

Seaweed Smarter, Not Harder: How we can sea-weed together to support the value chain

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Chair of the Seaweed Network in Denmark

Vice-president of the International Seaweed Association



Danish Seaweed

- Green/blue business for future food
- Collect seaweed





Danish Seaweed

- From the pure
Danish nature!

Michelin supplier for some of the
best restaurants in the world



[Click here!](#)



Seaweed business



Value chain of seaweed



Urd G. Bak 2019

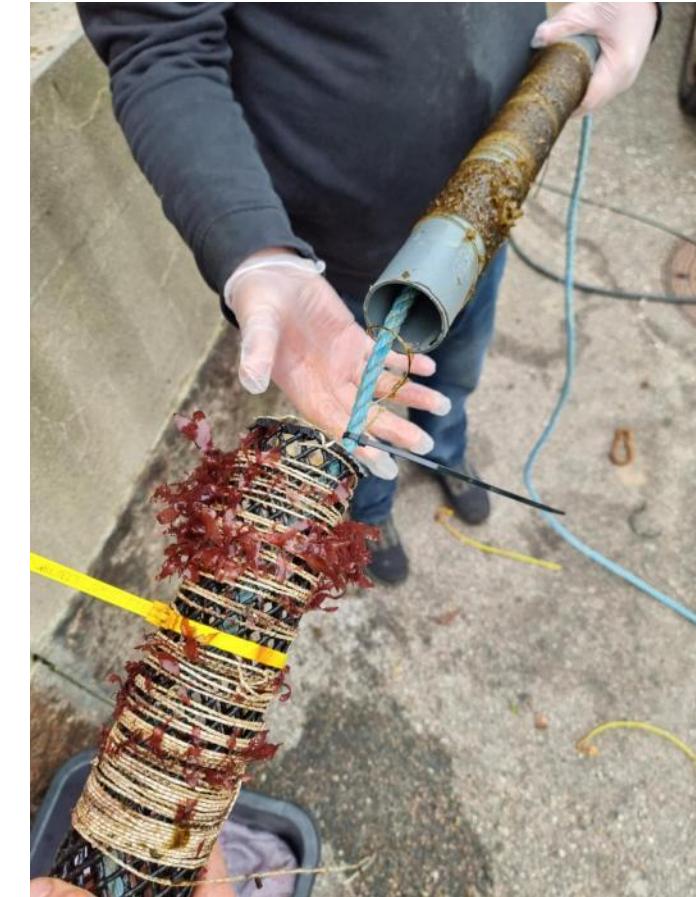
Value chain of seaweed



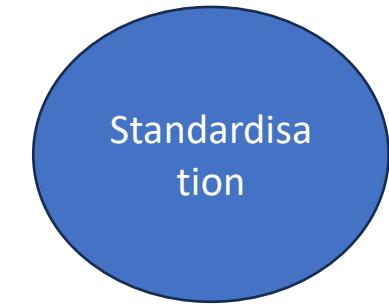
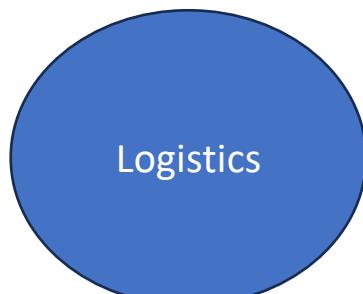
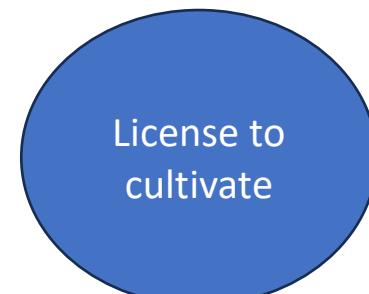
Urd G. Bak 2019

- Each company needs to work on the whole value chain
- And also navigate in a **lack of best practice and clear/no legislation**

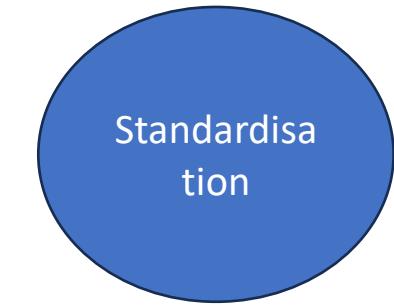
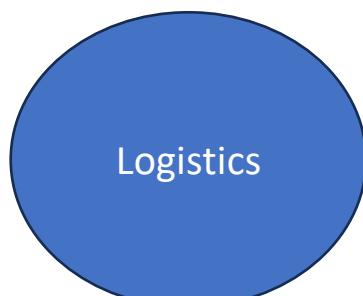
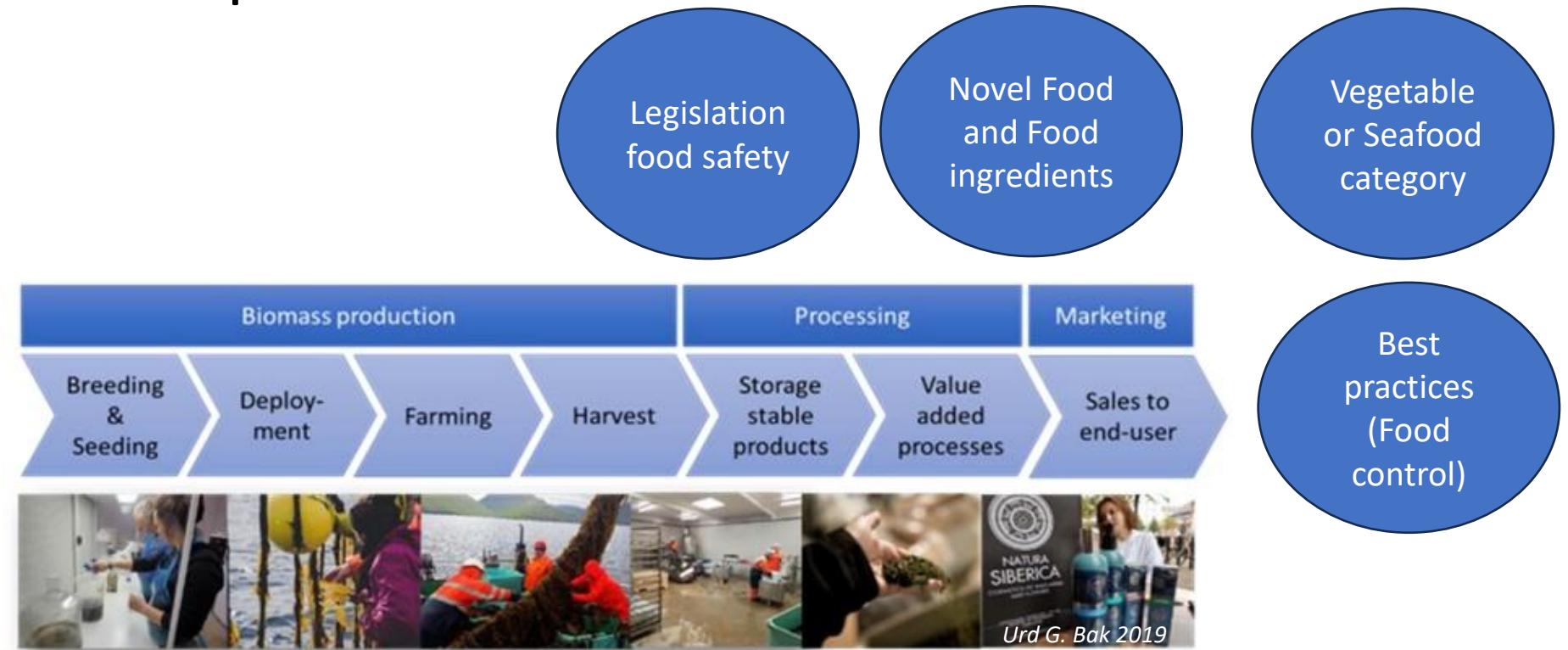
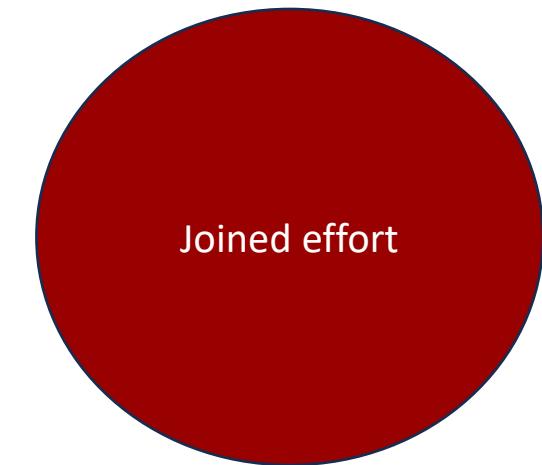
From product focus to production (supply security)



