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Secretary General of the International Seaweed Association

THE FUTURE- A perspective from Denmark and Europe

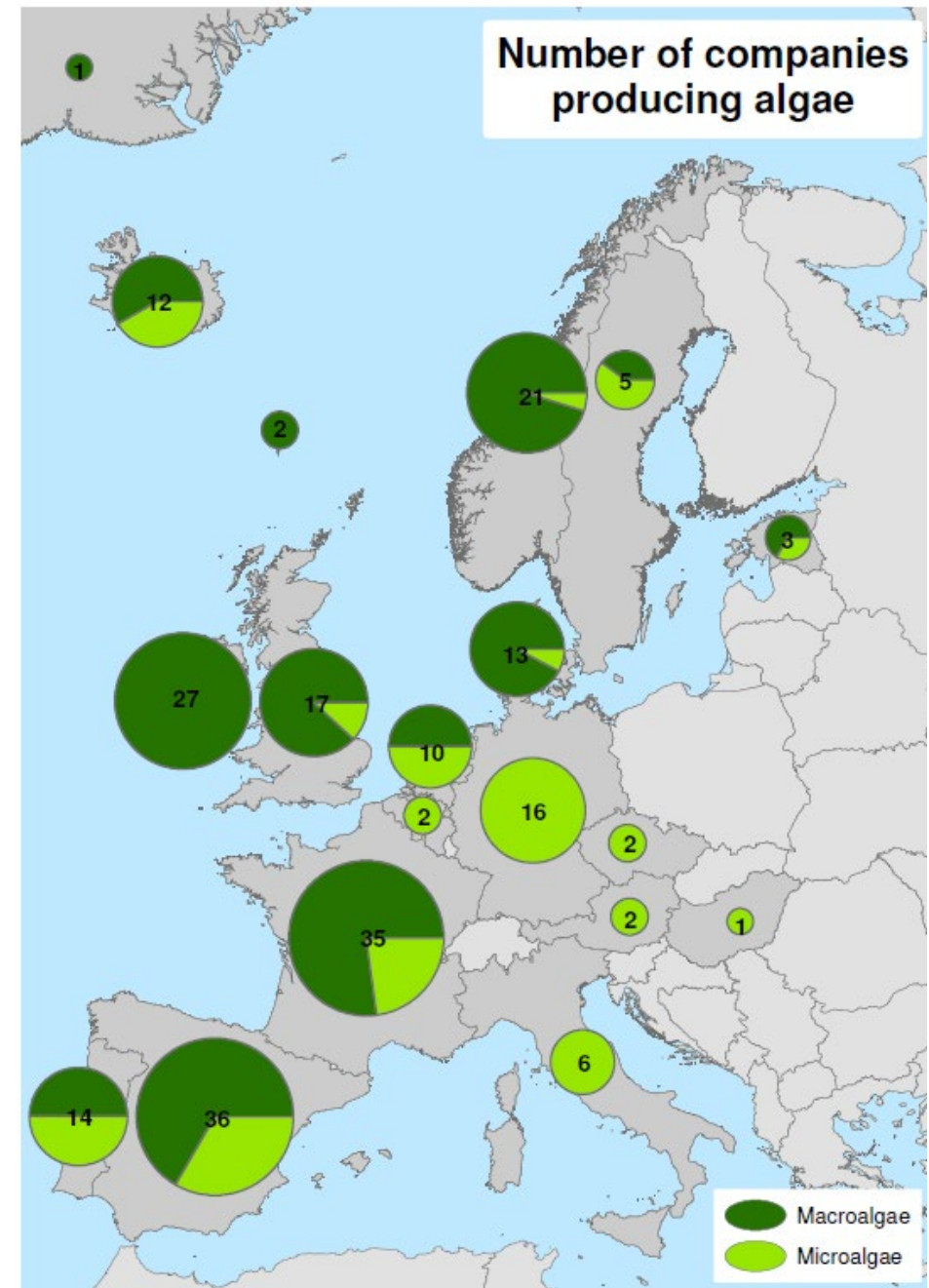
Agenda

- Seaweed as the goal (SDG)
 - Number of companies in Europe
 - Harvested or cultivated
 - Species
 - Methods of harvest
 - Volumes
 - Uses
 - Constraints
-
- Current status and FUTURE



