowing, etc.
- Visual impact of infrastructure on seascape and character:
    - Strong community voice and passion to keep our coasts pristine.
    - Perceived industrialisation of coastlines.
    - Light pollution.
- Impact on wildlife, habitats and coastal processes:
    - Gear damage and end of life could cause pollution issues.
    - Risk of wildlife entanglement.
    - Sensitive habitats.
    - Disturbance – lots more small vessel movement.
    - Nearshore installations could have negative impacts on coastal processes.
    - What are the impacts from loss of kelp during storm events. (40%?) loss was stated recently. Will this impact strandline ecology?
    - Light pollution.
    - Shading of natural seaweed habitat could affect natural growth on seafloor.
    - Anchoring systems used can impact seabed.
    - Disturbing feeding behaviour/habits for cetaceans in the area.
- Already congested coastal waters & competing spatial demands.
- Exposed weather conditions in Southwest approaches likely to make seaweed aquaculture a challenge.
- Who gets the contracts and what procurement process selects them?
    - Potential interest from dubious companies looking for a quick carbon offset opportunity.
    - The licenses could be sold to multinationals and all the money will go overseas.
    - Companies from elsewhere in the UK or further afield benefitting from Cornwall's coastal waters, rather than local companies to support local businesses.
    - Ensuring that the local economy will benefit needs to be built into the licensing process

Next Step(s)

3.3 What approaches or processes should be in place or considered when developing seaweed aquaculture in Cornwall?

- **Licensing processes:**
    - Strict conditions placed on any licences around how they can be transferred.

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  - All stakeholders including communities, harbours, statutory and non-statutory consultees must be made fully aware of potential licensees before a full license can be considered.
  - MMO need to do a first sense sift before applications go out to ensure they are up to standard, in correct potential sites and all engagement criteria are properly met.
  - Pre-agreed screening process for applications to ensure all necessary reports are in the public domain from the outset.
  - +This needs to include a long-term management plan as mandatory within applications which includes detail such as wreck/infrastructure removal, disaster recovery, cleanup, insurance etc.
- **Engagement processes:**
  - Holistic engagement with communities is vital before decisions are made.
  - MCP can help disseminate information to wider stakeholders.
  - There needs to be a single body as the go-to place to find ALL information on marine planning projects that are mapped - not this scattergun approach to different projects answering to different bodies.
- **Marine planning processes:**
  - The MMO planning portal should be much more accessible and attempt to engage the communities at the start.
  - Need a locally developed marine plan.
  - Cornwall should be a leader in developing new marine planning processes and create a new process for dealing with new industries that will have an impact on important existing industries.
- **Research and Development needs:**
  - Conduct necessary research to evidence which areas, if any, in Cornwall are suitable for seaweed farming.
  - Establish Environmental and Social Economic Impact Assessment requirements before considering applications in the same way as is required for management of fisheries.
  - Full ecological surveying prior to installation, and if successful, ongoing monitoring.
  - Assess the full life cycle analysis of seaweed aquaculture in terms of economics, environmental and social benefits Vs impacts.
  - + Inclusion of a guarantee that funds are available for baseline and ongoing surveying and that this needs to be completed to some acceptable standard. Potentially a license requirement.
- **Additional points:**
  - Use available evidence and data to inform potential locations (and aid responses). Cornwall Coastal Hub will be a valuable resource.
  - Community-led seaweed farms.
  - Contribution to Cornwall LNRS and Net Zero targets.
  - Cornwall Council should address in strategic environmental targets.
  - Joined-up approach is needed, between all involved regulators.

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- All seaweed farms to automatically trigger the Coastal Concordat which requires all bodies to work together.
- A small-scale pilot to show best practice, measure impacts and test AEZ principles. Can we be one of the 10 suggested sites and pilot these?

4. Recommendations

- There is an urgent need for a Cornwall & Isles of Scilly marine aquaculture strategy, potentially led by the MMO, using up to date evidence and data e.g. Crown Estate and University of Exeter mapping.
- A gold-standard marine aquaculture development framework needs creating to guide licence applicants, which considers environmental, social, and economic assessments and plans from application to end of life.
- Building social licence is vital and recent applications have highlighted the need to engage communities to overcome the communication challenges. A communication and engagement strategy should be developed and implemented by applicants at the earliest feasible opportunity.
- Collation of a knowledge hub for seaweed aquaculture, to enable the sharing of current research and mapping reports. For example, clear guidance on different seaweed farming systems and options, from long lines to installations such as Kelpedo.
- There is a clear need to start sharing balanced and evidence-based information on seaweed aquaculture to the public, such as via magazine articles and public webinars.
- It is important for the MMO to review marine planning and licences procedures within Cornwall and the Isles of Scilly ensuring transparency and effective engagement.
- The Cornwall and the Isles of Scilly Marine and Coastal Partnership can act as a central party to disseminate marine licensing consultations – via newsletter, e-alerts, and quarterly meetings.
- There is a need to review the economic benefits and challenges that would support the development of a sustainable Cornish aquaculture strategy such as onshore infrastructure and seaweed markets.
- A follow-up workshop for MCP and MLG members to consider these recommendations and create an action plan.

Cornwall & Isles of Scilly

Marine & Coastal Partnership

APPENDIX A

Seaweed Aquaculture Workshop

Presentation Slides

Seaweed Aquaculture

The Crown Estate

March 2024

THE CROWN ESTATE

THE CROWN ESTATE

Dating back more than 260 years, The Crown Estate is a unique business with a diverse portfolio that stretches across England, Wales and Northern Ireland

Established by The Crown Estate Act of 1961

As an independent commercial business with accountability to Parliament.

Return our net revenue profit to the Treasury

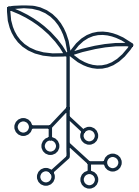
For the benefit of the nation's finances, with £3.2bn generated in the last 10 years.

Active owners and managers of land and seabed

We are one of the UK's largest landowners, with some of the nation's most remarkable places and spaces. We seek to leverage our scale and convening power to make a meaningful difference.