(full) Landscape of the value chain of seaweed

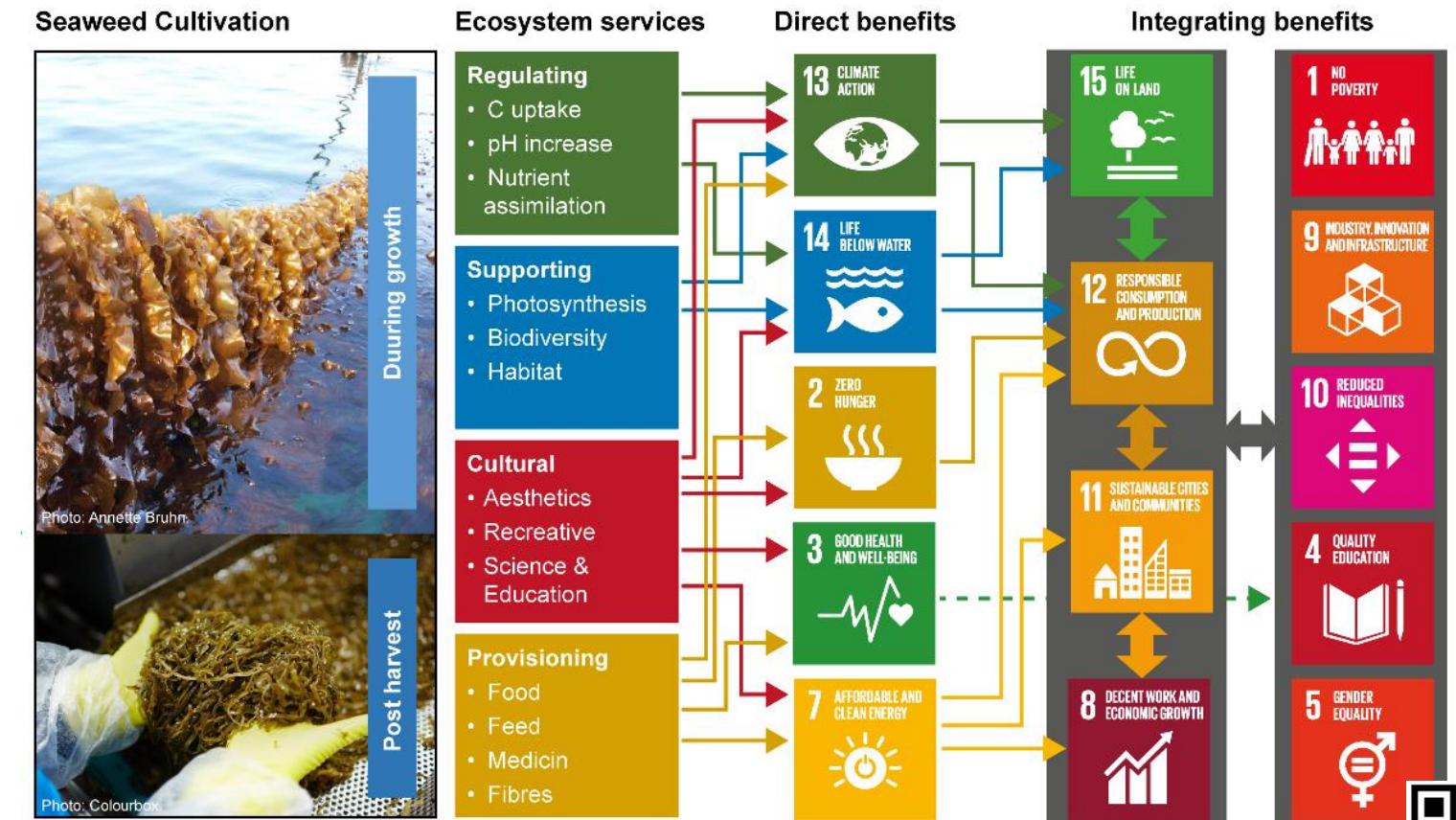


(full) Landscape of the value chain of seaweed



Seaweed as the GOAL

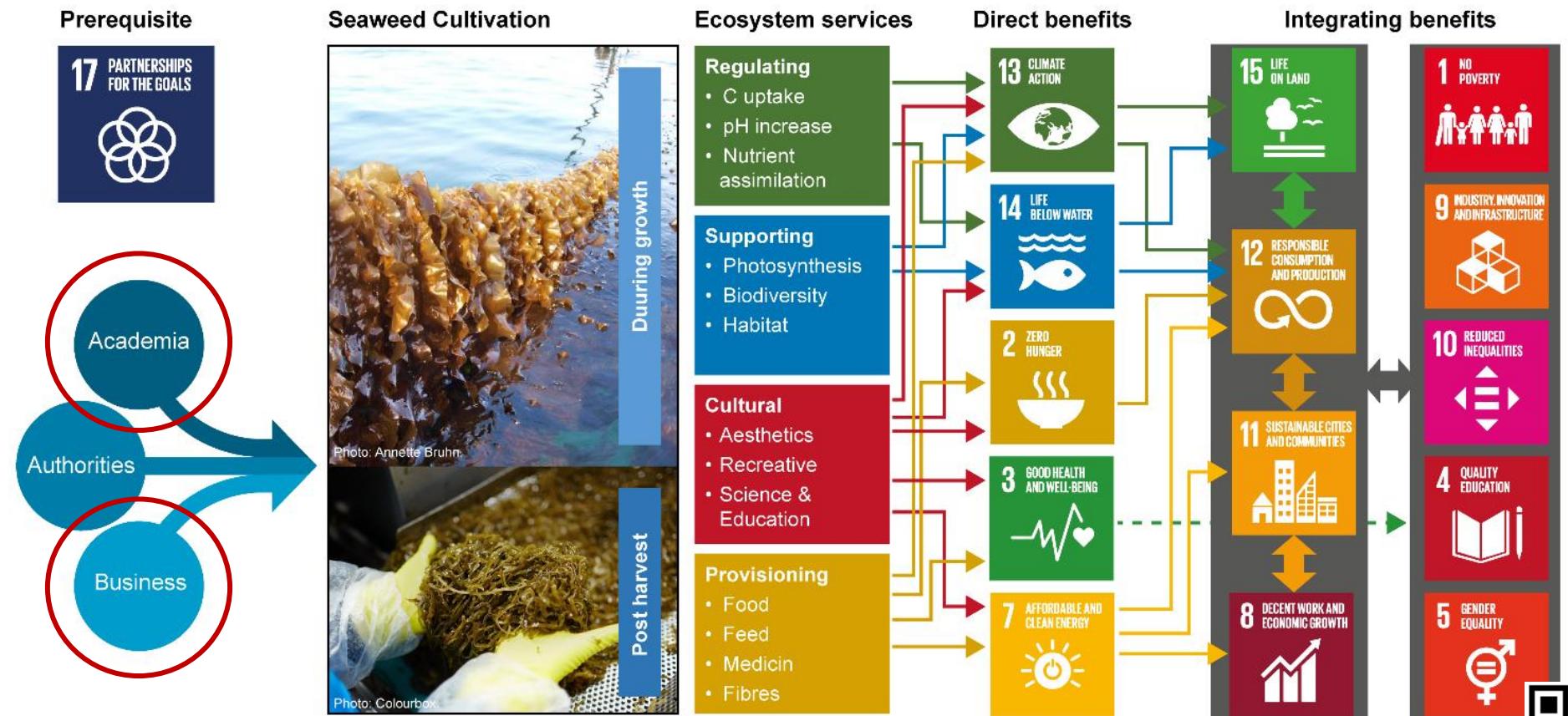
Joined effort



Duarte et al, 2021



Seaweed as the GOAL



Duarte et al, 2021



Documentation and knowledge

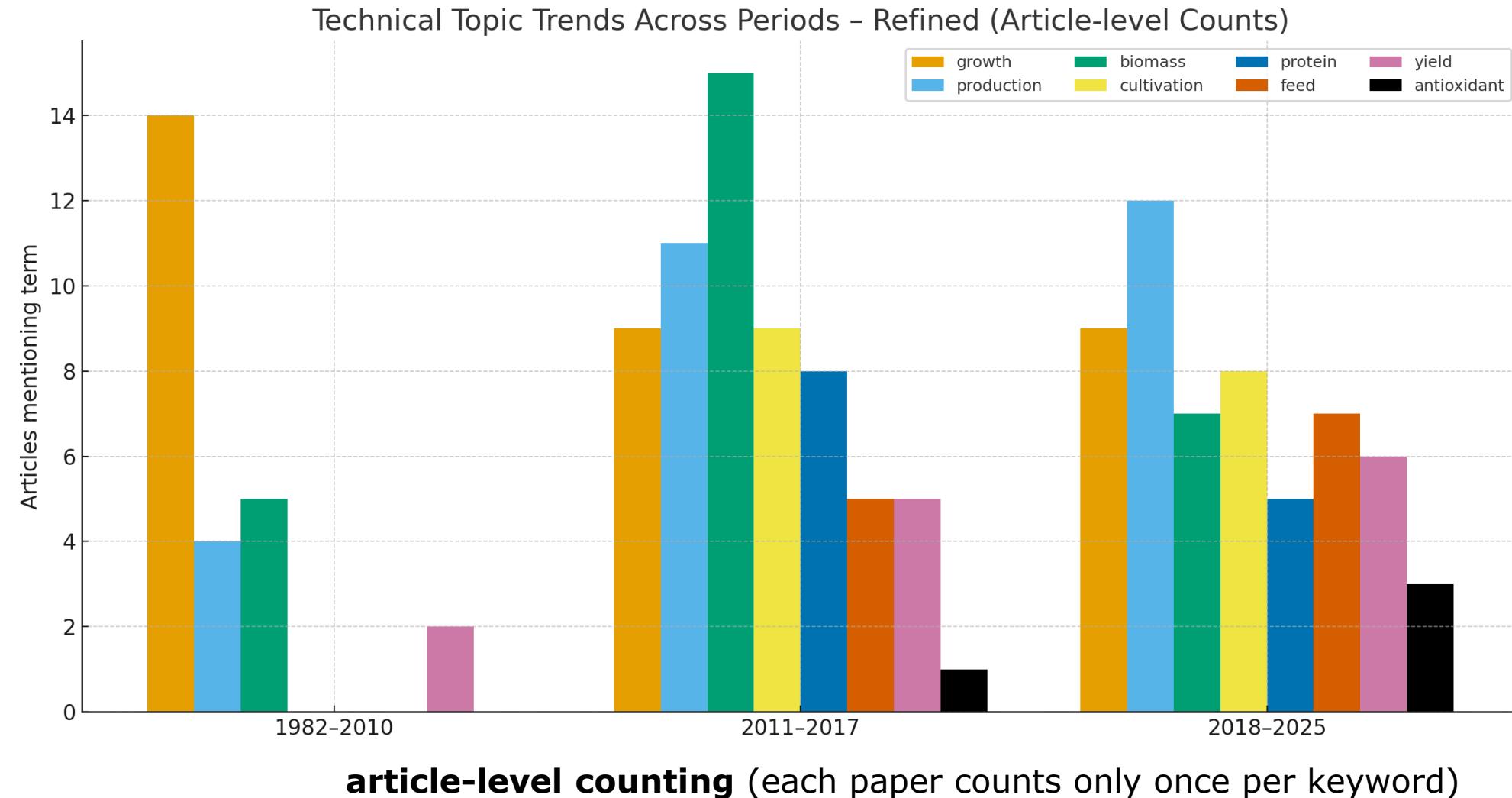
- Seaweed /algae are FOOD
- Convince the authorities about this
 - Documentation necessary
 - Research institutions are objective
- Ensure safe future solutions
- Business within a "reasonable framework"

*AI prompt: make a picture on documentation needed for **Seaweed** as safe future FOOD*



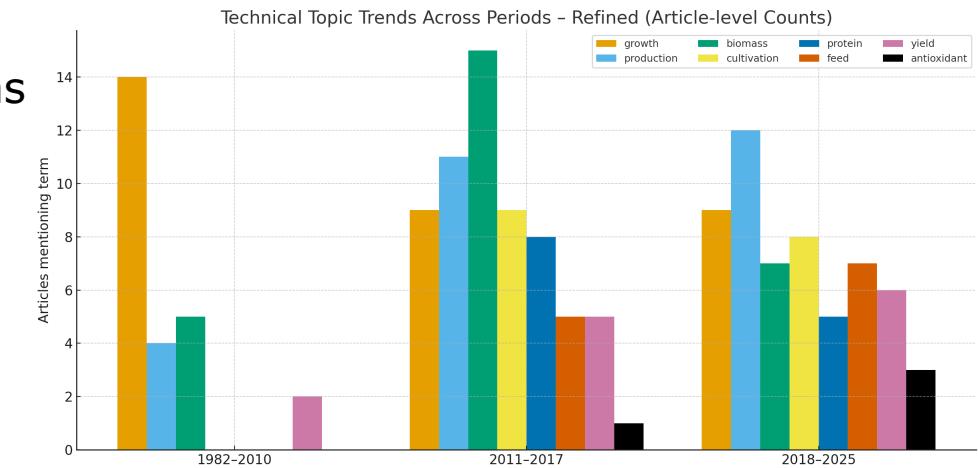
Articles:

Technical Topic Trends Across Periods (title and abstract)



The research focus in Danish seaweed publications has shifted over time

- **1982–2010:** Early work was dominated by **growth and biomass observations**, with scattered mentions of production.
- **2011–2017:** A transition phase with increased attention to cultivation, production, and protein, indicating a **move toward applied research**.
- **2018–2025:** A clear shift toward valorization and application, with **stronger emphasis on protein, feed, antioxidants, and bioactive properties**, while growth and biomass are less central.



Overall, the trend shows a progression from **basic biological research** → **cultivation and production** → **application and value-added products**.

