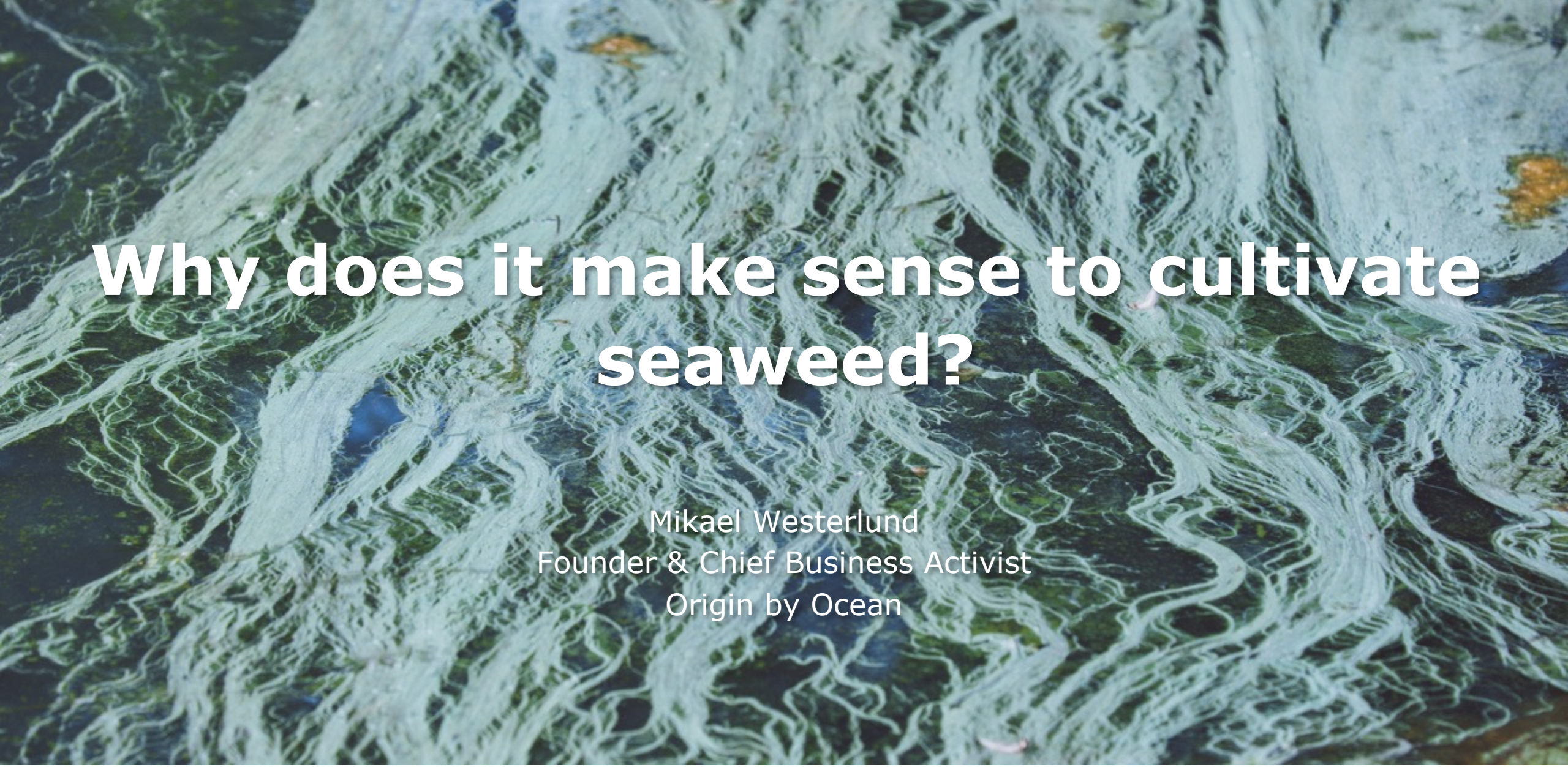

Why does it make sense to cultivate seaweed?

Mikael Westerlund
Founder & Chief Business Activist
Origin by Ocean

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#neo-ecology

Why

- 75% of the earth's surface is covered by oceans
- 30% of antropogenic CO_2 is absorbed by oceans buffering climate change
- 50-80% of oxygen production comes from the ocean
- 40% of all ocean-living species is affected by pollution and eutrophication
- Eutrophication = massive excess of nutrients, i.e. nitrogen (N) and phosphorus (P)
- In order to maintain planetary balance and keep the oceans alive, nutrients must be removed

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The Global Challenge

ANTIGUA NEWS ROOM

HOME NEWS COLUMNS REGIONAL VIDEOS ENTERTAINMENT ADVERTISE CONTACT

Antigua and Barbuda ships samples of the Invasive Sargassum Seaweed to Finland

April 1, 2021 2

Costs and damages

US 2,2bn $

Annual economic damages caused by eutrophication in freshwaters in the United States

US2,6bn $

Annual economic losses caused by depletion of perennial vegetation and fish stocks in the Baltic Sea.