Guided by a compelling purpose

To create lasting and shared prosperity for the nation



Delivering an ambitious strategy

Guided by our purpose and informed by major trends impacting our business, we seek to create broad financial, environmental and social value for our stakeholders, customers and the nation.

THE CROWN ESTATE

Our role in marine:

Unlock the potential of our seabed, sea and coastline to support the nation's transition to a resilient, sustainable and decarbonised future.

Our holistic management of the seabed means that we can help de-risk and accelerate the ambitions of industry in a way that supports diverse marine environments and other users of the sea.

Our ambition is to become the most attractive and sustainable marine economy in the world, while maintaining the rich biodiversity of our seas.

26 different marine industries enabled

41GW OSW already leased and a pipeline potential of nearly 50GW

c.11 million homes provided with clean electricity from our seabed holdings

How we contribute to our changing coastlines

In managing our diverse coastal portfolio, we're keen to find ways, with our partners, to work more closely with communities to better understand impact across social and environmental dimensions and particularly where there's connectivity between planet and people.

THE CROWN ESTATE

TCE & Seaweed Aquaculture

Supporting the sector though:

- Working with applicants to help them understand TCE leasing process
- Pilot stage seabed access through area/time limited trial licences,
- working with government/statutory bodies to improve statutory consenting and guidance.

Improving spatial data to guide siting of aquaculture activities around coast of England, Wales & NI

Concept studies investigating how to unlock growth e.g. aquaculture enterprise zones

Natural Capital Markets work

TCE in partnership with others

UNIVERSITY OF PLYMOUTH

TCE has commissioned a piece of work to map aquaculture potential in the UK to achieve a more granular outcome in terms of mapping opportunity areas in the marine environment

WWF

HATCH Innovation Services

MACALISTER ELLIOTT & PARTNERS LTD

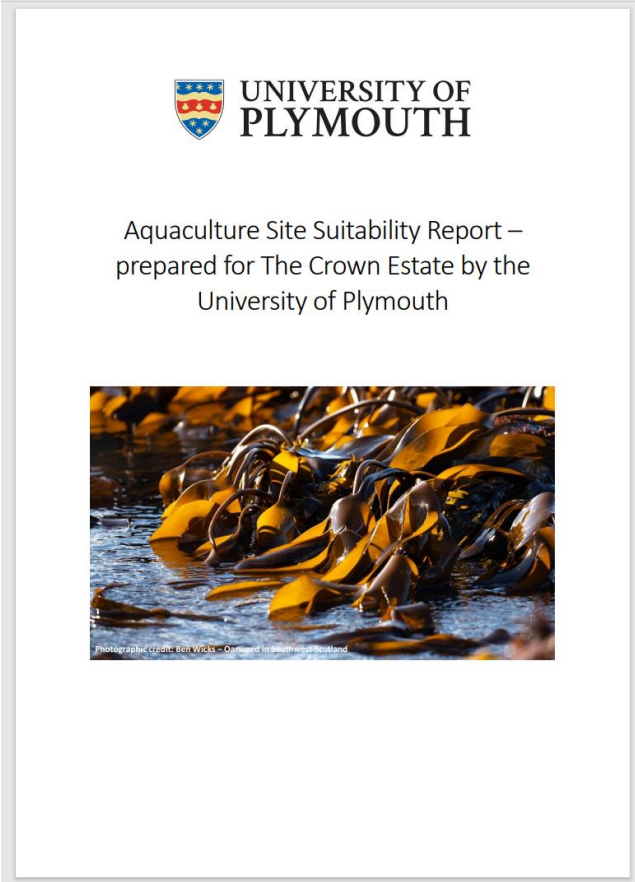
TCE is supporting the work of HATCH Innovation Services and Macalister Elliot & Partners Ltd who are working on a report for WWF drawing out the future value of Seaweed farming in the UK

THE CROWN ESTATE

TCE in partnership with the

UNIVERSITY OF PLYMOUTH

- TCE has commissioned the University of Plymouth to improve the spatial evidence base for where aquaculture production has greatest potential around England, Wales & NI
- The purpose of this project is to identify and map the extent of areas best suited to specific types of aquaculture, adding granularity to the publicly available layers shared by the Marine Management Organisation (MMO) in England and Welsh Government for Welsh waters.
- This project extends the methodology developed for the Dorset and East Devon FLAG aquaculture mapping project and the continuation of this into the North Devon Biosphere area.
- The outputs of this project include:
    - Aquaculture suitability layers for different culture methods, species and multi-trophic combinations.
    - Spatial data, including input, suitability and aquaculture potential layers.
- Largely for internal use within The Crown Estate's spatial mapping tools to inform future planning for the seabed and foreshore



THE CROWN ESTATE

TCE in partnership with

- TCE is supporting the work of WWF in collaboration with HATCH Innovation Services and Macalister Elliot & Partners Ltd
- WWF-UK's long-term vision is to have regenerative seaweed farms and products addressing climate, food, and nature restoration challenges while revitalising coastal communities.
- The purpose of this work is to draw out the future value of Seaweed farming in the UK
- Objectives:
  - Highlighting the environmental and economic advantage of seaweed
  - Supporting seaweed farming expansion
  - Depicting a context-based target for the UK seaweed sector
- There are 6 work packages, due for completion later in 2024.