Distribution and number of companies

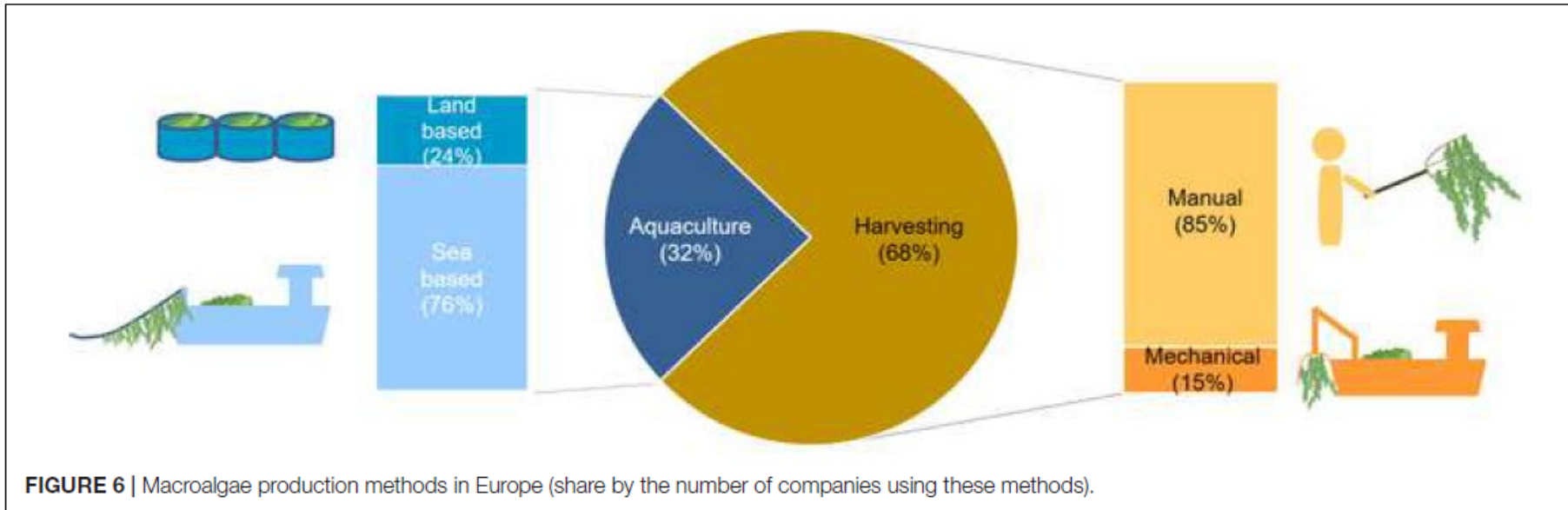
- Seaweed companies are located along the coasts
- Main actors:
 - Ireland, Spain, France, Norge



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Aquaculture vs harvesting seaweed

