

Portfolio of Project Factsheets (Algae)

A Horizon 2020 funded project

Full project title: ERA-NET Cofund on Blue Bioeconomy - Unlocking the potential of aquatic bioresources (BlueBio)

Website: www.bluebioeconomy.eu

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 817992

Project start date: 1 December 2018

Duration: 66 months



Overview

These factsheets outline the outputs and commercialisation needs for the 36 BlueBio funded projects as of November 2023. This includes 17 projects from the cofunded call (🇪🇺), 9 projects from the 1st additional call (🇩🇪), and 7 from the 2nd additional call (🇮🇹).

Each factsheet contains the following information:

- Project Name
- Brief description/tagline
- Relevant Blue Invest sectoral opportunity icon (see next page for description)
- Website (if applicable)
- Country flags of industry partners in the consortium
- Outputs (including Technology Readiness Level (TRL), brief description, Intellectual Property Rights (if provided))
- Commercialisation Needs or Next Steps

More information on the projects available on www.bluebioeconomy.eu

Blue Invest Sector Opportunities

Aquaculture



Aquafeed



Broodstock



Disease battling
& fish welfare



Equipment



Rearing/
Harvesting

Blue Biotechnology



Biofuels



Nutraceuticals



Cosmetics



Pharmaceuticals



Food & Feed



Waste Reduction



General

Blue Biotechnology



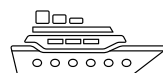
Fishery Services



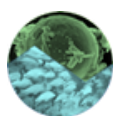
Fishing Gear



Fishing



Ship Equipment



AquaHealth

Microalgae Microbiomes
- A natural source for the
prevention and
treatment of diseases in
aquaculture

<https://aquahealth-project.com>



**Project consortium
includes 1 SME:**



Portfolio of Outputs and Commercialisation Needs

Outputs

Advanced meta'omics toolbox



TRL 4-5

Screening techniques

Cultivation and DSP methods



TRL 7+

Cultivation of microalgae
and down stream
processing methods

Microalgal microbiomes



TRL 3-4

Utilisation of bioactive
molecules from microalgal
biomes for aquaculture
health management

LCA Models



TRL 4-5

Life Cycle Assessment
models for microalgae
cultivation and fish
aquaculture

Commercialisation Needs

**Higher
efficiency/
productivity of
cultivation
system**

**Lower energy
consumption
(cultivation
phase and
downstream
processing)**

**Antimicrobial/
antiviral
assessment of
bioactives**

**Upscaling
production of
bioactives**

**User friendly
model with
graphical
interfaces, API,
or apps**

Aquaculture
technologies for the
production of innovative
feeds for improved fish
stocks

Portfolio of Outputs and Commercialisation Needs

<https://aquatech4feed.atb-potsdam.de/de/project>



Project consortium
includes 3 companies:



Outputs

Biofloc cultivation



TRL 6

Optimised tank
cultivation using
aquaculture
wastewater.

Duckweed cultivation



TRL 7

Optimised open
pond cultivation,
using aquaculture
wastewater.

Insect Cultivation



TRL 6

Optimised
cultivation of Black
Soldier Fly using
fish waste.

Micro and macro- algal cultivation



TRL 7

Optimised
cultivation using
aquaculture
wastewater.

Commercialisation Needs

Upscaling and
integration into
real environments

HEU funded
IMPRESS project
to develop higher
TRL (duckweed &
microalgae)

Development of
standardised
processes

Hygiene and
safety assessment
of the produced
biomass

Case studies for
social acceptance
and feasibility

MARIKAT

New catalytic enzymes
and enzymatic processes
from the marine
microbiome for refining
seaweed biomass

https://matis.is/en/matis_projects/marikat/



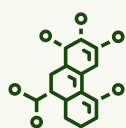
Project consortium
includes 3 SMEs:



Portfolio of Outputs and Next Steps

Outputs

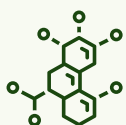
Novel enzyme product 1



TRL 5

Branched laminarin
oligo-saccharides of
defined size and
structures.