Research made into breakthroughs for industry

- In collaborations with industry



Urd G. Bak 2019



Cultivation
New species
Strain selection
Seeding





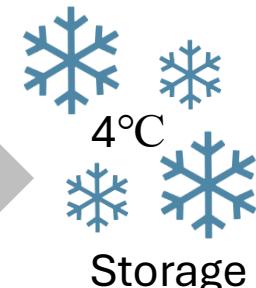
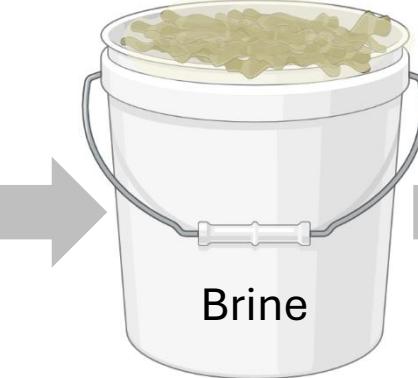
Cultivation
Material
Site selection
Upscaling





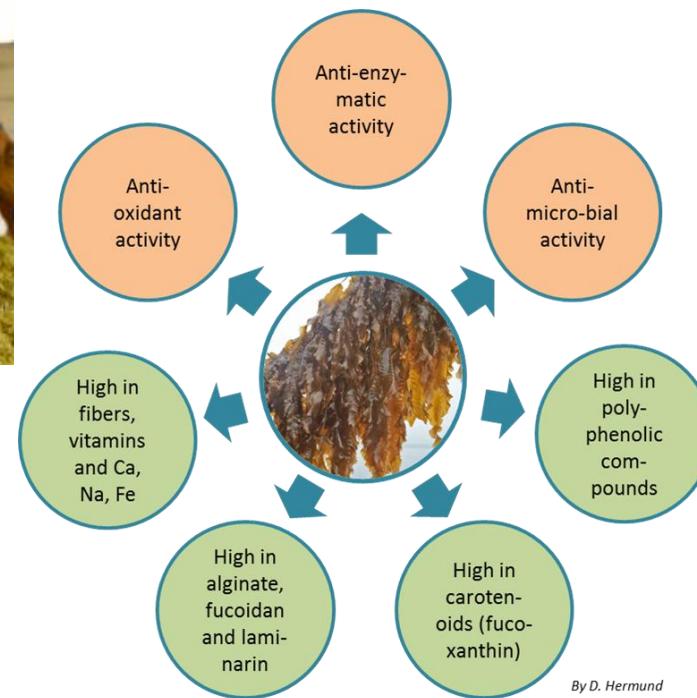
Technologies
Upscaling
Mechanization



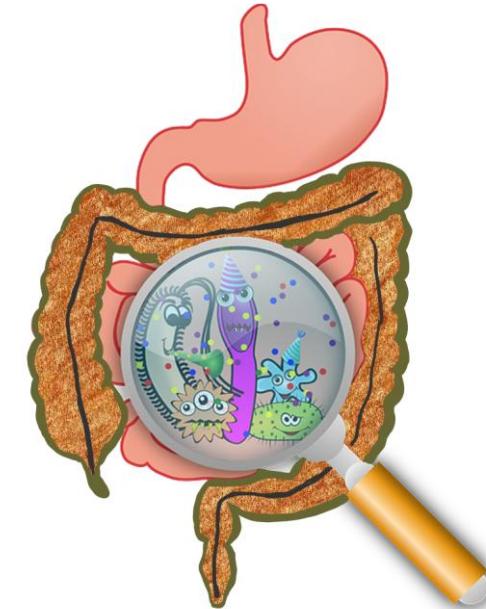


Technologies
Food safety
Blanching
Fermentation
Brining
Opt-Equipment





Multi-extraction
Ingredients
Pigments
Cosmetics
Methan reduction
Gut health





"Seaweed snack are serious gourmet sh....!"





Dry-salting



European Commission | EN | Food, Farming, Fisheries | Food Safety | Home | Food Safety | Animals | Plants | Horizontal topics | Home > Food Safety > Novel Food > Novel Food status Catalogue (New)

Novel Food status Catalogue (New)

As of 16 November 2023, a revised version of the [Novel Food status Catalogue](#) has replaced the former version. This revised version adds new foods (algal species and food cultures), updates the novel foods status of the foods listed in the catalogue and brings the following new features:

CEN Technical Committee 454 'Algae' has started the development of 10 standardization deliverables

EUROPEAN STANDARDS FOR ALGAE

energy@cen.eu

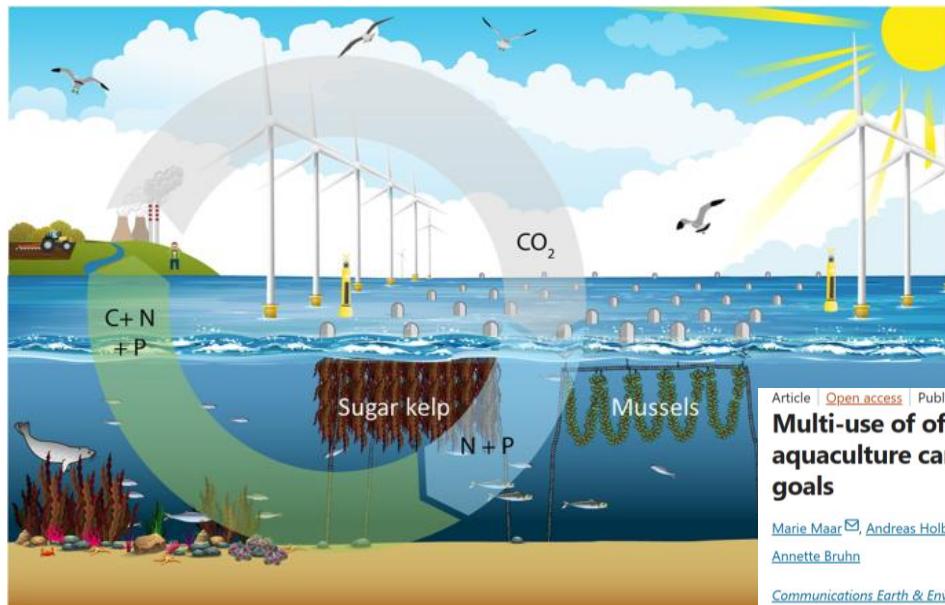


Environment
Spatial planning
Ecosystem services

- N and C credits

LCA

- Identify opt



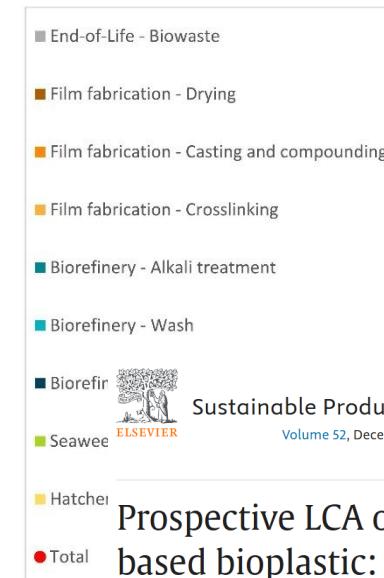
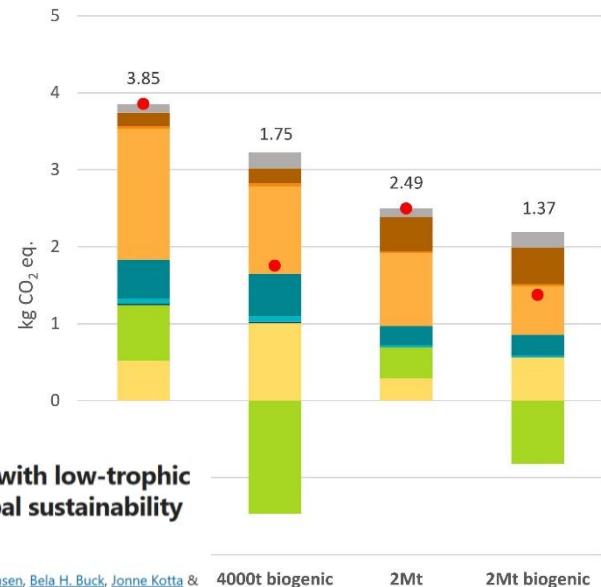
Article | [Open access](#) | Published: 29 November 2023