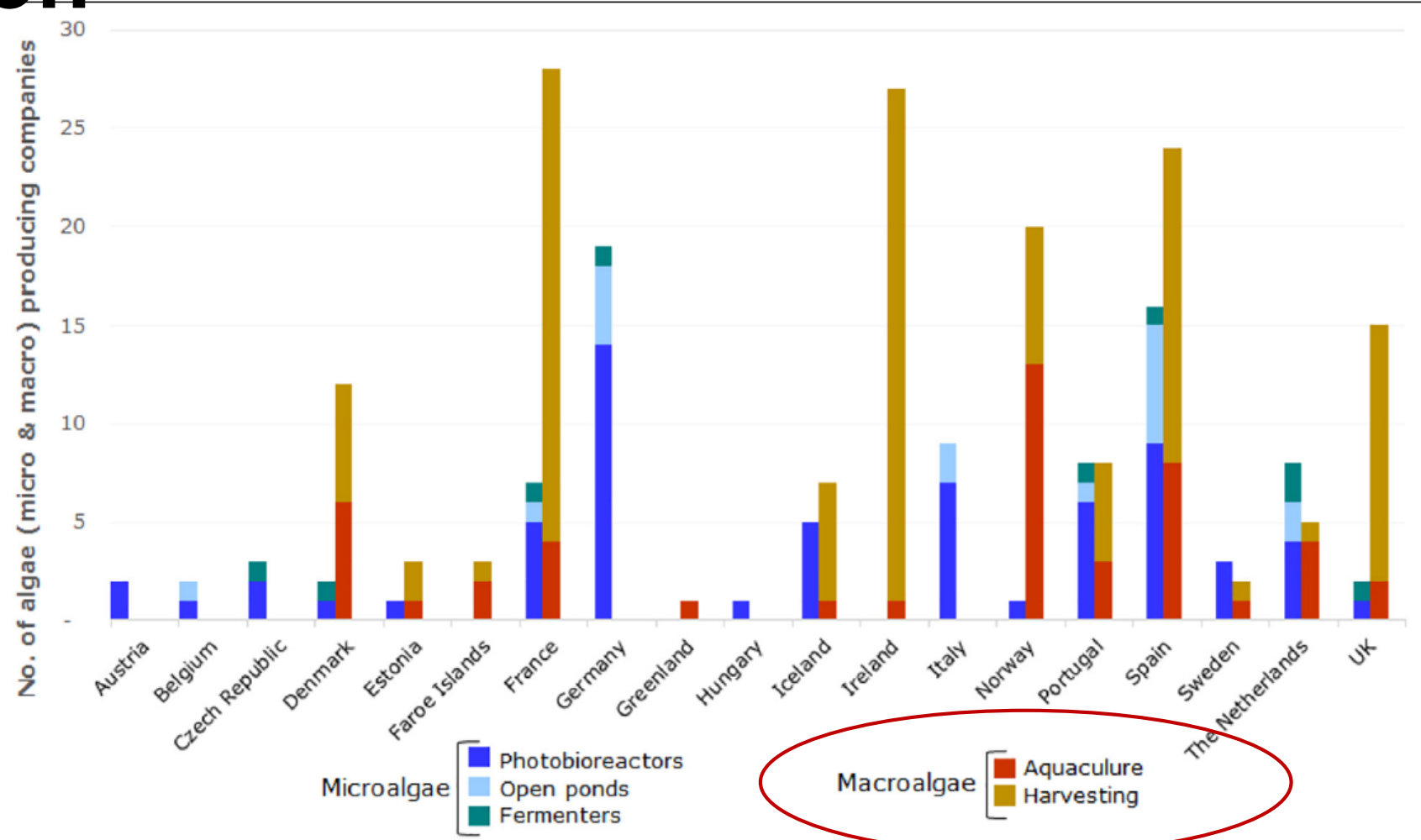
- Still wild harvest companies are the majority
- Mainly manual work
 - Future R&D
- Aquaculture mainly sea based



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Aquaculture and harvesting company distribution

- Manily companies harvesting seaweed biomass



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FIGURE 4 | Numbers of macro- and microalgae producing companies in Europe broken down by production technology and country.