US 4,2bn $

Annual cost to citizens' welfare around the Baltic Sea. Based on individuals' willingness to pay.

US3 trillion $

Globally, the market value of marine and coastal resources and industries is estimated at US$3 trillion per year, about 5 percent of global GDP.

3 billion

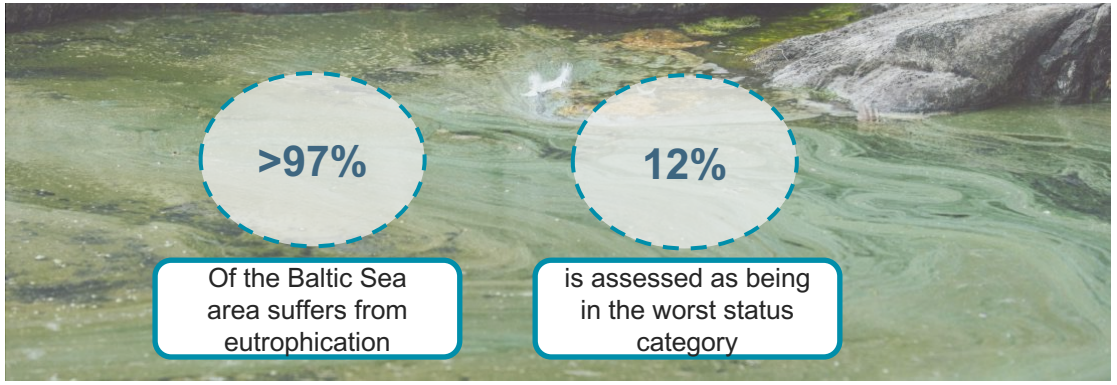
More than 3 billion people depend on marine and coastal biodiversity for their livelihoods.

Eutrophication of the Baltic sea

Eutrophication of Baltic Sea

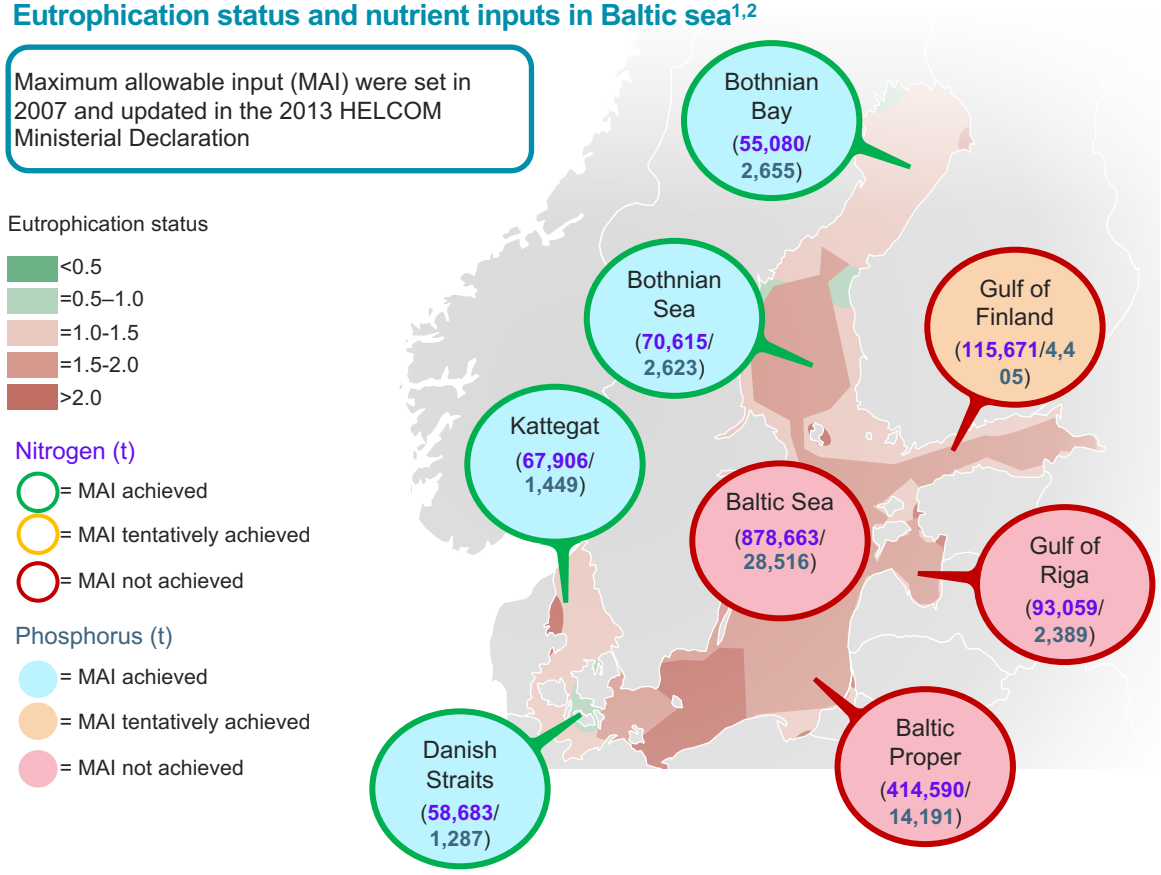
Eutrophication was first recognized as a large-scale pressure of the Baltic Sea in the early 1980s and action to reduce nutrient loading was agreed in the 1988 HELCOM Ministerial Declaration.