Multi-use of offshore wind farms with low-trophic aquaculture can help achieve global sustainability goals

Marie Maar [Andreas Holbæk](#), [Teis Boderskov](#), [Marianne Thomsen](#), [Bela H. Buck](#), [Jonne Kotta](#) & [Annette Bruun](#)

Communications Earth & Environment 4, Article number: 447 (2023) | [Cite this article](#)

18k Accesses | 27 Citations | 48 Altmetric | [Metrics](#)



Sustainable Production and Consumption
Volume 52, December 2024, Pages 416-426

Prospective LCA of brown seaweed-based bioplastic: Upscaling from pilot to industrial scale

Maddalen Ayala ^a, Neill Goosen ^b, Leszek Michalak ^c, Marianne Thomsen ^d, Massimo Pizzol ^a

Still obstacles in the value chain

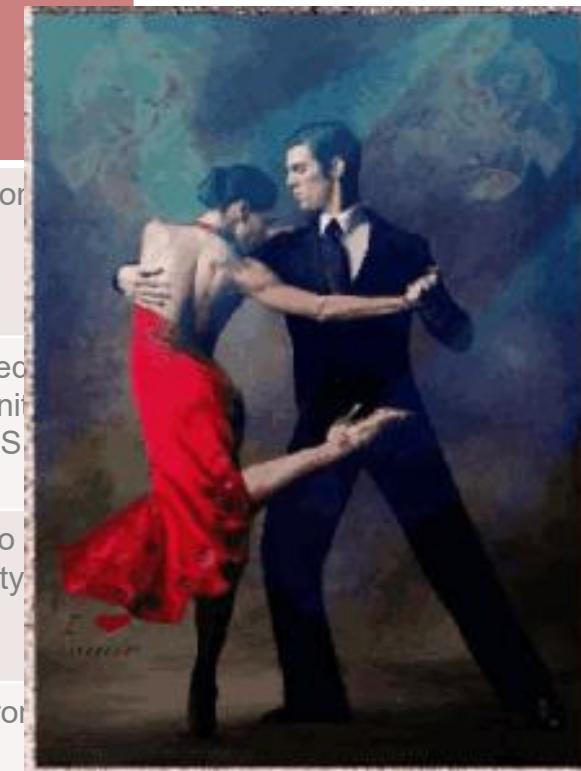
- Contaminants/PTE's- new suggestion from EC/EFSA
- New species/Novel Food (authorisation takes 5-7 years)
- Classification codes/best practices:
 - Companies
 - Food authorities for their control visits

Nice to have....

- Standardisation- what are we trading?



Danish Networks' Meetings, Conferences, Dissemination & Business Involvement

Aspect	Tangnetværket Seaweed Network in DK (2008- now)	Algecenter Danmark (2010- now)	Danish Seaweed Organisation (2015-2020)	
Meetings & Workshops	Member meetings, excursions	Internal working groups	Workshops, exhibitions	
Conferences & Events	Company visits Public events Reason for getting ISS 2016 to DK	Nordic Seaweed Conference	Food Expo (Seaweed bussiness as one/unit) SME's pitched at ISS	
Dissemination	Newsletters, Tangnet.dk	News, project updates	One entry website to seaweed, food safety	
Business Involvement	Inclusive membership,science, chefs, SMEs, general public	Science-Industrial Network	Joint sales, trade pro	

Summary of SWOT Evolution- Danish Seaweed Business

Category	2012 (Key Points)	2021/23 (Key Points)
Strengths	Trust, community , green transition, political attention, species diversity	Knowledge sharing, openness, lifestyle trends, fundraising

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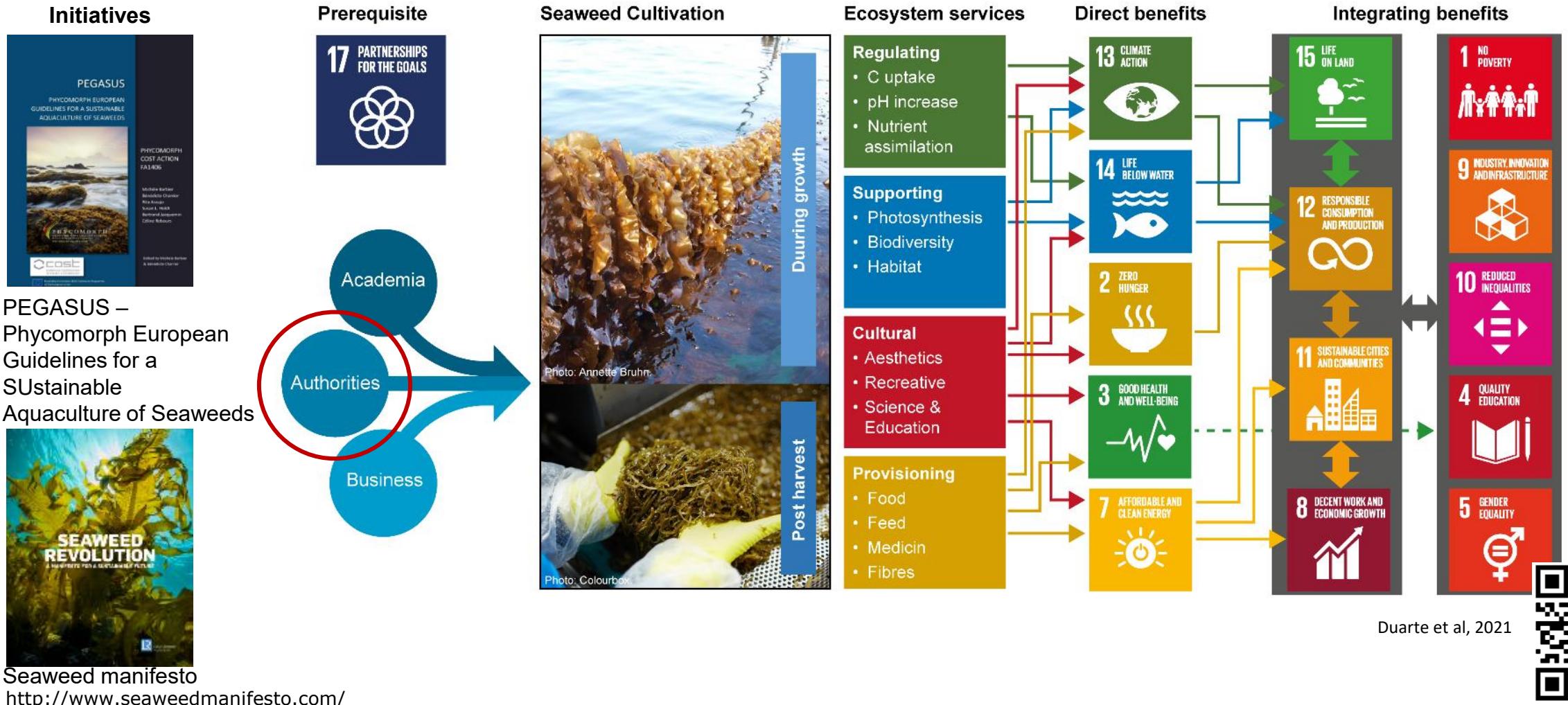
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Threats	Climate change, legislation, heavy metals , lack of capital	Scaling risks, competition (Norway), sea space, diseases, image risks