Volumes of seaweed

- Harvested total approx. 300,000 tonnes
- Aquaculture total approx. 500 tonnes (0.2% of harvested)
- Less species domesticated for aquaculture
- 10 tonnes per company for aquaculture

Aquaculture	Companies	tonnes (ww)
Others (Chondrus, Codium, Gracilaria, Porphyra sp., Undaria sp. etc)	26	n.a.
Saccharina latissima	26	376
Alaria esculenta	16	103
Ulva sp	10	50
Laminaria sp	8	n.a.
Palmaria palmata	6	n.a.
TOTAL		529
tonnes per company		10

Harvested	Companies	tonnes (ww)
Others (Alaria esculenta, Asparagopsis sp, Codiumsp, Gelidium sp., Gigartina, Lithothamnium, Mastorcarpus, Osmundia, Vertebrata)	80	n.a.
Ulva sp	38	217
Fucus sp	37	n.a.
Laminaria sp	37	209.772
Palmaria palmata	35	455
Porphyra sp	25	n.a.
Ascophyllum nodosum	24	82.476
Chondrus crispus	23	186
Himanthalia elongata	29	10
Saccharina latissima	25	n.a.
Undaria pinnatifida	22	294
Furcellaria lumbricalis (harvest and collected)	3	1.450
TOTAL		294.860
Species of seaweed (FAO, 2020; Araújo et al 2021; free after)		

Seaweed utilization

- Market share: Human food > cosmetic > food supplements > feed/fertilizer.....

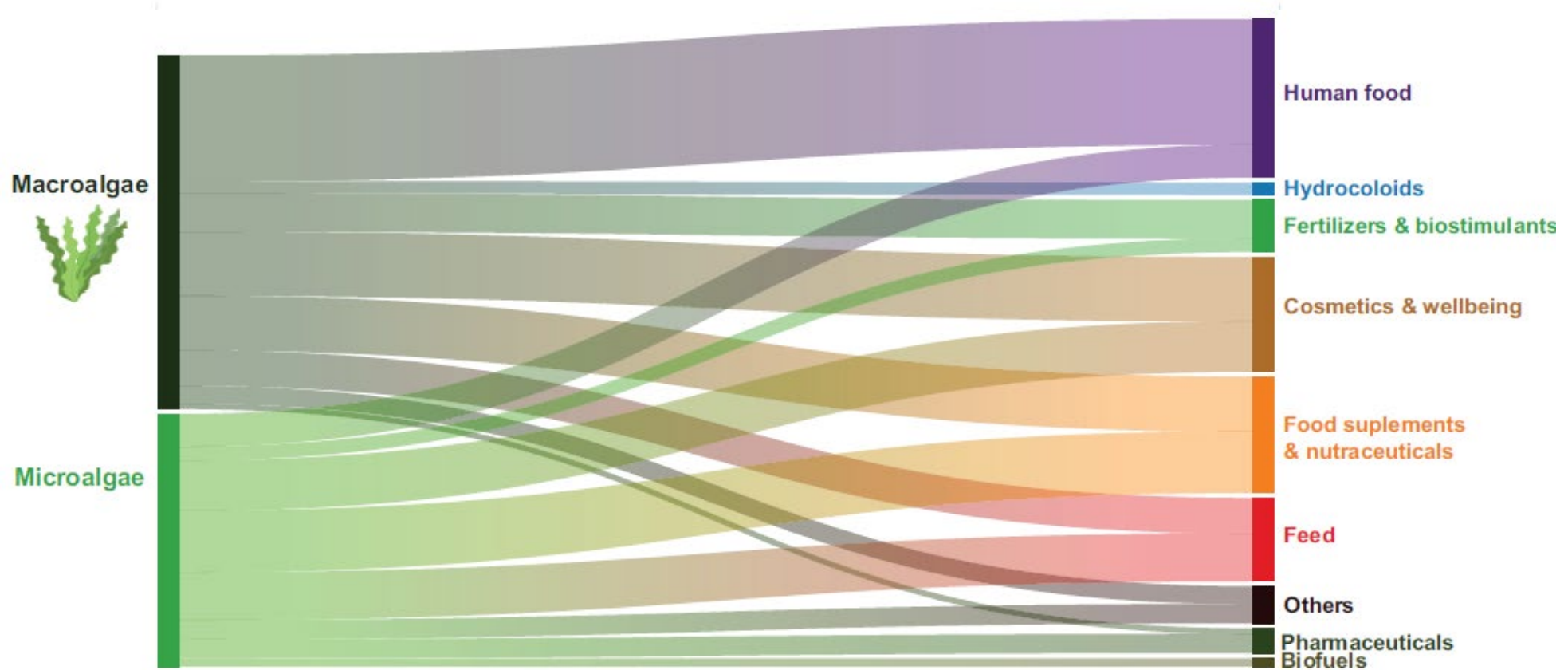
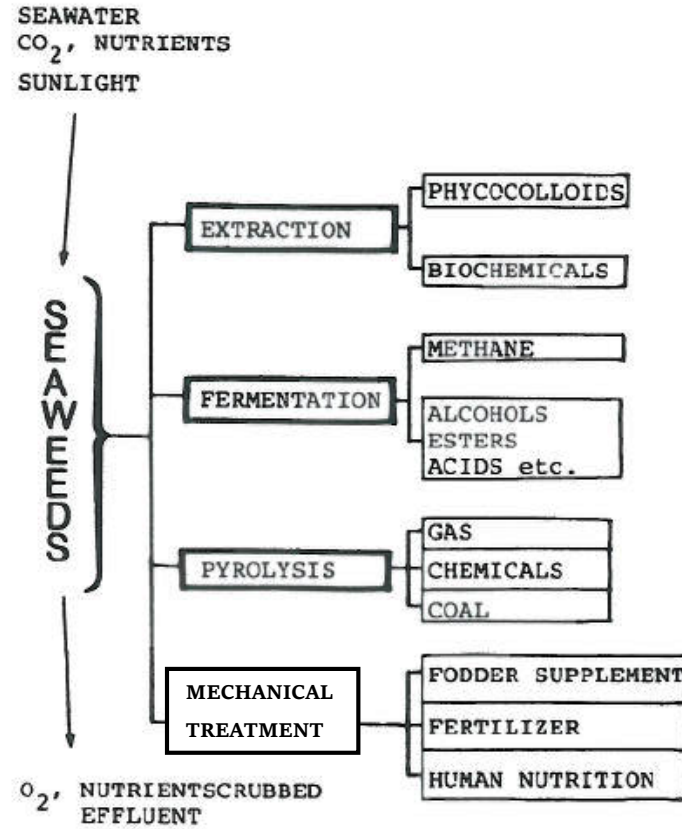