Innovative, Impact-driven Structure

The Additive Ecosystem

Additive.earth™

Additive.earth™

Asset-locked holding company – founded 2023

Pro-bono support from:

McKinsey & Company

Ambition
Accelerate society's response to the climate and nature emergency

Mechanism
Launch & scale a portfolio of global impact ventures

Approach
Concurrent, partnership delivery model

Impact
Reinvest profits in impact ventures to create a flywheel

Additive. catchments

Additive. aquaculture

Venture 3, 4, n

CMaaS Consortium

AtkinsRéalis · GallifordTry · SIEMENS · isle · University of Plymouth

Delivery partnership

University of Plymouth · University of Exeter · WWF · SIEMENS · HATCH Innovation Services · finisterre · NOTPLA · University of York · BDC Biorenewables Development Centre · The Cornish Seaweed Company

Additive.earth™

Global perspective on the opportunity

Seaweed Aquaculture in 3 numbers

Current seaweed aquaculture value:

$13.3 bn

The global seaweed market tripled between 2000-2018 to $13.3 billion. 99% in Asia

Food and Agriculture Organization of the United Nations

New seaweed applications value:

$11.8 bn

10 new seaweed applications with the potential to grow by an additional $11.8 billion by 2030

THE WORLD BANK

European 2030 seaweed market:

€3bn- €9.3bn

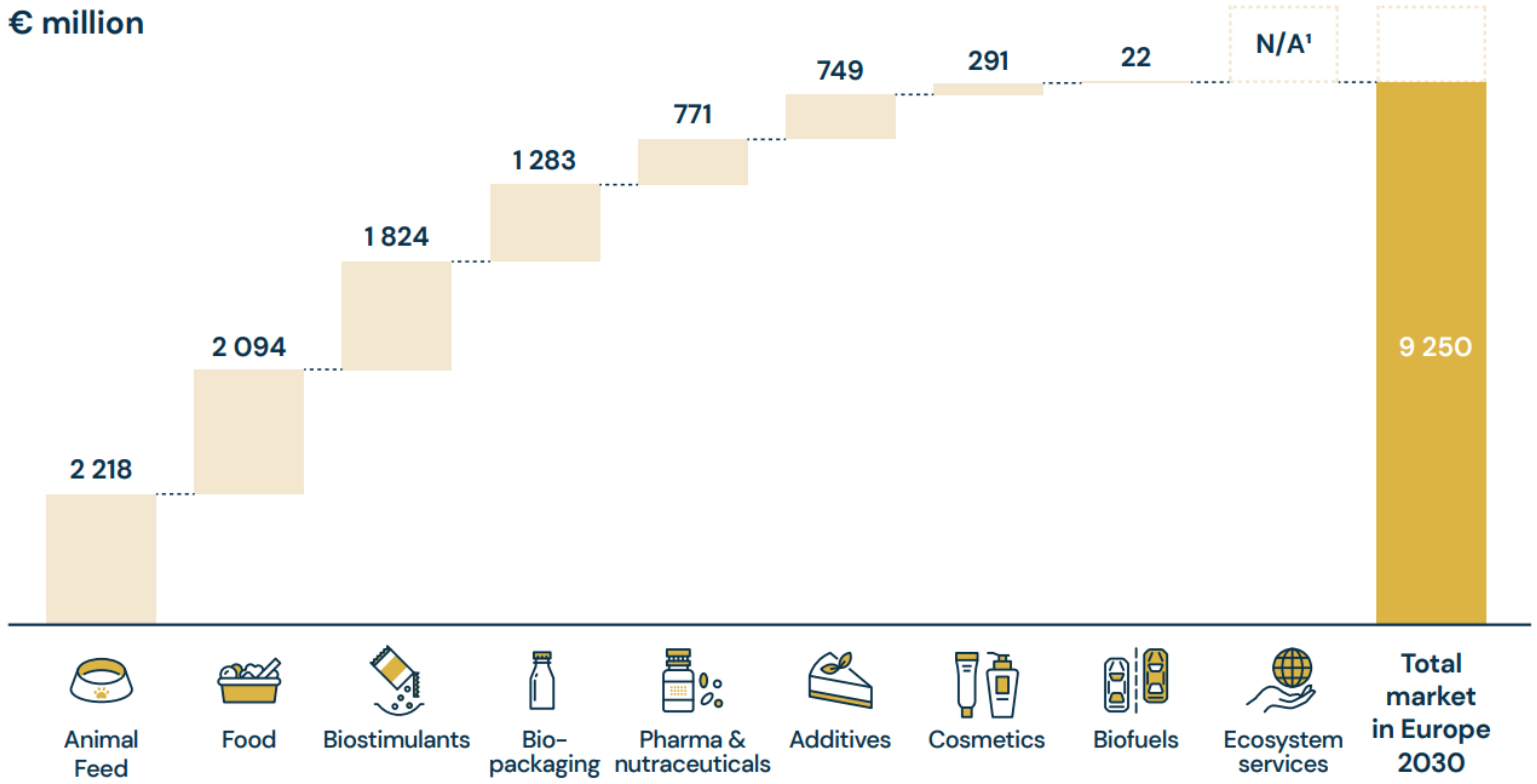
European seaweed market to grow up to €9.3bn by 2030

SEAWEED for EUROPE

SYSTEMIQ

High ambition case scenario (Source: Seaweed for Europe: Investor Memo, 2021)

European Seaweed Products Demand



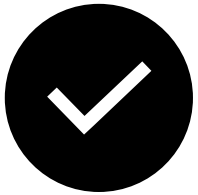
1. As of today, not yet quantified, but important focus for future research.
Note: Values are for high ambition level – see Appendix for low and moderate ambition level outcomes. Total may differ due to rounding.

Significant positive impacts for Europe by 2030

What does this mean for Europe?

ECONOMY
€9.3bn

JOBS
85,000 new FTE jobs



NET ZERO
5.4m tCO2e net

BIOMASS
8.3m tonnes

NUTRIENT CAPTURE
20,000t N & 2,000t P

PRODUCTION AREA
27,300 Ha

Source: Seaweed for Europe: Investor Memo, 2021

c14% of European coastline & fisheries tonnage

What *could* this mean for the UK?

