Comparing LCA of Micro- and Macroalgae Products: Approaches and Challenges at LOCALITY project

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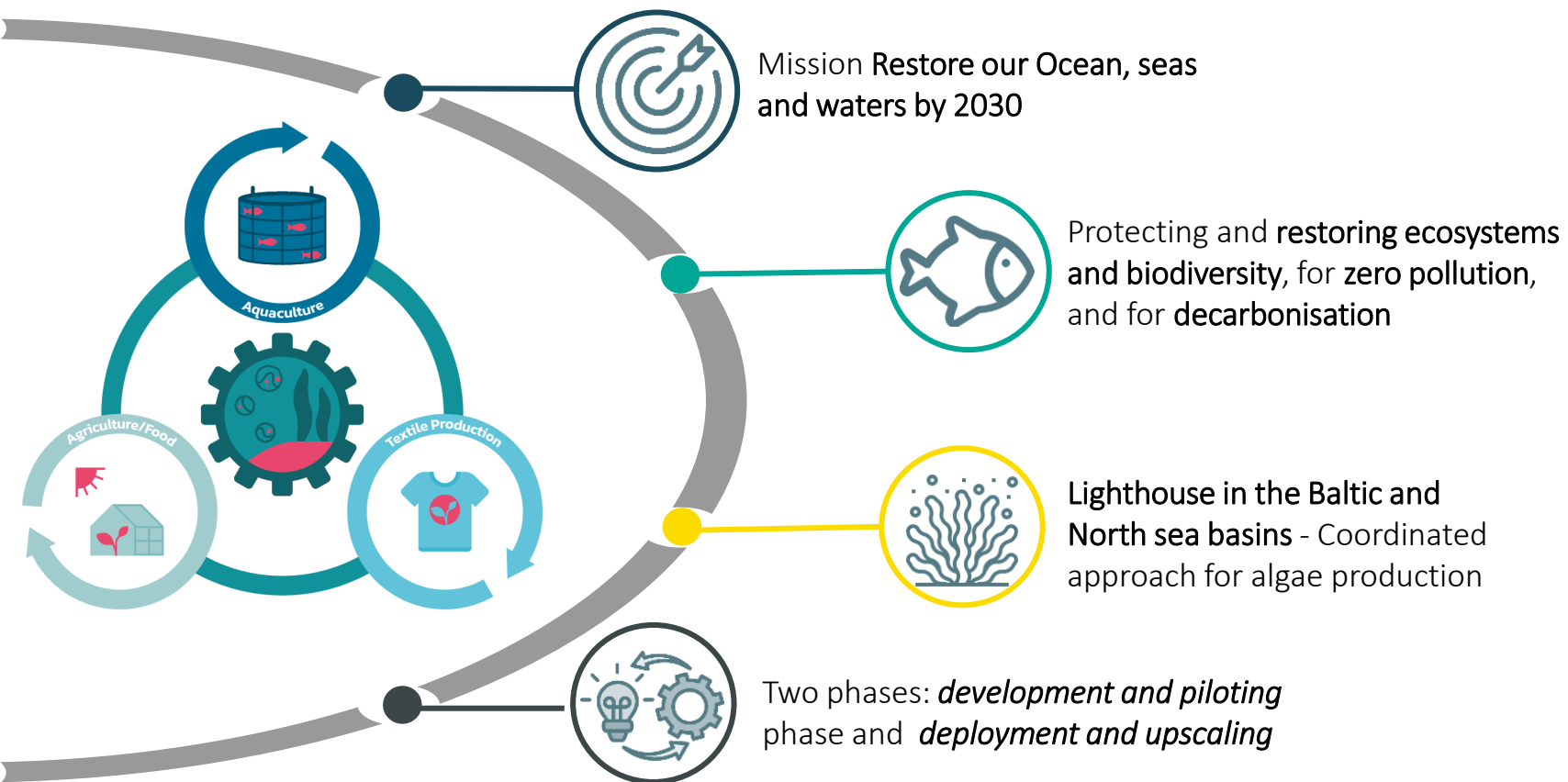
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Scope of the project

Nature-positive aLgae-based fOod, agriCulture, AquacuLture and textIle producTs made in North and Baltic Sea ecosYstems

Mission **Restore our Ocean, seas and waters by 2030**

Protecting and **restoring ecosystems and biodiversity**, for **zero pollution**, and for **decarbonisation**

Lighthouse in the Baltic and North sea basins - Coordinated approach for algae production

Two phases: *development and piloting* phase and *deployment and upscaling*

Aquaculture

Agriculture/Food

Textile Production

27 partners – 14 countries

Harmonising Algae–Based LCAs: Selecting Systems and Data Providers
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Value chain(s) analysed

- **Textile** anti-microbial & dyeing additive
- **Biostimulant** & Biocontrol product
- Functional **Aquafeed** product
- **Food** Products:
  - Fish analogue product
  - Meet analogue product
  - Egg analogue product
  - Nutraceutical products