Nutrient loading has decreased from 1980 peak but is still **over** MAI levels in the Baltic Sea excluding some sub-regions. Effect of the reduced nutrient loading has not yet been detected in the eutrophication of the sea.



Eutrophication status and nutrient inputs in Baltic sea[1,2]

Maximum allowable input (MAI) were set in 2007 and updated in the 2013 HELCOM Ministerial Declaration



Note: (1) Integrated status of eutrophication in the Baltic Sea 2011-2016 (2) 2018 input including statistical uncertainty
Source: European Commission, Circular Economy Loop, HELCOM, Origin by Ocean

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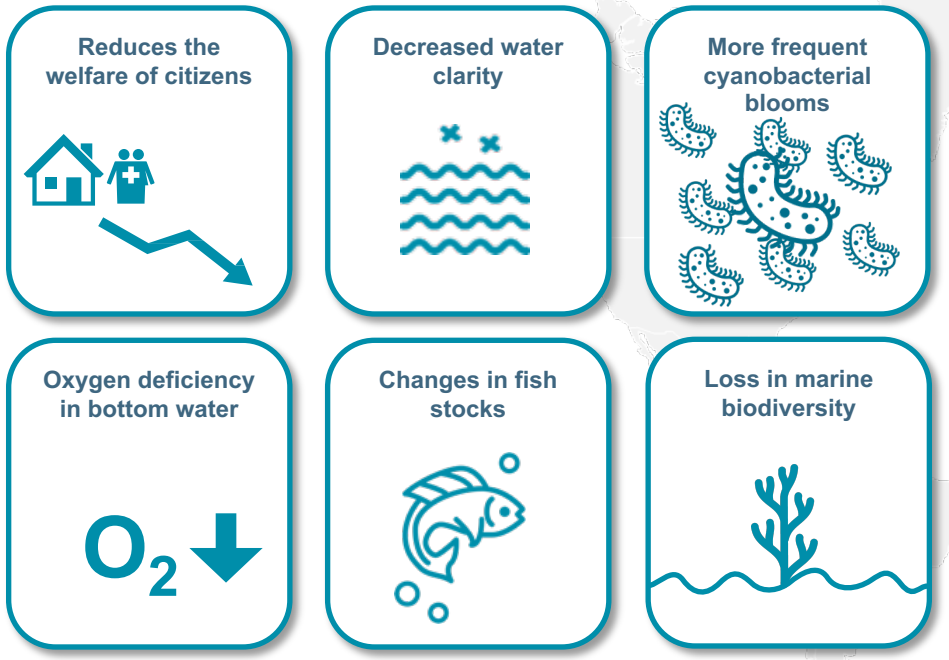
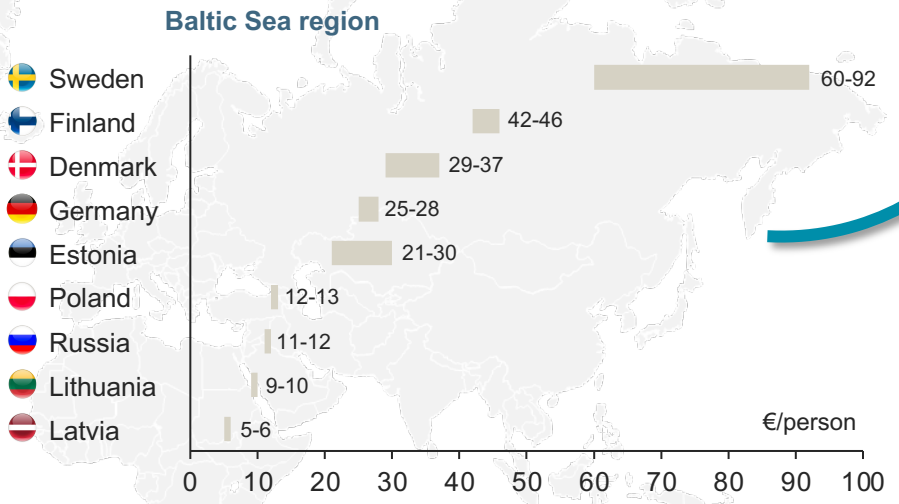
Cost of Eutrophication

Direct and indirect effects of Eutrophication



Annual loss of benefits due to eutrophication



Freshwaters in the US

Combined financial annual costs

$2.2b

Total financial loss annually

€3.8 –4.4b

Total financial loss per person has been estimated from all the costal countries of the Baltic Sea.

Estimated loss per peson includes both use-related values (recreational use, effect on citizens livelihood) and non-use related values (balance in biodiversity and health of the environment for future generations).

With better lower eutrophication status, citizens welfare would increase.