ECONOMY
€1.3bn

JOBS
11,900 new FTE jobs

NET ZERO
756,000 tCO2e net

BIOMASS
1.18m tonnes

NUTRIENT CAPTURE
2,800t N & 280t P

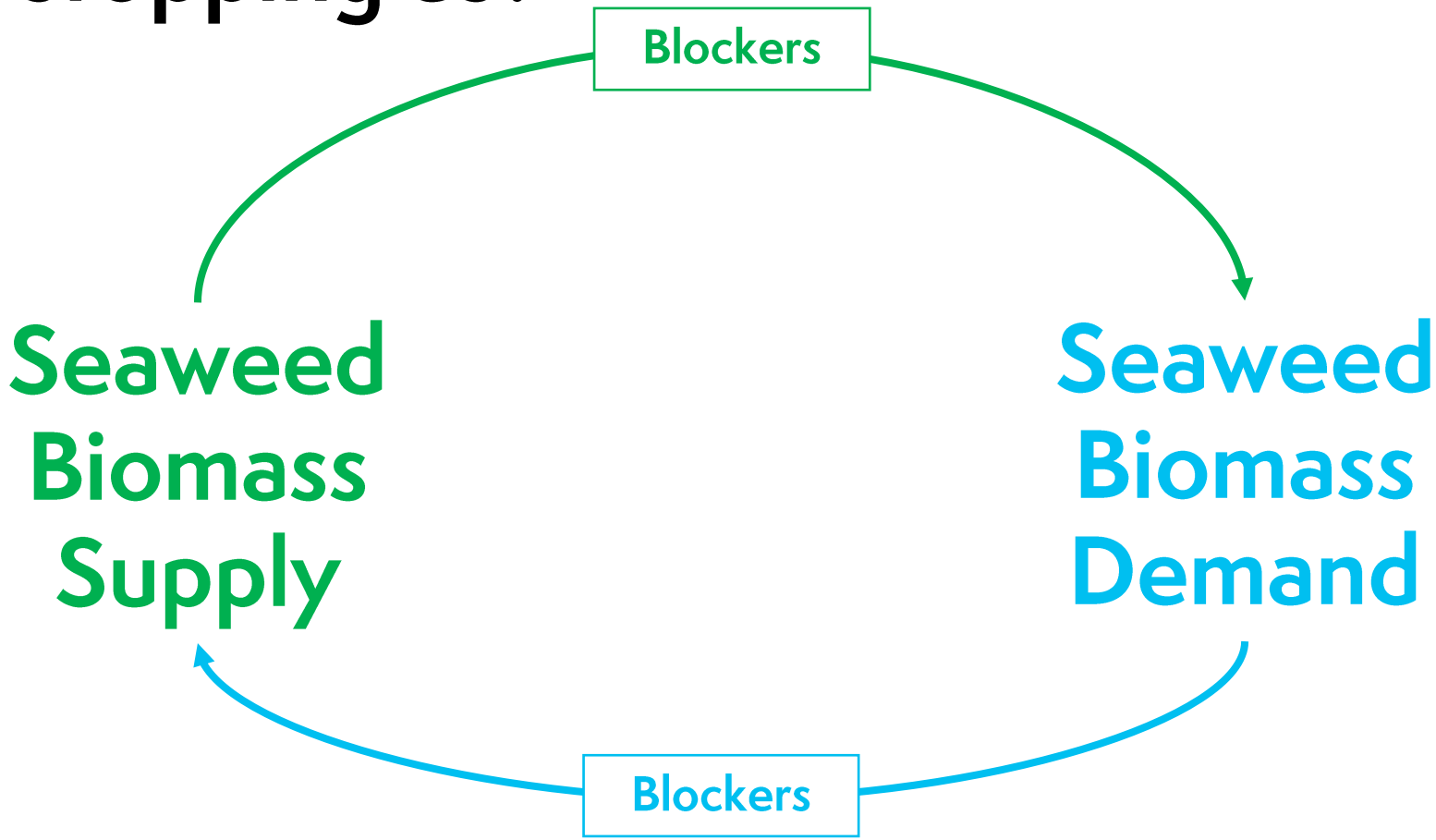
PRODUCTION AREA
3,822 Ha

Levelling Up Agenda ✓ | Environment Act 2021 ✓ | 25 YEP ✓ | Net Zero ✓ | Green Industrial Revolution ✓

Source: Seaweed for Europe: Investor Memo, 2021

From reaching 14% market share European market share? (€1.3bn)

What's stopping us?



Supply target: 1.18m tonnes by 2030

Biomass supply blockers

- Regulatory complexity
- Lack of offtake agreements
- Complex social license
- Limited local supply chain
- Environmental concerns
- Skills Deficit

Additive.earth™

Supply target: 1.18m tonnes by 2030

Additive.earth™

Unblocking supply – a viable option

Aquaculture Enterprise Zones

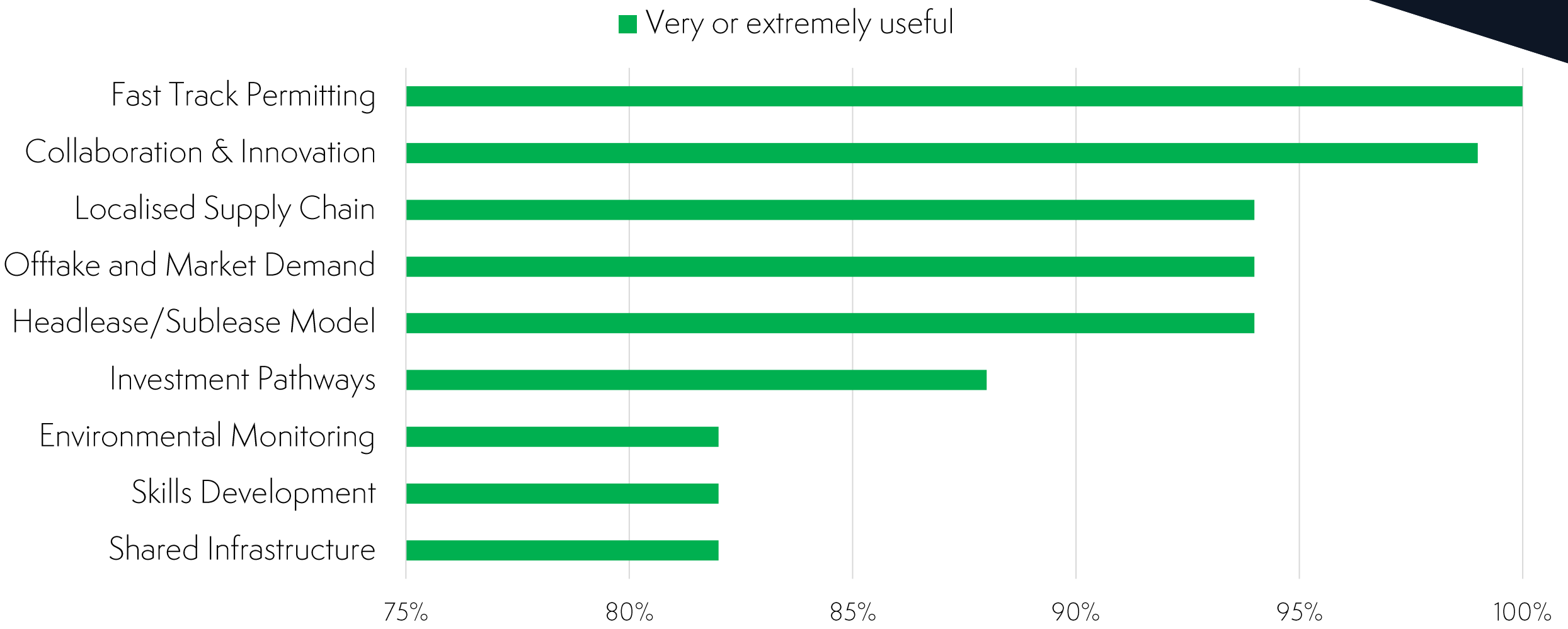
Commissioned by The Crown Estate to explore the viability of a repeatable, place-based Aquaculture Enterprise Zone model around England and Wales's coastlines to promote sustainable aquaculture development.