Sustainability of 3 algae circular industrial ecosystems + products

LCA of Micro and Macroalgae Products
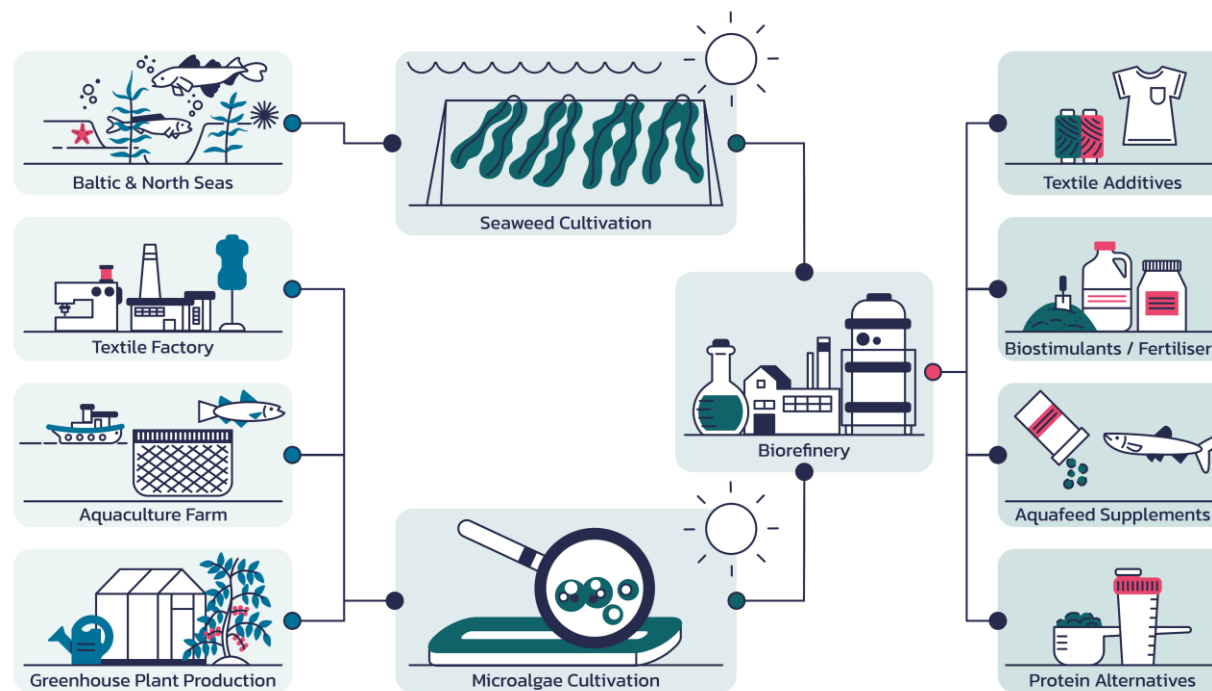
Methodology

- Attributional approach: Allocation at the point of substitution (APOS) / Allocation cut-off by classification?

- Cradle-to-gate (ingredient/product leaving the biorefinery facility)

- Functional Unit and Allocation will be defined later in the project depending on the biorefinery design and products

- System divided into 2 stages:
    - Cultivation system ⟶ Microalgae (3 water sources)
      Macroalgae

    - Biorefinery

- Data collected directly from the producers – scale to be defined

- Secondary data from Ecoinvent database

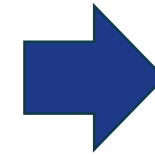- Impact calculated by PEF Method

System and data providers

- Not a lot of information in databases for algae cultivation and biorefineries

- Seaweed Cultivation
  - Difficulties in getting primary data
  - Ulva → Laminaria – Offshore – ropes (optimised and non-optimised in France, Agribalyse)

- Microalgae Production
  - Nothing in the databases, an internal database for the cultivation process
  - Challenges in the technology and culture media

- Biorefinery
  - Some equipment (drying and extraction), details need to be checked
  - Electricity updated to the current grid, but impact sources from Ecoinvent

Results

- Too early for results

- Challenge in comparing micro and macroalgae products

  - Scale: Definition in the future

  - Transportation: ignored

  - Functional unit might vary

➡️ Production systems and utilisation are different

- Variability and Uncertainty will be assessed by sensitivity analysis

- Results will be divulgated at the end of the project

Conclusions & main messages

- Micro & Macroalgae based products are new value chains to LCA
  - No direct proxies in the LCA databases → a lot of room to improve

- Maion Limitations in providers:
  - Technology – new equipment and complex biological processes
  - Environment – how to deal with the interactions with the environment

Harmonising and discussing LCA processes and methodologies is crucial to more understandable and comparable results

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Thank you for your attention!

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https://www.locality-algae.eu/

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