Note: (1) Hydrogen sulfide
Sources: HELCOM, Environmental Science & Technology

Table of contents

We exist for ”the Natural Balance of Ocean Life”

Our Mission

Cleaner water, cleaner oceans, cleaner life

Our Vision

A better planet for all of us, thru sustainable use of farmed and harvested marine biomass from our oceans

Our Solution

Clean, sustainable, natural marine bio-based ingredients for the food, beverage, cosmetics and pharma industries

We solve a Global Challenge...

Continuous flow of artificial phosphorous and nitrogen into our waters

Result:
Extensive blue-green algae blooms and concentrations

Contaminated drinking water

Loss of fish population and native seaweed

Health threats such as skin rash and allergies

Poisoning of animals and birds

Cloudy waters and slimy shores

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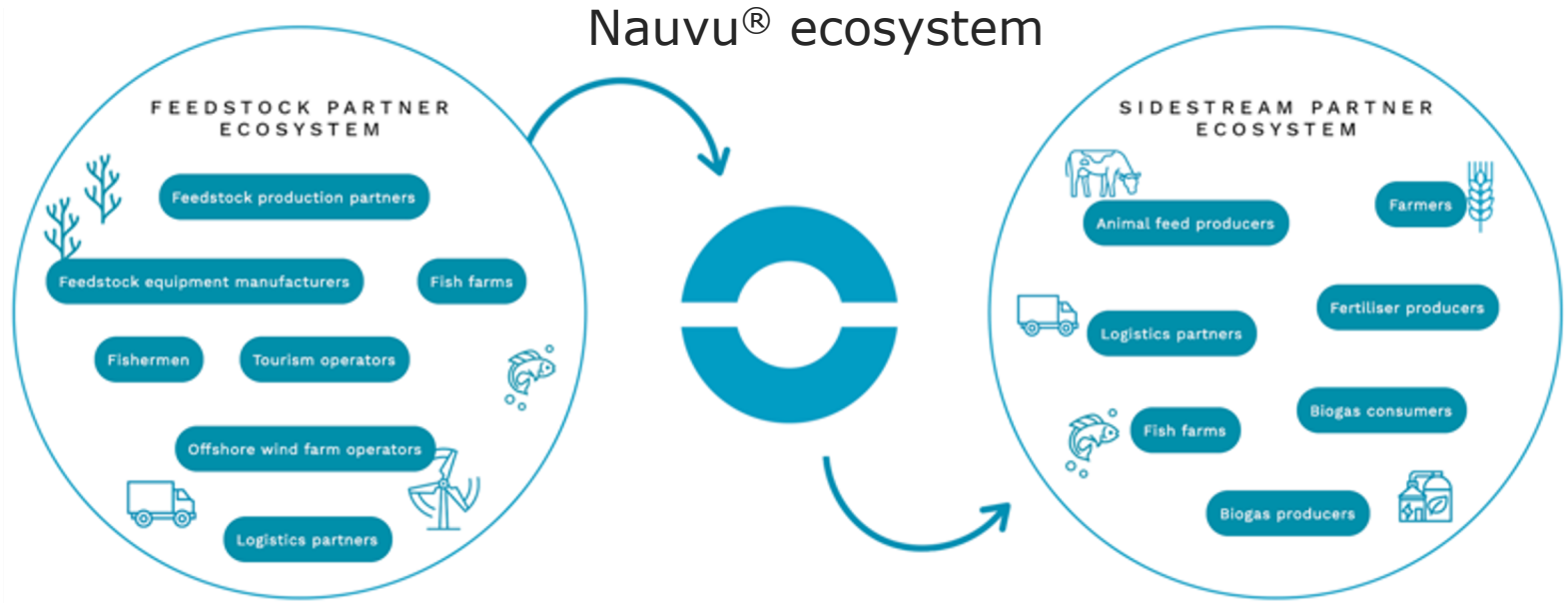
...by turning a problem into an opportunity...

Origin by Ocean use **harvested and farmed** sea and ocean grown biomass, grown in its natural habitat, such as micro algae, bladder wrack and kelp, **as feedstock to produce** natural and biologically sustainable **ingredients** for use in the food, beverage, cosmetics and pharma industries.

We are creating a **global algae-based business ecosystem**(Nauvu® Ecosystem), that will alleviate the excess nutrient problem of our oceans in a sustainable and economicallv viable manner



...in our novel biorefineries

Origin by Ocean develops a new **highly efficient biorefinery process** (Nauvu® biorefinery process). The unique **dual feed biorefinery process** sets the **new standard** for both overall **process and product yields**, enabling new levels of biorefinery **business profitability and scalability**.

Nauvu® is **designed to meet** the growing need for **plant based ingredients** for **fastmoving goods products** and segments.