Aquaculture Enterprise Zones (AEZ) seek to create a supportive and inclusive environment for aquaculture, navigating the barriers to entry and harnessing the underlying market drivers to create long-term prosperity for our coastal communities.

Strategy proposed 10 AEZs around England and Wales by 2030, and 20 by 2050

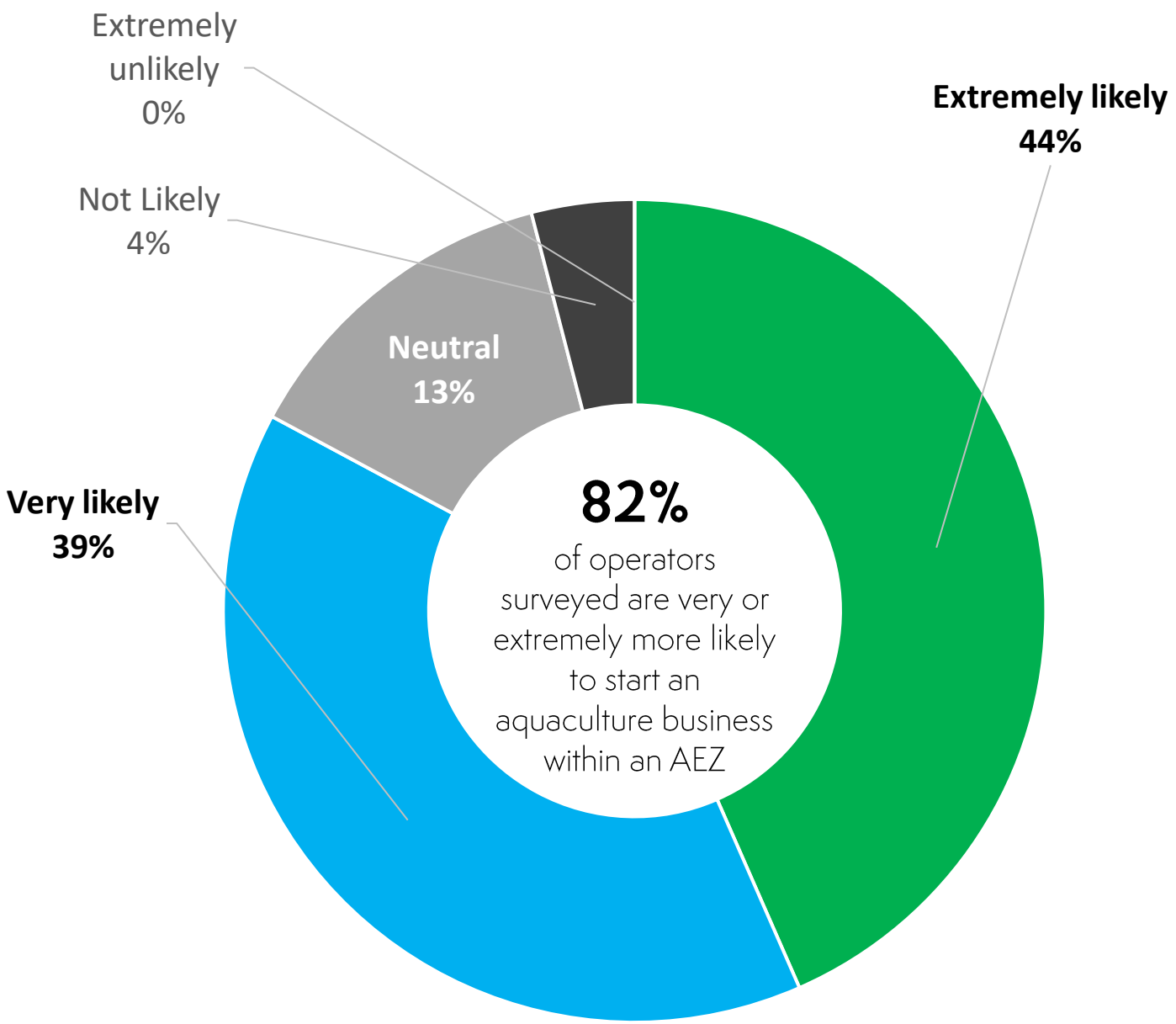
Additive.earth™ | University of Plymouth | CIEL | BDC Biorenewables Development Centre | SIEMENS | Regulators: Marine Management Organisation, Department for Environment Food & Rural Affairs, Natural England, Cefas, Environment Agency

Survey Question: "How valuable do you believe each component of the AEZ model is to your business?"



Source: AEZ Strategic Pathway Report – Survey based on 30 respondents to AEZ research survey

Supply target: 1.18m tonnes by 2030



Survey Question: "How much more likely would you be to start an aquaculture business within an AEZ compared to a location outside an AEZ?

