

## The seaweed sector in the Greater North Sea Region in 2050

The seaweed sector in 2050 offers numerous benefits to our society. In the form of clean and healthy living conditions on land and at sea, sustainable resources, circular products and solutions and high-quality employment.

### Production volume of 1-10mln tons in 2050 in the Greater North Sea Region

As a sector, we want to focus on a yearly production volume of 1-10mln tons of fresh seaweed. Using, available space on land, salt water resources in sheltered areas but primarily at sea in the wind farms in the North Sea. By 2050, the total production area of the seaweed sector will have increased to 1,000-10,000 km<sup>2</sup>. This is up to 3% of the total production area of wind farms as aspired in the Ostend agreement<sup>1</sup>.

### Circular products and solutions in 2050

In 2050, the markets for building materials, food, agriculture and packaging are all using products and solutions with seaweed. No longer because it's a sustainable alternative but because regulations and consumers have enforced the transition to circular value chains. Seaweed is an ideal resource because it can be produced locally, on large scale and in virtually closed nutrient and carbon cycles. The (cascaded) applications are so versatile that hardly any waste is generated and almost all applications are biodegradable.

### IN 2050, markets are no longer subject to disturbances in global value chains

Previously, Europe was largely dependent on global supply lines. Now, in 2050, seaweed can fill a large part of the market demand in food, feed, fertilizers and packaging with locally produced seaweeds as main resource. Because it is produced in all seas and salty waters of Europe and to some extent even on land, the market has access to many different types of raw material at different times in the season. Also to compensate for regional under- and overproduction.

### Employment in the seaweed industry in 2050

By 2050, at least 85,000 FTEs will be employed in the European seaweed industry, directly and indirectly<sup>2</sup>. A varied mix of academic and practical talents that are often close to the coast and are continuously improving quality, yield, cost-effectiveness as well as the (marine) ecosystem. Europe has become knowledge leader in the fields of crop cultivation, biorefinery, product development, circularity and nature restoration.

### Impact on carbon emissions and the climate

By means of a validated blue carbon standard, seaweed farms make an important contribution to capturing and avoiding CO<sub>2</sub>. This goes towards xx million t CO<sub>2</sub> per year<sup>3</sup>.

### Impact on nature at sea and on land

By means of standardized production methods, seaweed farms make an active contribution to nature restoration at sea. Per seaweed farm, about 800 reef-enhancing structures will be placed on the currently bare North Sea bottom for a long time. This leads to a sharp increase in biodiversity in the North Sea.

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<sup>1</sup> [Ostend Declaration](#)

<sup>2</sup> ["Seaweed for Europe - Hidden Champion of the Ocean - Report"](#) - 2021

<sup>3</sup> Target number and reference needed

## Where are we today in 2023

The seaweed sector is ready to scale up. Over the past 15 years, passionate entrepreneurs have discovered sustainably produced seaweeds as a versatile resource that can make a significant contribution to a sustainable and circular economy as a

- Biomaterial and as a substitute for plastics,
- Nutritious and protein-rich food (ingredient),
- Biostimulant (crop enhancer), an alternative to fertilizers or pesticides, and
- Valuable additive to animal feed.

At the moment supply chains are developing for each of these markets: from the production of seaweed seed, the cultivation of seaweed (seaweed farmer) to the processing, production and sales of products. These supply chains mainly comprise of small pioneering entrepreneurs but slowly existing industries are stepping. Either as direct supply chain player or as supplier/service provider.

Other stakeholders, researchers and knowledge institutions also recognize and confirm the added value of locally and sustainably cultivated seaweed for a future-proof society. Not only as products for the above-mentioned applications. Also as a potential building block for improved biodiversity in the North Sea. For example, through the use of eco-anchors and artificial reefs in combination with nature-inclusive cultivation. Finally, many entrepreneurs are already developing products and services that are needed in the sector such as (maritime) advice, seed material, processing machines. In short, the knowledge, the courage and the passion to take this sector to a higher level are already available today.

This large and growing group of seaweed entrepreneurs is eager to further expand their – often – innovative start-ups and scale-ups, and to make the use and production of sustainable seaweed as 'normal' as the use of grains in our food and sustainable energy in our homes. Within the sector organisation North Sea Farmers, 130 of these European companies, knowledge institutions and stakeholders have joined forces to further develop the sustainable and nature-inclusive seaweed industry.

However, the still young sector is now struggling in a number of areas. The first signs that companies cannot survive on their own are already becoming visible. Therefore, the sector urgently needs support from governments that helps them to make the seaweed industry a success and help build a sustainable and circular (blue) economy.

On behalf of the seaweed industry in the Greater North Sea Region, we offer this first draft of the 10-point action plan for 2030. This will form an integral part of the Seaweed Industry Roadmap that is currently being developed. The 10-point plan below lists the most important steps up to 2030 to allow the sector to mature, and to allow sustainably cultivated seaweed to contribute to the prevention of further climate change and the achievement of the Sustainable Development Goals as formulated by the UN.