Food
Thickening agents and suspending agents

Cosmetics
Vegan options for, e.g., skin care, hair care, makeup and oral care

Pharma
Binding or carrier substances for e.g. pills and capsules

Other
E.g. textile industry products and the production of alginate bandages

Lab-test's and analytics suggest **5-6X yield improvement** for key products, compared to currently best available technology & process

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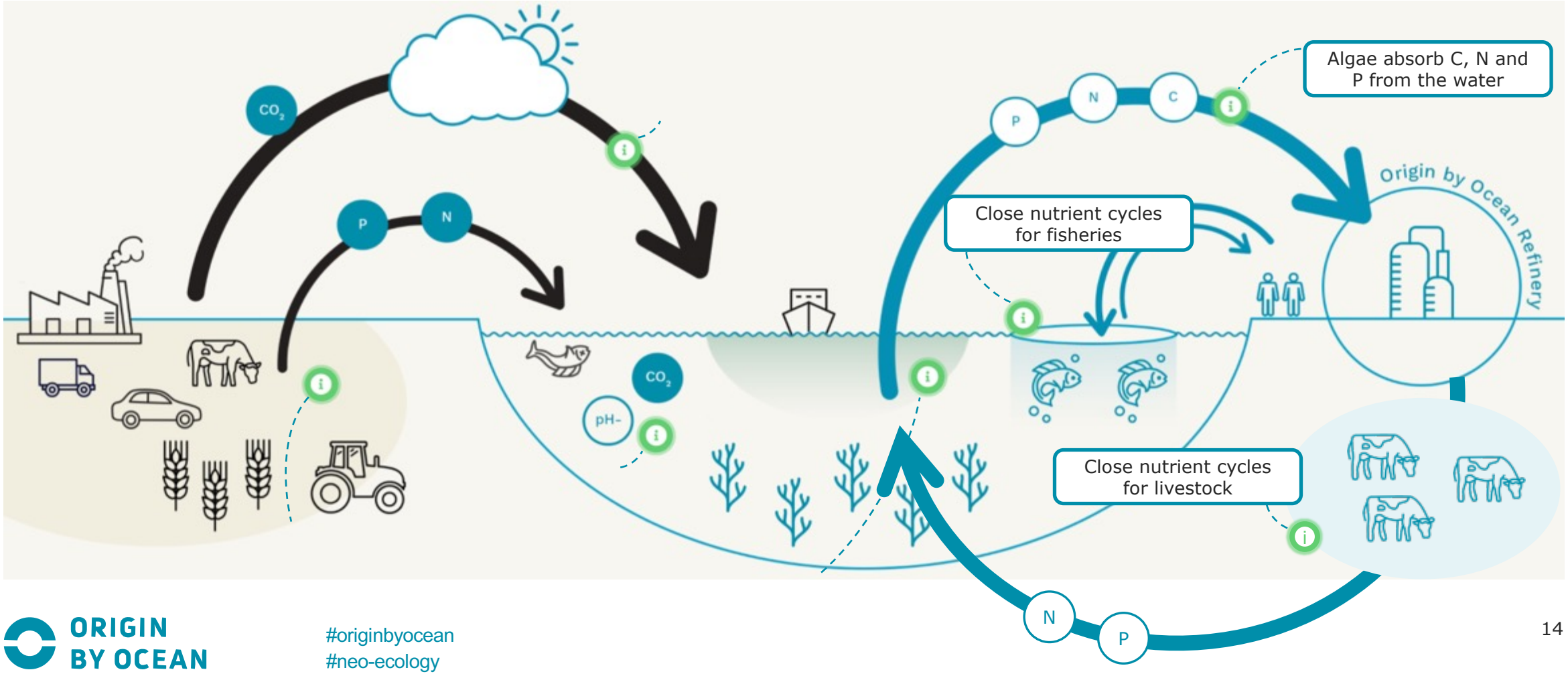
How to create value from an environmental problem?

Our Nauvu® neo-ecology biorefinery solution

Enhancing circular economy by processing ingredients from seas

Our Nauvu® Biorefinery technology & process closes the nutrient cycle from land to sea and sea to land whilst converting a global environmental problem into valuable and sustainable ingredients for industrial applications, creating new closed nutrients cycles, sequestrating carbon and generating new circular economy systems.



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Why seaweed and algae?

Seaweed and algae offers a sustainable, clean and biological source of raw material, usable for a wide array of applications, that can be harvested and processes with very little burden on the environment.

It is an environmentally sustainable source of raw material

Certain algae's, such as blue-green, are in themselves harmful – harvesting reduces the burden

It grows naturally and can be cultivated

Seaweed and algae extracts can replace ingredients such as fats, synthetic emulsifiers, antioxidants, pigments and active ingredients

Seaweed and algae extracts can be used for a wide variety of applications

Process residuals are biodegradable and can be used in, e.g., fertilizers

Use of Natural resources

Territorial waters of Finland:
52 470 km²

Example of Bladderwrack cultivation 50km²
~0,02% utilization

Forest of Finland:
224 090 km²

*Metsä Group Äänekoski plant, 6,5Mm3 timber~8700km2 area per annum, ~0,4% of forrest in Finland, Growth period 60years