Demand blocker analogy

Additive.earth™

Demand blocker analogy

Additive.earth™

Additive.earth™

Creating the missing link in the UK seaweed value chain

Cascading Seaweed Biorefinery

- Full utilisation of seaweed biomass
- Valorisation of seaweed biomass
- 5-10 year forward contracts for seaweed biomass production
- Playing catch-up with Europe

Thank you

Rob Passmore
CEO & Co-founder

Additive.earth™

Cornwall & Isles of Scilly

Marine & Coastal Partnership

APPENDIX B

Seaweed Aquaculture Workshop

Mentimeter Results

What do you feel could be the benefits and opportunities of seaweed aquaculture in Cornwall?

Carbon capture, supporting eco products and creating jobs in coastal communitees

New jobs, potential carbon capture

Faster Carbon capturing, new innovative business if managed properly.

Alternative to plastic

Increasing carbon capture in cornwall

Potential new business for local, often deprived coastal areas

Money for big business and the treasury

Sequester carbon

What do you feel could be the benefits and opportunities of seaweed aquaculture in Cornwall?

Prevent other potentially more destructive activities in area

Water Quality improvements

Creating job opportunities

Natural carbon capture scheme

Shore protection

Increase in biodiversity

A potential new industry that sequesters carbon and provides a product with multiple uses

Carbon capture

What do you feel could be the benefits and opportunities of seaweed aquaculture in Cornwall?

Help with carbon capture

Replacement for plastic

Creating new industry esp if dovetailing with others eg fishing

Sustainable

Jobs, reduce imports from overseas, benefits to the local economy.

ability to demonstrate coloation of industries with floating offshore wind

long-term growing industry (ideally sustainable)

Generates habitat for marine life

What do you feel could be the benefits and opportunities of seaweed aquaculture in Cornwall?

Carbon capture, new economic activity

Jobs, skills opportunities, local economic value.

In theory could help to slow erosion in problematic areas

Seaweed farming could support fishing communities Products can be sustainable alternatives to other

Useful biomass product as an alternative to plastic

Increased habitat ie fish nurseries

supporting local/job opportunities economy if done in the correct way

Support the move to a low fossil-fuel economy

What do you feel could be the benefits and opportunities of seaweed aquaculture in Cornwall?

carbon capture

Diversification for local fisheries if stocks decline - but better to focus effort on safeguarding stocks than starting new businesses with unproven success

Improve water quality although I am unsure how this ties in with creating some products which are for human consumption

Improve biodiversity in targeted areas

Fisheries - nursery/ shelter for juveniles

Carbon sequestration potential, increased biodiversity, water quality improvements. Potential to offer more sustainable options

a chance to demonstrate strategic planning with other marine sectors to avoid risk of displacement

Sustainable products farmed locally with low footprint (if we can refine locally too!)

What do you feel could be the benefits and opportunities of seaweed aquaculture in Cornwall?

Increasing biodiversity... if that's what's proven; can imagine nursery grounds might be increased

diversification of fishery businesses

re-invigorate smaller port and harbour activity that has lost much of their traditional fishing fleet

Local ownership and acceptance of industry.

supporting local economy

It has the potential to deliver biodiversity gains.

Alternative to plastic

My support some other marine species by providing shelter.

What do you feel could be the benefits and opportunities of seaweed aquaculture in Cornwall?

Potential local jobs and diversification

Regeneration of local Harbours and Ports.

Colocation with renewable energy infrastructure

potential for increased biodiversity

Is there a potential for seaweed farms to protect land from coastal erosion?

Possibly part of a wider approach to securing longer term sustainability of coastal communities

Has the potential to provide valuable habitats for many species including fish.

Nursery/protected area from fisheries - benefit to fisheries long term

What do you feel could be the benefits and opportunities of seaweed aquaculture in Cornwall?

If benefits exceed impacts could increase biodiversity

Removal of damaging fishing practices from some inshore areas to protect sensitive habitats eg mearl.

Potential for community/co-operative led new businesses

Potential opportunity for some businesses to switch to a more sustainable activity

sustainable food production

There are loads of things it could do, But will it? that is the key question. and at what cost in terms of multinationals coming in and taking control, and licensing decisions

sustainable Soy bean replacement for cattle feed

The danger is that, just like with fishing quotas, the licenses will be sold to multinationals and all the money goes overseas. So the devil will be in the detail.

What do you feel could be the benefits and opportunities of seaweed aquaculture in Cornwall?

Potential new circular product development eg Plastic alternatives

Evidence base

Visual impact of infrastructure on seascape and character

resistance to change. competition from other users.

Risk of wildlife entanglement - especially humpback whales which are much more present now than they were a few years a go and use very inshore waters (sometimes less than 50m from shore)

site specific impacts on sensitive habitats

Dubious companies looking for a quick carbon offset opportunity

Resistance to change

What do you feel could be the benefits and opportunities of seaweed aquaculture in Cornwall?

Trying to sort out the genuine applicants from the 'fly by night' get rich quick schemes

could this have the potential to add to marine plastic from the new infrastructure?

Assessment of the impact of Seaweed farms on marine species and other habitats

The economic cost could outweigh the benefits - A new industry bringing £xM to the economy could see an £x+M loss elsewhere such as fishing and tourism

Risk of entanglement especially for humpback whales which are much more present now and use very inshore habitat (<50m from shore sometimes)

Impact on surfing

Impact of stabilisation and refinery infrastructure on landscape character

Applications need to fully recognise the existing natural environment, particularly seabed

What do you feel could be the benefits and opportunities of seaweed aquaculture in Cornwall?

Has already made a negative impression!

Are any of our inshore areas actually suitable for the type of farm proposed given the coastal conditions

Entanglement

lack of available vessels and necessary infrastructure

Blocking light to habitats such as seagrass, maerl & natural kelp

Has the shore infrastructure been considered - what is needed and where should it be?

Competition for space in our nearshore areas and the impacts on other activities

Noise pollution (installation?) & harvesting

What do you feel could be the benefits and opportunities of seaweed aquaculture in Cornwall?