FIGURE 9 | Share of commercial biomass applications by macroalgae and microalgae production company. These results are based on the share in the number of companies (not by volume).

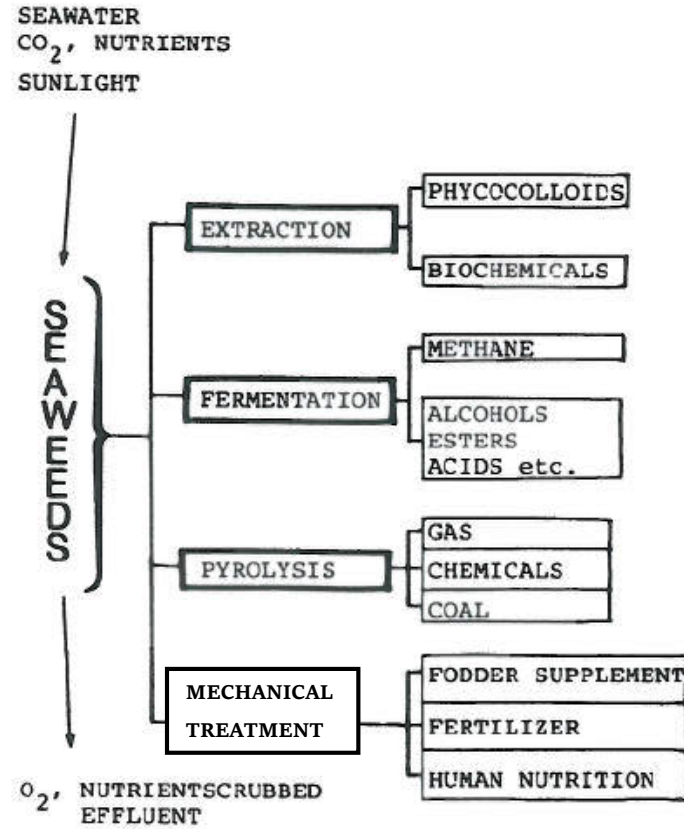
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Past and future use of seaweed