Bladderwrack Cultivation

Farming depth: 3-4m
Typical yield: 3-19kg/m2

- Average yield used for estimates: 10kg/m2

Growth period: 3years

80-50.000Tonnes WW Biomass feed requirement

- Annual harvest area: ~5-10km2
- Total farming area: 25-50km2

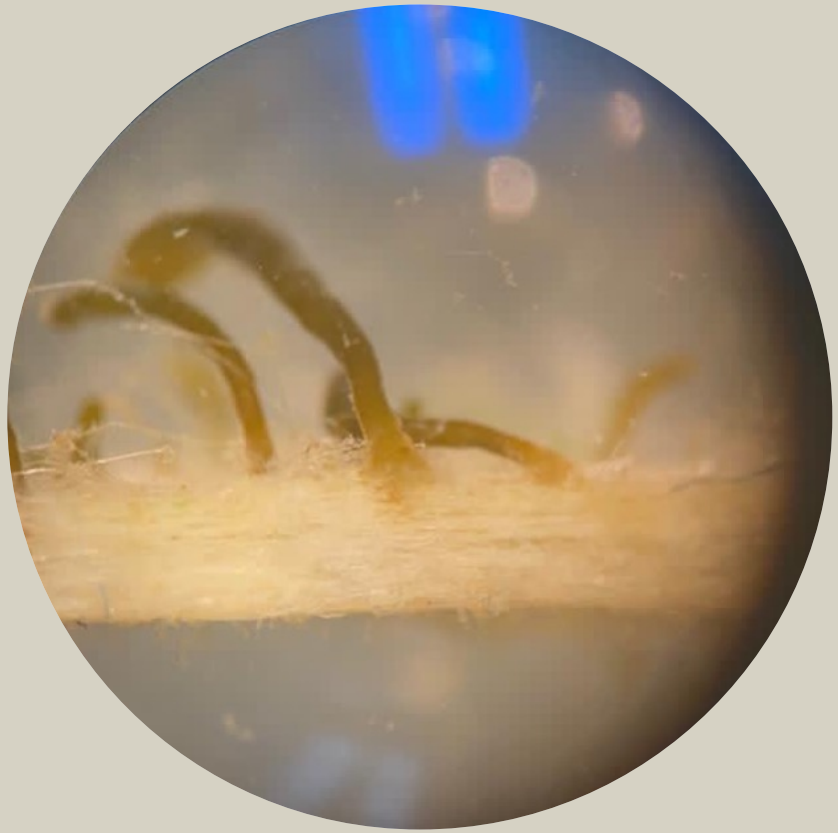
Farming methods:

- Rope, lower yield, easier to harvest
- Nets, higher yield, more complicated harvesting

Cultivation scaleup

Bladderwrack production steps:

- ✓ **Reproduction**
- ✓ **Zygot storage**
- ✓ **Zygot seeding**
- ✓ **First growth stage, onshore**
- **Transfer to offshore cultivation site**
- **Biomass production at cultivation site offshore**
- **Biomass harvesting**



Season 2022 activities

Transfer to offshore cultivation sites

Nauvu® Process

The value we create

To the customers, Origin by Ocean creates value by offering bio-based and non-synthetic ingredients that improve sustainability throughout the value chain up to the end user.
Products of animal origin are replaced by the plant-based innovations.