If you don't do this, will the rest of the UK take the steal on taking up the economic opportunity?

Any company that mentions carbon credits should be viewed with suspicion!

Community engagement

More publicity about planned activity

Transparency of environmental surveys/ impacts undertaken

What could be the issues and challenges of seaweed aquaculture in Cornwall?

Impact on wildlife , fishing and visual impact

Impact on wildlife

Just like fishing quotas, the licenses will be sold to multinationals and all the money will go overseas. So the devil will be in the detail.

Lack of science on baselines prior to farming so no proper assessment of ecosystems impacts

Evidence base

competing spatial demands

Competitive industry causing more damage than it solves

Strong community voice and passion to keep our coasts pristine

What could be the issues and challenges of seaweed aquaculture in Cornwall?

Impact on wildlife, also watersports and recreation

No real assessment of any negative impacts which is wholly unrealistic

Issues with colocated industries

Lack of evidence and science generally with statements about lack of negative impacts as a result of lack of scientific rigor.

Restricting responsible recreational use

Seascape issues

The affect on nature, biodiversity, ecosystems and also the inshore fishing sector

Entanglement risk of marine species, lack of data

What could be the issues and challenges of seaweed aquaculture in Cornwall?

Impact on existing industries, e.g.fishing , that already have a unique socio-economic contribution to Cornwall.

wildlife disturbance

Lack of evidence base, lack of baselining

Lack of community voice - another top down initiative starting with money

site specific impact on sensitive habitats

Exposed weather conditions in South west approaches likely to make seaweed aquaculture a challenge?

Perceived industrialisation of coastlines which are currently highly valued for their 'wildness'

impacts on recreational activities, e.g. watersports and the businesses that support these activities

What could be the issues and challenges of seaweed aquaculture in Cornwall?

Risk of entanglement for mulitple marine species

Anchoring systems used can impact seabed, even a small bit of seabed can be significant, and if thos is going to scale will add up.

Regular winter swells between 4 and 8 metres. Data can be verified by CCO. How will the infrastructure deal with this?

Conflict with recreational operators and fishers

Who gets the contracts and what procurement process selects them? Is environmental impact as high in value during procurement as for example base costs (cheap isn't always better)

Damage to seabed by anchors and moorings

Nearshore installations could have negative impacts on coastal processes

Lost of gear in storms

What could be the issues and challenges of seaweed aquaculture in Cornwall?

Lack of infrastructure to support biorefining etc

huge investment needed for processing and supply chain infrastructure

Very busy inshore waters so high level of potential conflict with other sea users

Companies from elsewhere in the UK or further afield benefitting from Cornwall's coastal waters, rather than local companies to support local businesses

Wind and increase in storms damaging the farms

the current marine planning process and that fishing is not a statutory stakeholder, so is not consulted in the early / strategic stages

storm damage to infrastructure creating marine litter

Displacement of feeding areas for marine mammals and seabirds being the most obvious ones

What could be the issues and challenges of seaweed aquaculture in Cornwall?

Seabed smothering

Infrastructure to process the seaweed and the impact on the land of this

Its a lot of kit in a dynamic environment, losses and entanglement are concerns, especially in our stormy seas in Cornwall

Already Congested coastal waters

Responsible management of seabed becomes exposed to the influence of market forces

Disturbing feeding behaviour/habits for cetaceans in the area

Pollution from vessels that size

Co location realistic options

What could be the issues and challenges of seaweed aquaculture in Cornwall?

Long-term impacts on wildlife and environment are unknown?

Shading of natural seaweed habitat could affect natural growth on seafloor

Risk of entanglement, especially humpback whales which are much more present now and often use very inshore habitat (<100m from shore) regularly

Sound in the seascape

Single business ownership and no community benefits

Higher disturbance due to lots of small vessel movements

Water chemistry changes

Navigation issues

What could be the issues and challenges of seaweed aquaculture in Cornwall?

There has been no local benefit from solar farms, so not sure why we will see local benefit from seaweed aquaculture. Somehow this needs to be built into the licensing.

Gear damage resulting in pollution

Resistance to change

Coastal impacts from erosion

seaweeds ability to evidence its social and economic benefits in comparison to the cornish fishing and seafood industry , why replace one for another if benefits do not outweigh

shoreside infrastructure

what are the impacts from loss of kelp during storm events. (40%?) loss was stated recently. will this impact strandline ecology?

Light pollution inshore impacting marine life

What could be the issues and challenges of seaweed aquaculture in Cornwall?

light pollution (dependent on infrastructure)

Impacts on surfers and swells

Disrupting an already thriving marine habitat

Licences are being given for very long time scales without evidence that there will be no impact.

Navigational light pollution

Large blocks of water will effectively be no-go for water recreation .

light pollution and visual impact

Additional boat activity inshore potentially increasing disturbance of marine life

What could be the issues and challenges of seaweed aquaculture in Cornwall?

Visual impact of (cumulatively) tens of thousands of surface markers and restricting shared space

Restricting other industries, fishing and ecotourism

AONB Visual impact

Loss of amenity leisure, waterspouts, events etc

Perception that the sea can be built on without the same planning processes and consents as terrestrial development (i.e.: lack of regulation)

Cant be too negative, need more research and evidence so lets try it at a small scale and see

1 fisherman in Cornwall = 15 jobs on the seafood supply chain, clearly the impacts of displacement of fishing for seaweed could be catastrophic if a site impacts on existing fishing grounds

unkownQ negative and positive impacts on recreational use of the coastal zone. sailing, surfing, scuba, fishing

What could be the issues and challenges of seaweed aquaculture in Cornwall?

Lack of resistance to storms

We need a proper systematic assessment of the potential and impacts of this industry.

Kelp lost in groundswells washing onto tourist beaches that is never popular with tourists!

Strategic approach for seaweed farming should include SEAs to better understand sustainable opportunity going forward.

finding appropriate areas to situate farms in an area with inadequate spatial plans

Lack of evidence of impacts on features of protected sites in Cornwall

MMO marine licenses need to be made locally with proper local consultation. The current consultation process is not fit for purpose as it does not reflect the importance of ensuring that local people.