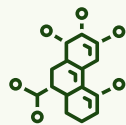
Novel enzyme product 2



TRL 5

Sulfated
oligosaccharides
from fucoidan.

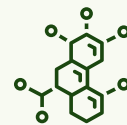
Novel enzyme product 3



TRL 5

Sulfated
oligosaccharides
from ulvan.

Novel enzyme product 4



TRL 5

Alginate
oligosaccharides.

Next Steps

Scale up
enzyme
production

HEU Project
funded to reach
higher TRL

SEAMARK
Seaweed-based
Market Applications

<https://seamark.eu>

Apply for
provisional
patent



Marine Innovation using Novel
Enzymes for waste Reduction
and Valorisation of Algal
biomass

<https://minerva-bluebio.weebly.com>



Project consortium
includes 2 SMEs:



Portfolio of Outputs and Commercialisation Needs

Outputs

Antifouling substances



TRL 2

Biologically inspired
antifouling substances
that may offer novel
alternatives to currently
used materials and
coatings in aquaculture.

Food Ingredients



TRL 2-4

New food fibres and
flavour ingredients
that address key
market drivers and
growing demand for
sustainable, healthy
food.

Facial serum



TRL 3

Facial serum
product with
*Ascophyllum
nodosum* extract.

Biomedical Applications



TRL 3-4

Marine derived actives
and polymers that
may offer new
solutions for drug
development and
tissue engineering.

Skincare Product



TRL 7-8

Facial skincare
product with
*Ascophyllum
nodosum* extract.

Commercialisation Needs

Continued
bioactivity
screening &
characterisation

Food applications
trials & sensory
analysis

Cost analysis, Life
Cycle Assessment &
Social-LCA

Targeted market
needs analysis

Scale up of
extraction
processes and
production

Scope any
regulatory
constraints



Novel enhanced bioplastics
from sustainable processing
of seaweed

Portfolio of Outputs and Commercialisation Needs



**Project consortium
includes 2 SMEs:**



Outputs

Processing of cultivated brown algae



TRL 5

Production of biopolymer
extracts with low costs and
energy use, and utilisation
of residual materials.

Bioplastic product manufacturing



TRL 4-6

Methods for casting films
and producing
thermoplastic pellets based
on seaweed biopolymers
and residual biomass.

Transparent flexible films



TRL 5-6

Fibre-enforced alginate-
based films that are
compostable and have
mechanical properties that
can be tuned through
formulation and
manufacturing method.

Thermoplastic composite materials



TRL 5

Composites of seaweed-
based alginate and fiber
fractions with biobased
thermoplastic polymers,
allowing manufacturing
with conventional plastic
processing equipment.

Commercialisation Needs

**Technology
transfer research**

**Market and
consumer aspects**

**Engagement with
large industry
(biomass providers,
technology
providers, end
users)**

**Increased
incentives for
biobased materials
and/or restrictions
on conventional
plastics**

**Establishment of
sustainable and
economically
feasible supply
chains for raw
materials**



**Seaweeds for Novel
Applications and
Products**

<https://tinyurl.com/ye28268y>



**Project consortium includes
1 Small and 1 Large Enterprise:**



Portfolio of Outputs and Commercialisation Needs

Outputs

Biorefinery methodologies



TRL 5

Isolation of high-quality polysaccharides such as alginates, cellulose, fucoidans, carrageenans, laminarins.

Upgraded & modified polysaccharides



TRL 4-6

Seaweed based foams and seaweed microsheets.

Seaweed cellulose based biomaterials



TRL 4-6

Novel biopolymer modifying enzymes. Enzymatically and chemically tailored polysaccharides.

Alginate based biomaterials



TRL 4-5

Novel hydrogels for cell cultivation.

Cellulose alginate composite biofibres.