## What is needed: 10 points until 2030

1. Set a European (EU commission driven) target for the production of circular resources at sea
  - a. Create an incentive for EU/European countries to develop specific seaweed subsidy programs including multi-year (>10yr) exploitation subsidies for seaweed projects
  - b. *For example: create an EU directive that requires a replacement of xx% of domestically produced non-circular fossil or agricultural resources with local circular resources.*
2. Encourage European countries to set up programmes to financially support exploitation (long-term) and innovation (short-term) of seaweed projects
  - a. Provide multi-year (>10yr) operating/exploitation subsidies for seaweed (farm) projects
  - b. This risk reduction measure helps project developers to attract funding and start more seaweed farm developments. These farms are essential for innovation and cost price reduction.
3. Communicate best practices on permitting and licensing procedures for seaweed farm operations throughout Europe
  - a. So countries may adopt best practices leading to more successful applications and more farms in Europe in less time
  - b. Also, governments are advised to include co-use as standard requirement in tenders for offshore wind farms, and
  - c. Finally, governments are advised to facilitate co-use projects with surveys, security measures, (financial) insurances and infrastructure
4. Work towards uniform European regulations on seaweed production and the 4 most important seaweed markets: food (ingredients), feed (additives), biostimulants (ingredients) and biobased materials.
5. Support research into validation of the ecosystem services of seaweed production & applications
  - a. so that the value of the seaweed economy becomes visible to policymakers, the market and consumers in terms of CO2 reduction, biodiversity & nature restoration and nitrogen absorption (or eutrophication).
6. More support from national government policy makers to help the seaweed industry developments:
  - a. Create more capacity at government ministries to directly support seaweed opportunities & challenges,
  - b. Collaboration with policy makers from existing industries is suggested as the emerging seaweed industry can provide solutions for agriculture, fisheries and fossil industries
7. Develop a central platform for sharing state-of-the-art scientific knowledge on seaweed cultivation, processing, and products, aiming for a fact-based overview to support the industry and its stakeholders
8. Stimulate the awareness of seaweed as a sustainable & local resource and the benefits of seaweed-containing products among market parties and consumers through marketing and communication.
9. Develop and communicate a clear positioning of locally and nature-inclusive grown seaweed in relation to imported or wild harvest seaweed.
10. Establish a European advisory committee of research and industry experts to identify state-of-the-art and promising developments to inform the industry and new subsidy programmes

## North Sea Farmers' Roadmap for the Seaweed Industry [early draft]

North Sea Farmers represents the European seaweed sector. It does this in particular with its members from the greater North Sea region and from the entire value chain. This North Sea Farmers' Roadmap has been developed in collaboration with these members. It sets out the ambitions for 2050 and how to get there. This is a "living document" that is constantly updated in dialogue between members and facilitated by NSF. It's still in draft and the outcomes of member dialogues, review of this paper and various other representation actions will be included this soon to be issued [NSF Roadmap for the Seaweed Industry](#)

### Seaweed production in the greater North Sea area in 2050

The aim of the sector is to scale up the cultivation of cultivated seaweed in the greater North Sea area to between 1-10 million tonnes of fresh seaweed per year from 2050. This spread is still large because it is not yet clear what annual amount of biomass is feasible in relation to the carrying capacity of the North Sea ecosystem. This will have to be further investigated in the coming years through research in pilot projects offshore and nearshore.

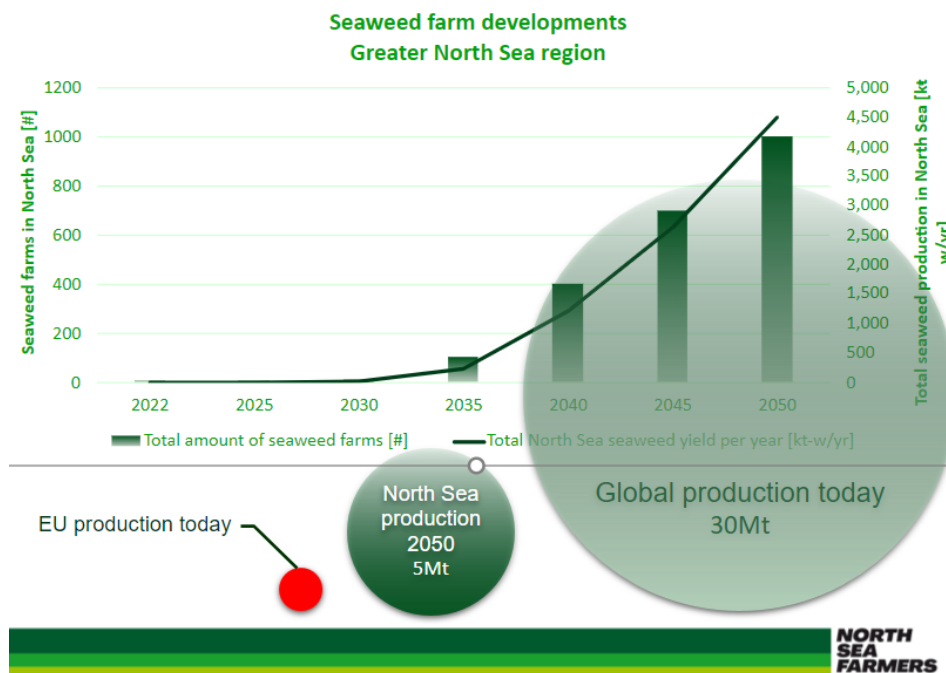


Figure 1: Overview seaweed production to 2050 in biomass t-wet and number of seaweed farms