Seaweed as the GOAL



Seaweed manifesto
<http://www.seaweedmanifesto.com/>



EUROPEAN FOOD SAFETY AUTHORITY

Dorthe Licht Cederberg



Ministry of Food, Agriculture
and Fisheries of Denmark

Danish Veterinary and
Food Administration

Max Hansen
Toxicologist



DTU



Food advice to the authorities - DTU Food



- No limits on iodine
 - If limits people think it okey to eat it (and plenty) if below the threshold level
- Collect seaweed from clean waters.
- Avoid seaweed species with high arsenic content (hijiki and bladder-bearing sargassum).
- Eat seaweed on special occasions (not every day). This also applies to producers.
- The more seaweed you eat, the more important it is to choose species with a low iodine content.
- Denmark (and Norway)



Stakeholder meeting Sept 26, 2025





 **efsa** 
EUROPEAN FOOD SAFETY AUTHORITY



**Ministry of Food, Agriculture
and Fisheries of Denmark**
Danish Veterinary and
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Stakeholders
1 voice



2 to TANGO: Seaweed and microalgae – in step for the future of food

- Industry organisation
- Novel food-more species approved for food
- Control guidelines
- Dietary advice
- Much more....

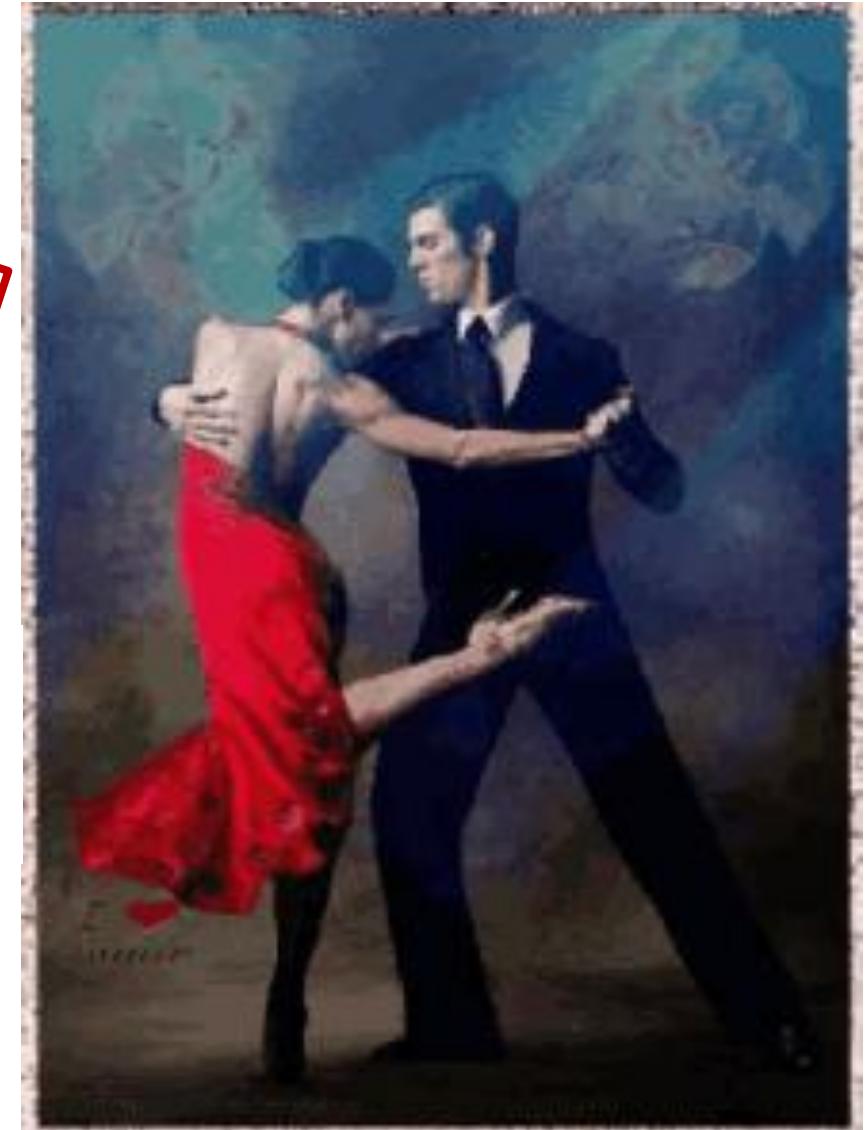
*Any initiative in other EU countries
- please let me know*



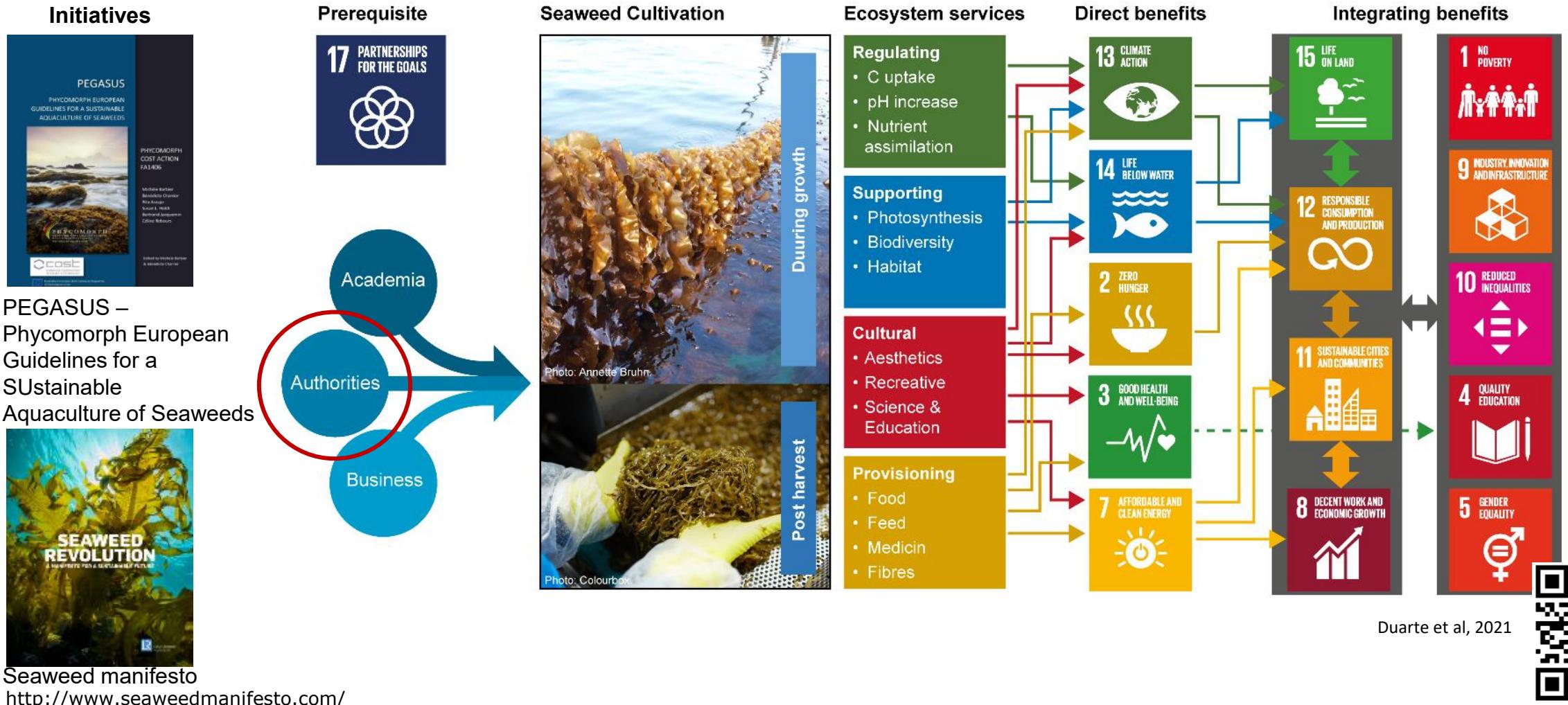
**PLANT-BASED
FOOD GRANT**



DanskTANG
- SEAWEED



Seaweed as the GOAL



PRESS RELEASE Nov 15, 2022

Commission proposes action to fully harness the potential of algae in Europe for healthier diets, lower CO2 emissions, and addressing water pollution