Pharma

Fertilizers

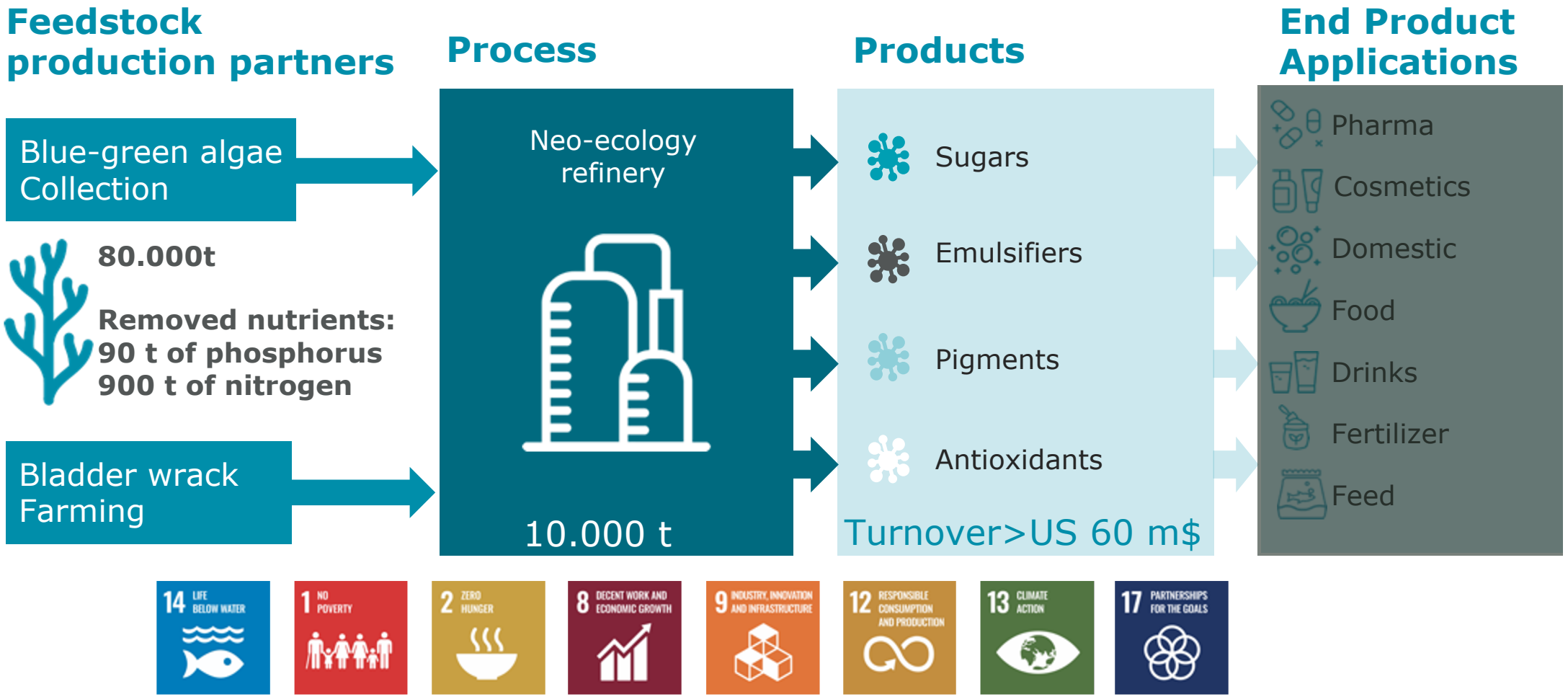
Detergents

Feed

Food

Cosmetics

Solution: Nauvu® biorefinery process



Bringing the balance of ocean life

Initial numbers, demo facility Southern Finland

1. Farm & Harvest

Feed from blue-green algae & bladder wrack

Industrial scale collection of blue-green algae and large scale bladder wrack farming

2. Refine

Origin by Ocean neo-ecology refinery

Our first Neo-ecology refinery will annually process:

- **30,000 Wet tons of blue-green algae**
- **50,000 Wet tons of bladder wrack**

3. Apply

Global and domestic industry customers can utilise extracted components in their products

The Neo-ecology refinery will produce 10,000 Dry tons of Biomolecule products

4. Purify

Through extraction of blue-green algae and bladder wrack aquaculture, the sea we operate in is purified.

Resulting in a annual total nutrient removal from the Baltic Sea of:

~ 90 Tons Phosphorous

~ 900 Tons Nitrogen

Our partners

Broad range of product application development partnerships signed and announced

Valio	HARTWALL	KiiLTO	VITAE Clean Cosmetics
2B USD dairy producer Market leader in Scandinavia	400M USD Market leader Beverages, Finland	US 270M $ Domestic cleaning & hygiene, Market leader Finland	High-quality private label contract manufacturing of cosmetics and hygiene products

+ a number of non-disclosed co-operations with publicly listed fastmoving goods manufacturers within baked goods, confectionary, cosmetics and packaging

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We spread value

by creating new seaweed and algae based products for use in different industry applications

For Local communities

The value creation capacity of the Nauvu biorefinery generates new income opportunities for people living in coastal areas to earn a living, creating new value streams and contributing to a more sustainable society.

For nature

The feedstock biomass captures large amounts of nutrients and sequestrates CO_2. This way improving the water quality. Seaweed farms generate new habitats and breeding grounds for marine species, thus improving the bio- diversity of the seas.

For industries

Generate a new line of high tech industry which can become a new "trademark" for Finland. Create new business opportunities for companies in the maritime environment

Creating new seaweed and algae based products for use in different industry applications.

For individuals

Giving Individuals the consumer choice to impact the environment by choosing sustainably produced products. Contributing to a high impact via high value products from marine biomass, contributing to sustainability goals worldwide, thru consumer choices and goods.

Who we are

Our purpose

Mari Granström
Chief Science Activist

"I am passionate about sustainability and bio-based solutions respecting nature's resources. I am an environmental change making urban activist with a scientific business twist."

"We found our common purpose from solving the global eutrophication problem of our oceans. We are committed to build a sustainable and innovative business ecosystem, by creating value streams for society, individuals and businesses, while turning a global problem into a profitable global business."

Mikael Westerlund
Chief Business Activist

"I am passionate about our wildlife and the wellbeing of our nature. I was born in Nagu, in the midst of the Turku archipelago, with the Baltic sea close to heart."

Our team

Unique subject expertise & skills

We have more than 140years of combined experience of Business leadership and development, biorefinery process and biobased materials research and development, organic chemistry, biochemistry, marine biology and environmental engineering.

Where are we going?