Lack of join up between CE, MMO, NE about balance of environmental, economic and social benefits and impacts both nationally and locally

What could be the issues and challenges of seaweed aquaculture in Cornwall?

is the whole life cycle of the business included in the carbon cycle calcs? does it include export carbon cost to the rest of the world?

Time needed to gather evidence vs climate crisis & investment opportunities

Changing peoples early formed assumptions is very hard!

Contribution to Cornwall LNRS and Net Zero targets

Conduct necessary research to demonstrate Cornwall is actually suitable for seaweed ?

A management plan for Cornwall to set out best practice. Benefits and negatives. A community benefit similar to wind turbines when profit thresholds reached.

What approaches or processes should be in place or considered when developing seaweed aquaculture in Cornwall?

Pre agreed screening process for applications to ensure all necessary reports are in the public domain from the outset

Community led seaweed farms

Holistic Engagement with community before decisions are made.

Available evidence and data to inform potential locations (and aid resonses) Cornwall Coastal hub will be a valuable resource!

How they will be assessed for permissions - if there are lots of small applications being looked at individually how will the overall cumulative effect be assessed?

We have to have a clear gatekeeper approach with MMO with clear thresholds that have to be met for applications to progress to public

Ensure the application process is fair and equitable to all cross sector

Full ecological surveying prior to installation, and if successful, ongoing monitoring

What approaches or processes should be in place or considered when developing seaweed aquaculture in Cornwall?

Citizen scientists involved in monitoring impacts with feedback loops a licence requirements to update mitigation

joined up approach between all involved regulators

Who is keeping track of the bigger picture of what is going on in our seas?Seaweed farms go through the MMO licence process however Planetary Tech's controversial project in St Ives Bay did not

Contribution to Cornwall LNRS and Net Zero targets

CCC should address in strategic environmental targets

Strict conditions placed any licences around how they can be transferred

MMO need to do a first sense sift before applications go out to ensure they are up to standard and in correct potential sites

The MMO should be taken to task on their lack transparency. Their planning portal should be much more accessible and and attempt to engage the communities at the start

What approaches or processes should be in place or considered when developing seaweed aquaculture in Cornwall?

conduct necessary research to evidence that Cornwall is actually suitable for seaweed farming

Understanding the ecology

All seaweed farms to automatically trigger the Coastal Concordat which requires all bodies to work together.

Assess the full life cycle analysis of seaweed aquaculture in terms of economics, environmental and social benefits Vs impacts

Scientific baselining of our sub low water habitat mapping to scientifically assess impacts

Improved MMO consultation process with informing both Statutory and Non-statutory consultees e.g . Parish & Town Councils and National Landscape Team

A full 360 research and evaluation on downsides, upsides and opportunities re: wildlife impact, carbon, fishing, local communities and recreation/tourism to develop an application scoring system

A unified position we can all stand by

What approaches or processes should be in place or considered when developing seaweed aquaculture in Cornwall?

A community link should be demonstrated before a full licence can be considered

more accessible marine planning portal

A much more balanced understanding of pros and cons in advance of any application

All stakeholders including Harbours and fundus owners have to be made fully aware via some sort of certificate process.

Interesting how it may relate to MCP interaction with near shore development proposals

See how this links to the wider cc strategic direction, alongside balancing the varied needs in communities

MCP can help disseminate info for wider use

There needs to be a best practice for Seaweed farming developed

What approaches or processes should be in place or considered when developing seaweed aquaculture in Cornwall?

Engage with existing industries at a very early and strategic level to review the ability to accommodate any new industries

Identifying key habitats outside of existing MPAs

A consultation process that mirrors the terrestrial consultation process

There needs to be a single body as the go-to place to find ALL information on marine planning projects that are mapped - not this scattergun approach to different projects answering to different bodie

Establish Environmental and Social Economic Impact Assessment requirements before considering applications in the same way as is required for management of fisheries

Collate all current relevant research and best practice from other areas Eg Sussex

We need to produce a clear statement on where responsibilities lie for regulation

Work also with strategic partners ie harbours, docks, fishing, vcse to ensure all plans are considering best location/ best practise for communities

What approaches or processes should be in place or considered when developing seaweed aquaculture in Cornwall?

Need a more coordinated approach to developing a strategy for inshore of 6nm of all Cornish coastal waters.

Public consultation needs a major revamp! There could be an outline application for major proposals where you get a two stage consultation process.

more comprehensive marine planning - e.g. local plans extending into sea!

Cornwall should be a leader in developing new marine planning processes and create a new process for dealing with new industries that will have an impact on important existing industries.

clear ongoing monitoring obligations

MMO may manage licensing but if a new industry could come to Cornwall surely CCC should address aquaculture in its strategy to guide planning decisions/investment etc

Need a locally developed local marine plan.

Learn lessons from Scotland Seaweed aquaculture process where they have many years experience

What approaches or processes should be in place or considered when developing seaweed aquaculture in Cornwall?

Better engagement process / consultation notification by MMO. Appreciate its hard to tell everyone but tell MCP and we can then share to all

We need more bespoke tailored suitability mapping for Cornwall

Informing MCP as interested party for all potential plans

Lets develop a proper consultation strategy for marine license applications with the MMO.

Proper EARLY engagement with communities and stakeholders that will be impacted eg fishers. A notice isnt enough.

SEAs strategically, EIAs at case level

Need to trigger the Coastal Concordat for more license applications

Love the idea of proper strategic approach as we have had with offshore wind. Proper due diligence needed.

What approaches or processes should be in place or considered when developing seaweed aquaculture in Cornwall?

Can a role for the MCP be to champion a better engagement process for local communities? Try finding contacts for fisherman with nicknames or second home owners as you may find in gerrans?

Triple bottom line approach that Cornwall Council have been promoting is vital! The commercialisation of the marine environment in this way is frankly terrifying! I am more worried than I was before

Licence applicants must commit to running farms as agreed for decade at least before they can sell a licence!

Ensuring adequate ongoing monitoring

A small scale pilot to show best practice, measure impacts and test AEZ principles. Can we be one of the 10 suggested and pulot these?