Today, the Commission adopted the Communication '[Towards a strong and sustainable EU algae sector](#)', a pioneering initiative to unlock the potential of algae in the European Union. The Communication proposes 23 actions to create opportunities for the industry to help it grow into a **robust, sustainable and regenerative sector capable of meeting the growing EU demand**. The EU is **one of the biggest importers of seaweed** products globally, and the demand is expected to reach €9 billion in 2030, especially in food, cosmetics, pharmaceuticals, and energy production.

Next steps

The Commission will discuss today's communication with the European Parliament and the Council. **The Commission will coordinate putting the 23 actions into practice with the Member States, industry (e.g. via the EU4Algae Forum) and other relevant stakeholders.**

The Commission will prepare a report assessing progress in implementing the Communication by the end of 2027.



DG Mare: Supported € 550 mill over the last 5 years



Network and knowledge sharing

Outreach and collaboration with authorities

- EABA
- AlgaEurope
- ISAP
- EU4Algae
- Global Seaweed Coalition
- ISA- International Seaweed Association



The Danish Seaweed Company

In dialogue with politicians- take them out in waders

Join research projects

Join networks and business collaborators

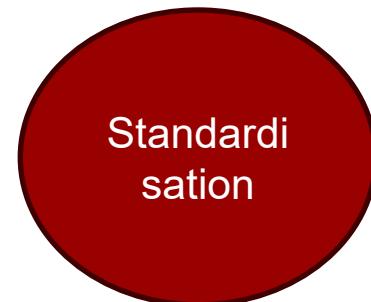
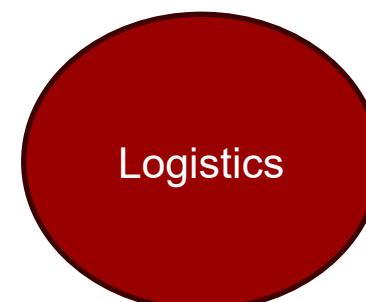
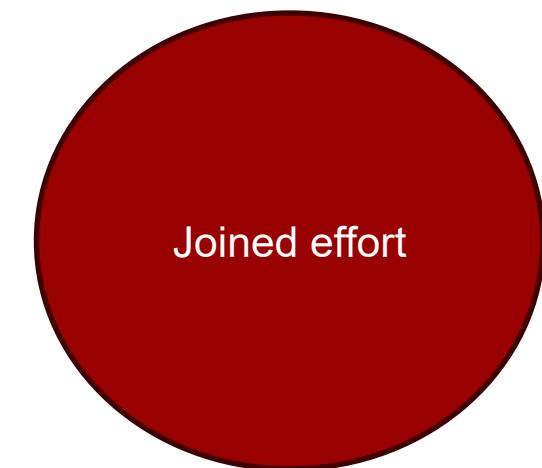


Long progress but:

- Just prolonged their existing cultivation license 10y more (but not answer yet on expanding/new licenses)
- New approved cultivation area
- Cultivation of new species?

License to cultivate

(full) Landscape of the value chain of seaweed



Friendly competitors

- We see each other as friendly competitors – working together to build the sector, even while competing



Product information

- Norway is making a good example in the Norwegian Seaweed Association
- Quality control
- Seaweed got a new name- brand
- SEA GREENS FROM NORWAY
- Registered, certified, HCAAP

Vegetable
or Seafood
category

Best
practices
(Food
control)



Kvalitetsstandard for merkevaren «Sea Greens from Norway»

Daglig kvalitetskontroll

Følgende dokument skal fylles ut på hver produksjonsdag.
Skjemene skal lagres og være tilgjengelig for revisjon inntil 2 år etter at varens holdbarhetstid har utløpt.

Dato for utfylling:

Værforhold under høsting (sol/regn/overskyet) og lufttemperatur under høsting:	
Lagring mellom høsting og videre prosessering (emballasje, sted, temp., tid):	
Er produksjonen registrert hos Mattilsynet?	
Er produksjonen GFSI-sertifisert (BRC, FSSC 22000 eller tilsvarende)?	
Følger produksjonen HACCP prinsippet? HACCP prosedyren må kunne fremlegges.	
Er produksjonen/produktet økologisk sertifisert?	

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Er produksjonen/produktet økologisk sertifisert?			

2. Kvalitetskontroll (gjøres i siste ledd før stabilisering/prosessering) Sjekk minimum 10 individer pr. batch

Dato og sted for kvalitetskontroll, ansvarlig person:

.....

a) Visuell inspeksjon og sortering

	Ja	Nei	Kommentar
Er festeorganet fjernet:			
Har taren frisk lukt:			
Er taren blank/fuktig og brun, uten grønne flekker, og ikke tørket ut:			
Har taren fast og fin tekstur, ikke falt sammen og blitt myk:			
Har taren blitt skylt/vasket?			
Hvis ja, spesifiser metode og vannkvalitet.			
Er taren sortert? Hvordan?			

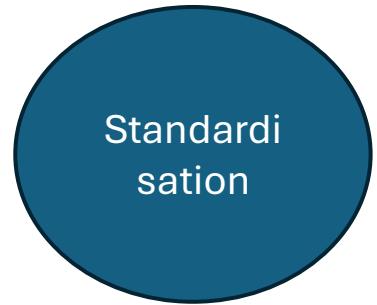
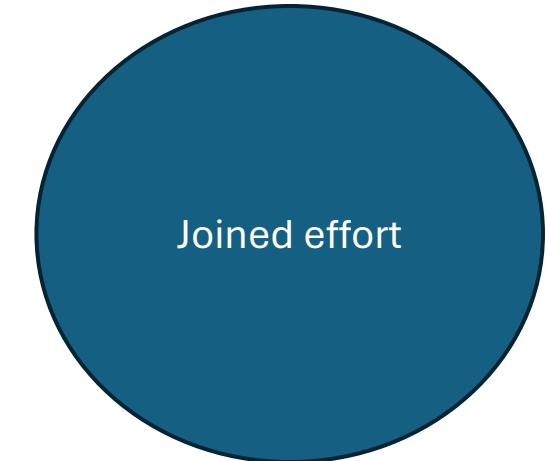
Friendly competitors

- Every time we give consumers a good experience with seaweed- we all benefit
- Market is large enough
- And growing