### How much is 5mln t-wet seaweed?

If we take the average of the above with 5mln tonnes (1-10mln t) then that sounds like quite a lot, but at European level it is not so much or rather, actually not enough. If you compare 5mln t-wet with, for example, the meat industry in Europe (see figure below) you will see that this is much larger with 43mln tons. In other words, if you would have the ambition to replace 10% of the meat industry with seaweed proteins, you would already need much more seaweed than this 5mln t because you still have to make the conversion to dry weight and protein. In short, 5 million tonnes seems like a lot for the North Sea, but for the European market it is actually still far too little. Fortunately, the North Sea is not the only area in Europe where seaweed could be produced, so with the farms in sheltered areas and other regions in Europe we can get a lot closer to replacing linear markets with circular seaweed supply chains.

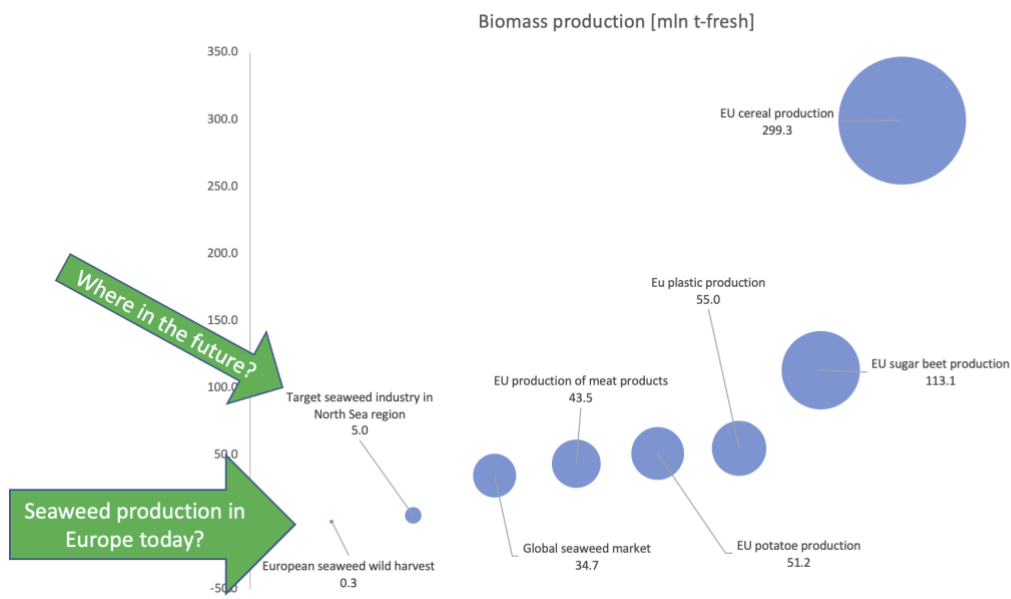


Figure 2: Potential European markets for seaweed-based products

### Number of seaweed farms in the greater North Sea area in 2050

To be included

# Seaweed is Good

*For us, for nature, for our planet*

**North Sea Farmers:** *Invest in seaweed, the resource of the future!*

Making possible what seems impossible today. That is in the blood of the seaweed pioneers in the North Sea Farmers network. Together, because alone you're faster but together you'll come further.

We all believe in seaweed as resource of the future. A raw material that does not need fresh water and land to grow. Which is truly renewable, contributes to a clean blue planet and is forms a home for new marine life. Seaweed is a natural resource that will replace linear and polluting supply chains. That enriches agricultural land in a natural way. And that offers a nutritious and plant-based alternative to animal protein. Seaweed is good. That's what we all believe in and that's what binds us

That is why we are building the first seaweed farm in an offshore wind farm. Close by, on our own North Sea, with and for the seaweed industry. Together, we'll create a blueprint for seaweed cultivation of the future and a fair value chain for all players; from farmer to consumer. This is how we bring local and sustainable seaweed to your home. From seaweed seed to seaweed sock.

**Make an impact with Forebel X North Sea Farmers socks** [*this is an idea we're testing to see if this could help to promote seaweed with consumers. Note: a small portion of revenue would go to NSF to support us in our mission*]



Together with North Sea Farmers, Forebel developed a cheerful collection of socks that contribute to more seaweed in our lives. Seaweed as a sustainable alternative, for a clean blue planet, and a home of new marine life.

With every pair sold, we bring seaweed as the resource of the future closer to your home. First of all, as a sock!

Create impact!

- Sell them in your own webshop / store
- Buy a batch
- Carry them yourself

Buy Forebel X North Sea Farmers socks? Check [HERE | Forebel](#)