Commercialisation Needs

**Establish of
sustainable and
economically
feasible supply
chains for raw
materials**

**Scalable processes
for biorefining of
seaweed**

**New
infrastructures for
sustainable
processing of
biomass**

**Engagement with
industry on further
projects to realise
innovations**

**Regulatory
framework for
seaweed derived
products for use in
food, feed, and
pharma.**



Novel biorefinery supply chains for wastewater valorisation and production of high market value bio products using microalgae

Portfolio of Outputs and Commercialisation Needs

<https://www.bluebiochain.eu/>



Project consortium includes 1 SME & 1 LE:



Outputs

Microalgae cultivation in wastewater



TRL 5

Optimised valorisation of waste water by cultivation of microalgae.

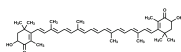
Skin cream



TRL 5

Production of cosmeceuticals from microalgae.

Food colouring agents



TRL 5

Production of food additives from microalgae.

Aquafeed



TRL 5

Production of aquaculture feeds from microalgae.

Commercialisation Needs

Upscaling

Continue to monitor resource efficiency impact

Further develop market analysis, projection scenarios, value chains

Environmental impact mapping

Networking with industry

(e.g. feed and cosmetics companies, aquaculture farms)



**Sustainable utilisation of
MARine resources to
foster GREEN plant
production in Europe**

Portfolio of Outputs and Commercialisation Needs

<http://www.marigreen-project.eu/>



**Project consortium includes
3 SMEs & 2 Large Enterprises:**



Outputs

Residue treatment methodologies



TRL 4

Treatments of fish, seaweed and mussel residues to obtain fertilisers/biostimulants.

Organic fish farming sludge treatment methodology



TRL 4

Innovative treatment of RAS sludge from organic fish farming to obtain a composting material with a high carbon content.

Fertilisers and Biostimulants



TRL 5

Developed using different treatment technologies (grinding, mixing, pelletising, composting, extraction, compost fermentation, biochar impregnation).

Commercialisation Needs

**Upscaling
production and
equipment**

**Designing
fertilisers/
biostimulants
targeted to market
preferences**

**Linking raw
material suppliers
with processors/
farmers**

MICROALGAE IN IT

Microalgae based,
safety-tested and
optimised fish feed value
chain by using
interdisciplinary R&D and
IT solutions

Portfolio of Outputs and Commercialisation Needs

<https://www.poweralgae.eu/microalgae-in-it>



**Project consortium
includes 1 SME:**



Circular model for microalgae cultivation

Carbon dioxide
from flue gas to
enhance
microalgae
growth



TRL 5/6

Agri-food residues to
provide cheaper
nutrients for
microalgae



TRL 5/6

Information and
communications
technology (ICT), sensors,
and algorithms for
efficient bioprocess
management



TRL 5/6

Chemical testing for
product safety



TRL 5/6

Commercialisation Needs

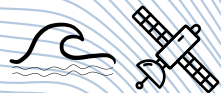
**Validation of
aquafeed
producers' needs**

**Validation of fish
farmers' needs**

**Microalgae
components
users in the food
sector**

**Microalgae
components
users in the
cosmetics sector**

**Retail channels
for food &
nutraceuticals
(physical &
online)**



Portfolio of Outputs and Commercialisation Needs

Enhancing and controlling the quality of cultivated seaweeds for large-scale production and a sustainable supply chain to food and feed markets

<https://bluebioeconomy.eu/enhancing-and-controlling-the-quality-of-cultivated-seaweeds-for-large-scale-production-and-a-sustainable-supply-chain-to-food-and-feed-markets/>



Project consortium includes
1 large enterprise and 2 SMEs:



Outputs

Preservation methods



TRL 6

Criteria for choice of preservation method, e.g. added acids or fermentation, based on composition and intended use of the biomass.

Methods for assessing biomass quality



TRL 5

Rapid, instrumental methods for determining biomass composition and state, for decisions about use and preservation method.

Monitoring and tracking systems



TRL 6

Sensors and logging systems for real-time decisions related to processing and logistics planning, and for biomass tracking.