Five steps to success

✓ Step 1: Accelerate the project, develop technology and test outcome in live customer cases

Work in progress — Step 2: Establish proof of concept, from harvesting to end product

Work in progress — Step 3: Secure our position through an extensive IPR-portfolio

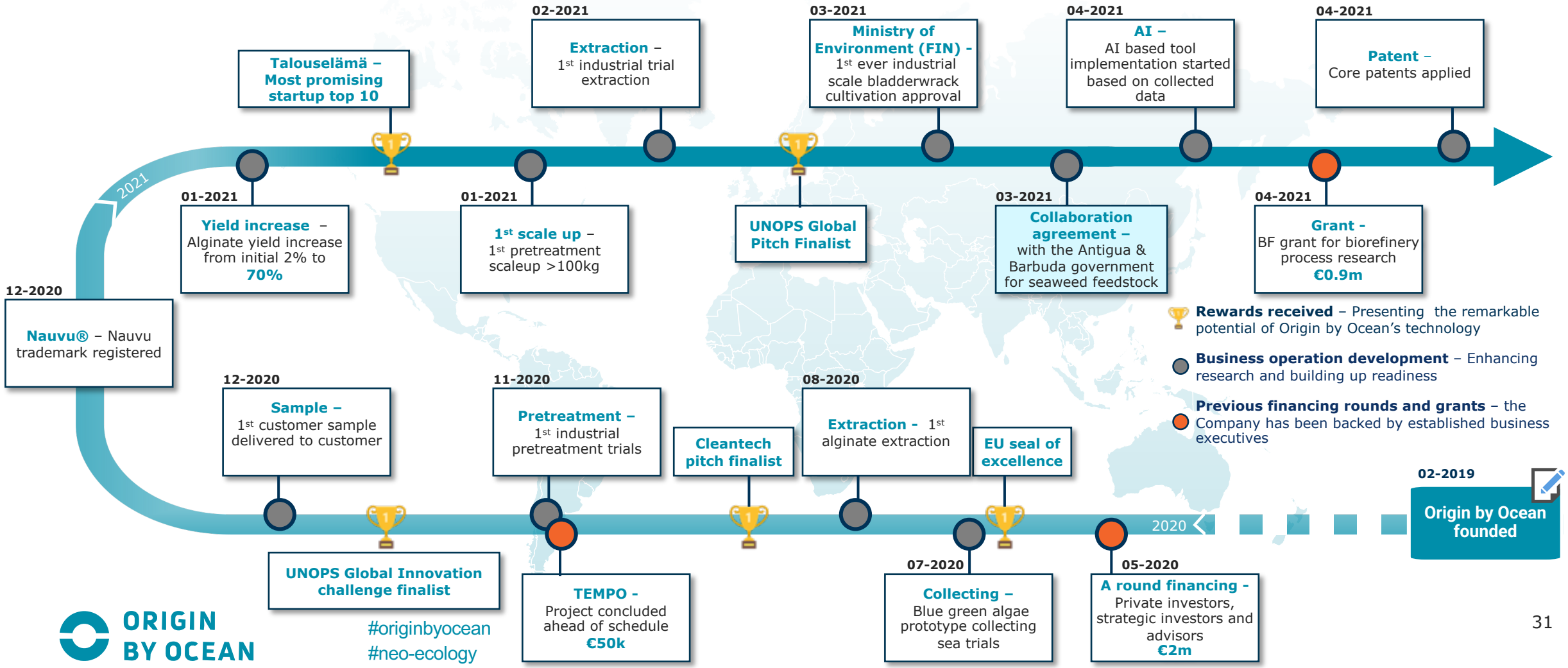
Step 4: Commercialise products globally

Step 5: Expand and scale production footprint

We are on our way

Origin by Ocean has made great progress in short time

Origin by Ocean's progress is on schedule and proceeding according to the plan - recognized by multiple awards



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We aim to grow in three phases

Establish proof of concept	Grow to become a €50m business	Scale up operations by starting up 3 – 4 new sites
Yield and process proven in test environment Purchasing commitments received from clients Proven technology and process Site investment ramp up	One site operational on the baltic coast of Finland Net sales €50m EBITDA XX % Production 10000 tons Established position as supplier of thickening agents to leading players in food, beverage and cosmetics	4 – 5 new sites operational in areas where raw material is available (Indonesia, Gulf of Mexico / Caribbean, China, Australia) Net sales > €500m EBITDA XX – YY % Expansion of product range
2020 - 2026	**2026 - 2029**	**2030 and beyond**

Our next step forward

The integrated Pilot phase

Our goals

We are motivated to build a global company which takes the lead on **solving environmental issues with a new approach**.

We aim to build a **network of ecosystem partners** that jointly work towards creating value while solving environmental issues in our oceans.

We strive to become recognized as the most innovative producer of algae-based raw materials, **creating nutrition balance in our oceans**.

As a business, we aim to be a **50 million business** by the end of 2029. To reach our goal, our target is to commercialize our products and gain sustained foothold for our products within 2029”

Our long-term goal is to become a **global market leader** in the nutrient removal business being the first company to remove **1Billion tons of nutrients** from our oceans.

Our commercial goal is to be generating an annual turnover in the range of 1 Billion US$ in the latter part of the 2030´s

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