The aquatic resource. Indergaard **1983**

Past and future use of seaweed



Present level

Industry

Industry

Research

Research:

cars and air plane

Research

Research

Research

Industry

Industry

Industry

Future

biorefineries

high added

value products

Low value

bulk products

(2. generation)

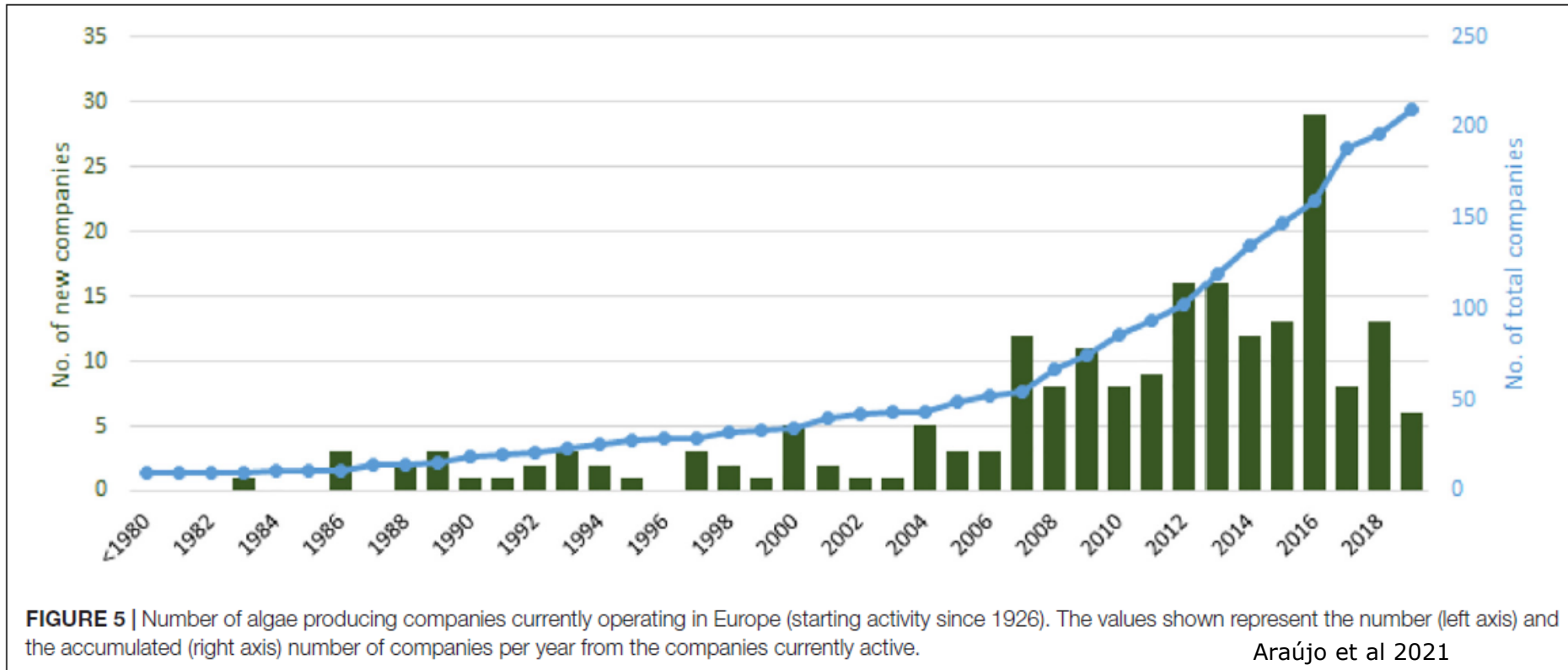
→ Western world

Waste water management

The aquatic resource. Indergaard 1983

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



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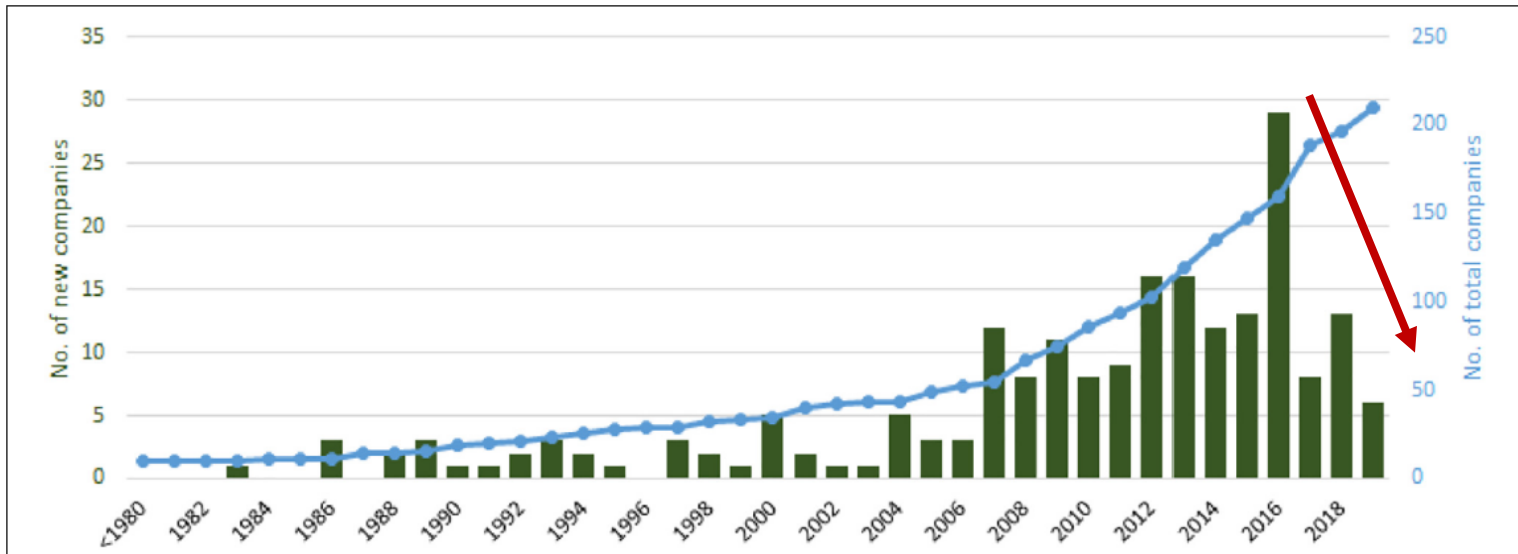


FIGURE 5 | Number of algae producing companies currently operating in Europe (starting activity since 1926). The values shown represent the number (left axis) and the accumulated (right axis) number of companies per year from the companies currently active.

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

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Conclusions

- Few species domesticated for cultivation
 - May also be less species than harvested in future
 - Aquaculture= small volumes
 - Larger scales needed in future
- Manually labour- mainly time as costs in LCA
 - Mechanisation needed
- More focus on multi-use of our resources- cascading, multi-extraction
- Increasing total companies---- aquaculture and harvest of natural populations, but less new-starters the recent years
- Constraints must we solved in parallel
 - Partnerships/collaboration- business, academia, authorities



Look out for this reference

Thank you

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Emerging sectors of the Blue Bioeconomy in Europe: status of the algae production industry

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