Management Model



TRL 4

Supply chain management model for strategic planning and decisions.

Commercialisation Needs

Dedicated equipment and storage solutions for scale-up of preservation

Outreach to seaweed farmers and processors

User demonstration and testing of hardware and digital tools

Market development

Product development & demonstration
(Food, functional ingredients, materials)



SuMaFood

**Sustainable
preservation of
marine biomass for an
enhanced food value
chain**

<https://sumafood.eu/>

Portfolio of Outputs and Commercialisation Needs



**Project consortium
includes 3 enterprises:**



Outputs

Demonstration cases



TRL 6

Two cases (salmon slaughter & seaweed) established waste reduction, product range extension, enhanced product quality & stability, and provision of unique products.

Marine biomass powders



TRL 6

Production of fish and seaweed powders to be used as food, ingredients or feed.

Optimised processes



TRL 6

Optimised techniques for separation and fractioning of fish residues and preservation techniques for marine biomasses.

Food Products



TRL 6

Bakery products, instant soups, pasta, and sauces with fish protein hydrolysate or seaweed.

Drying technology



TRL 7

Optimised novel drying technologies applied to marine biomass.

Commercialisation Needs

**Venture capital to
scale up
hydrolysis process
of marine residual
raw materials**

**Close
collaboration with
fish processing
industry**

**Inquire into
regulations
pertaining to
novel marine
powders**

**Increase impact
and market
readiness of
marine
ingredients**

**Promotion of new
ingredients for
enhanced
consumer
acceptance**



TACO ALGAE

Total value chain optimisation
of harvested *Furcellaria
lumbricalis* and cultivated
Schizymenia valentinae

[https://nofima.com/projects/
dye-from-red-algae/](https://nofima.com/projects/dye-from-red-algae/)

Portfolio of Outputs and Commercialisation Needs



Project consortium
includes 2 SMEs:



Outputs

Algal
Harvesting



Furcellaria lumbricalis
harvesting methodology.

Algal
Cultivation



Schizymenia valentinae
cultivation methodology.

Biorefinery



A complete Life Cycle Analysis
for environmental, economic &
social sustainability.

R-phycoerythrin
& Biostimulants



Production of R-phycoerythrin
and biostimulants from
harvested and cultivated
seaweeds.



Life Cycle Sustainability

Validation of value chain using Life Cycle Sustainability approach.

Commercialisation Needs

Upscaling
phycoerythrine
production &
purification

Evaluation and
validation of food
prototypes

Validation of pilot
scale processing
of seaweed

Minimise growth
of diatoms in land
based cultivation
tanks

Validation of
biostimulants in
the field



Value creation and ecosystem services of European seaweed industry by reducing and handling potentially toxic elements from breeding to soil

<https://bluebioeconomy.eu/value-creation-and-ecosystem-services-of-european-seaweed-industry-by-reducing-and-handling-potentially-toxic-elements-from-breeding-to-soil/>

Portfolio of Outputs and Next Steps



Project consortium includes 2 large enterprises, 2 SMEs and 1 medium enterprise:



Outputs

Genetic parameters in sugar kelp help for selective breeding



Advancing to TRL 5

Knowledge on phenotypic measures, and genetic parameters of sugar kelp as basis for selective breeding for different traits (e.g. growth, Potential Toxic Elements (PTE) content).

Safe soil amendment application



Advancing to TRL 5

Fundamental studies to ensure safe application of seaweed and seaweed residues as soil amendments in relation to health and environmental risks completed.

Next Steps

PTE analysis, estimation of phenotypic variance and correlations, interaction between genotype and environment

Arsenic analysis in soil and crop samples (experiments)

Carbon sequestration study in soil following application of seaweed amendment

LCA, economic feasibility, cost-benefit analysis of ecosystem services, regulatory barriers, incentives

Dissemination (interviews, workshops, multi-stakeholder platform) and human capacity building