(full) Landscape of the value chain of seaweed

- Growing....specially if some of these issues are matured

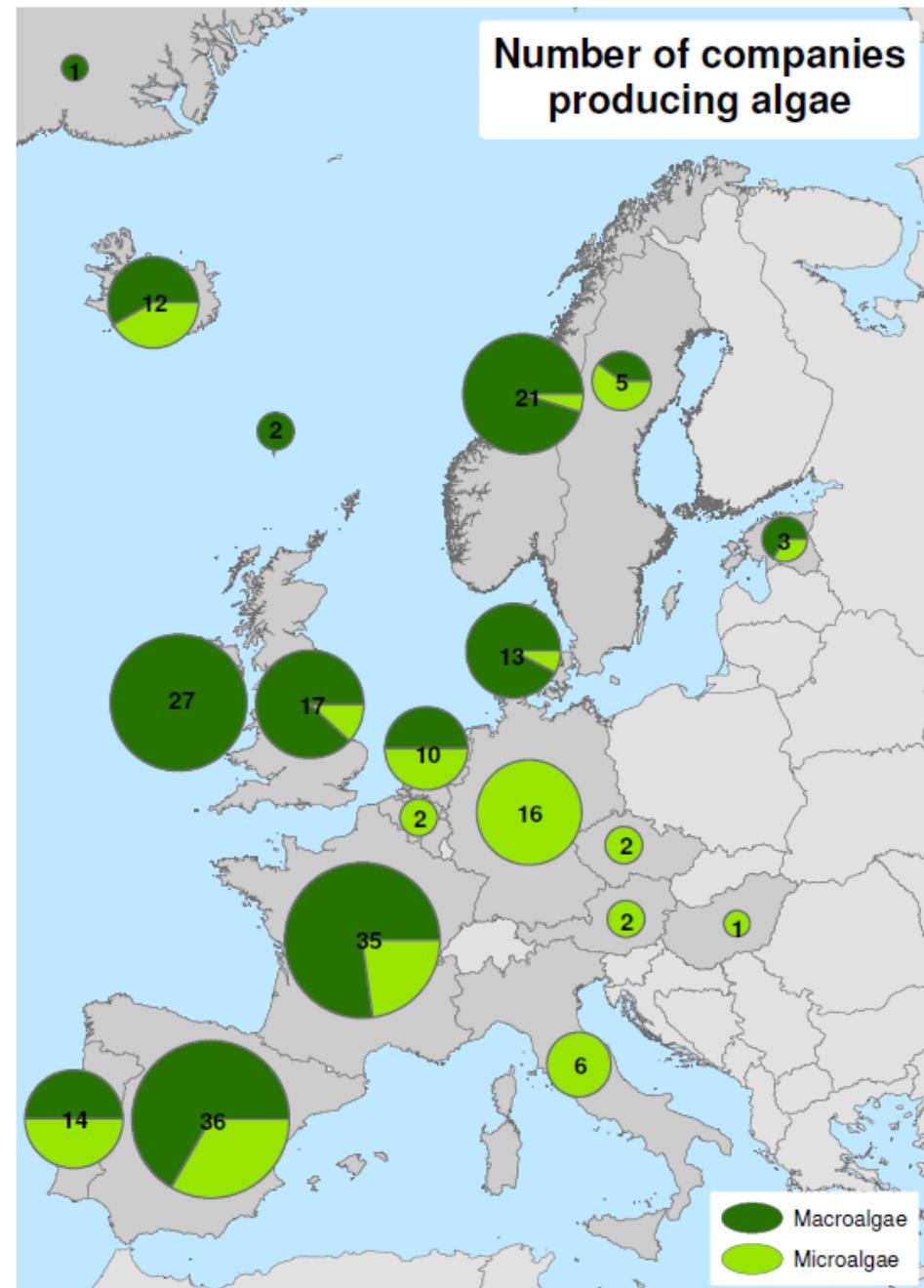


Distribution and number of companies

- Seaweed companies are located along the coasts
- Main actors:
 - Ireland, Spain, France, Norge

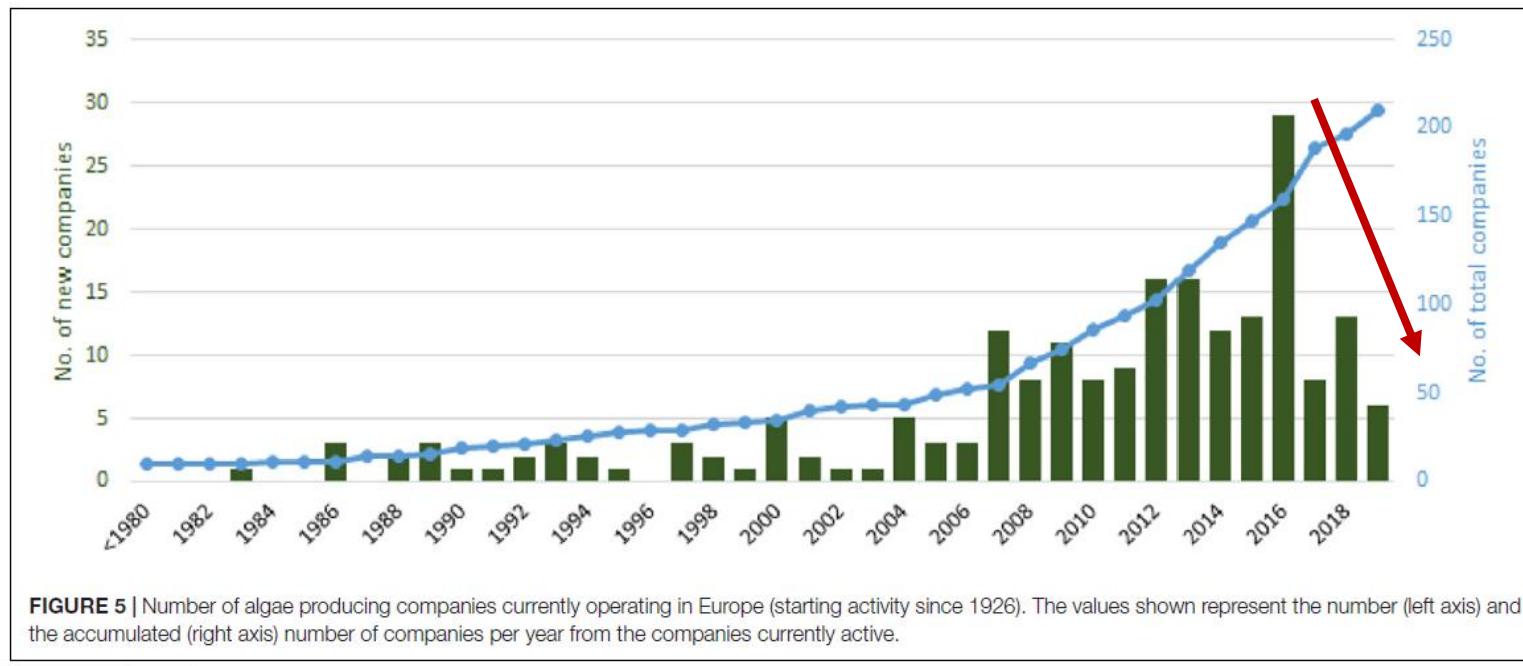


Araújo et al 2021



Companies cultivating microalgae and seaweed

- Linear increase in total companies over the years (approx 200 in 2020)
- New companies activity in the last decade increasing with 150%
- Decrease in new companies since 2016



Some constraints for sector expansion:

- small market size for algae commodities in Europe
- variability in the annual biomass supply- supply security
- current state of technological development in the production and processing of biomass
- complexity and/or inexistence of some EU and national regulations in aspects:
 - cultivation licenses
 - limit values for harmful metal
 - organic certification

Araújo et al 2021

Conclusions

- Seaweed is a great food opportunity and business
- The whole value chain needs to be addressed
- Seaweed smarter- work with friendly competitors
- Joined force between academia, business and authorities
- Information and documentation
- More great collaborations and synergies needs to be enforced
 - For the future seaweed food opportunity to be realised
 - Give seaweed business a "reasonable framework"

