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SKAGEN
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Fish Meal and Oil – a Life Cycle Assessment Perspective

Fish meal and oil – a Life Cycle Assessment perspective

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Today’s talk

- Greenhouse gas (GHG) emissions of seafoods and drivers behind

- Insights from Life Cycle Assessment (LCA) of Danish fish meal and oil production

Life Cycle Assessment

- A tool to quantify a broad set of environmental impacts in a systematic manner
- ISO standardized, but each study unique in methodological decisions
  - Functional unit (e.g. per kg, protein, etc) , system boundaries, allocation of impacts between co-products, impact assessment method, data representativeness, …
- Lots of initiatives on ”standardized assessments” of product groups
  - E.g., Product Environmental Footprint (PEF), PAS 2050:2011
- Cannot use absolute values from different studies to compare without harmonization

Ziegler et al. (2022) Methods matter: Improved practices for environmental evaluation of dietary patterns. *Global Environmental Change*, *73*, 102482.

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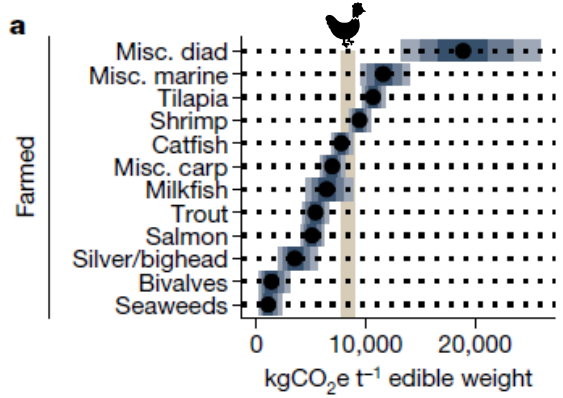
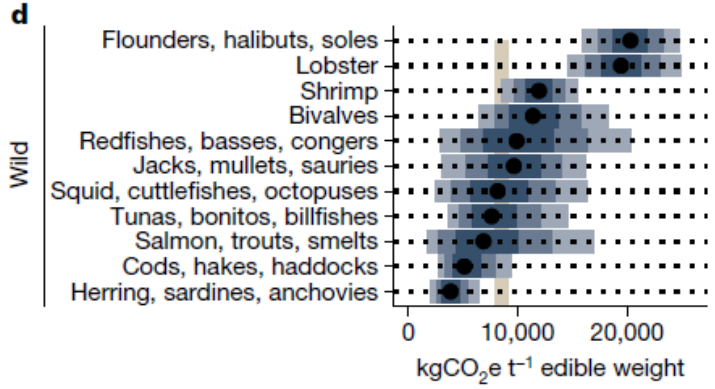
Seafood – GHG emission overview



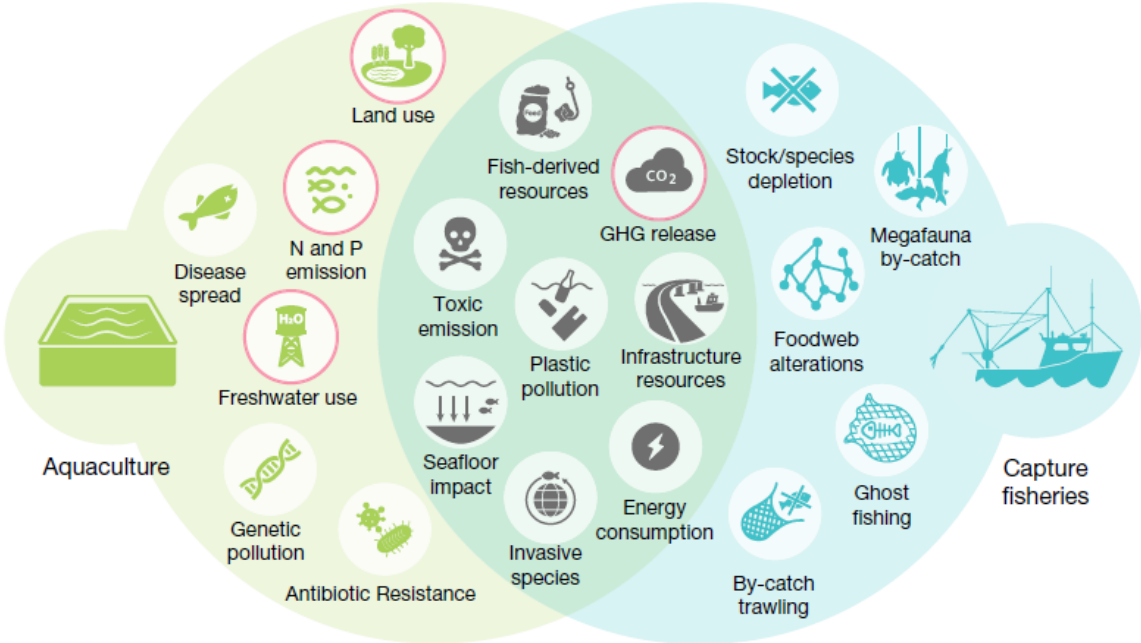
Driven by feed use



Driven by fuel use

Gephart et al. (2021) Environmental performance of blue foods. Nature 597; 360-366

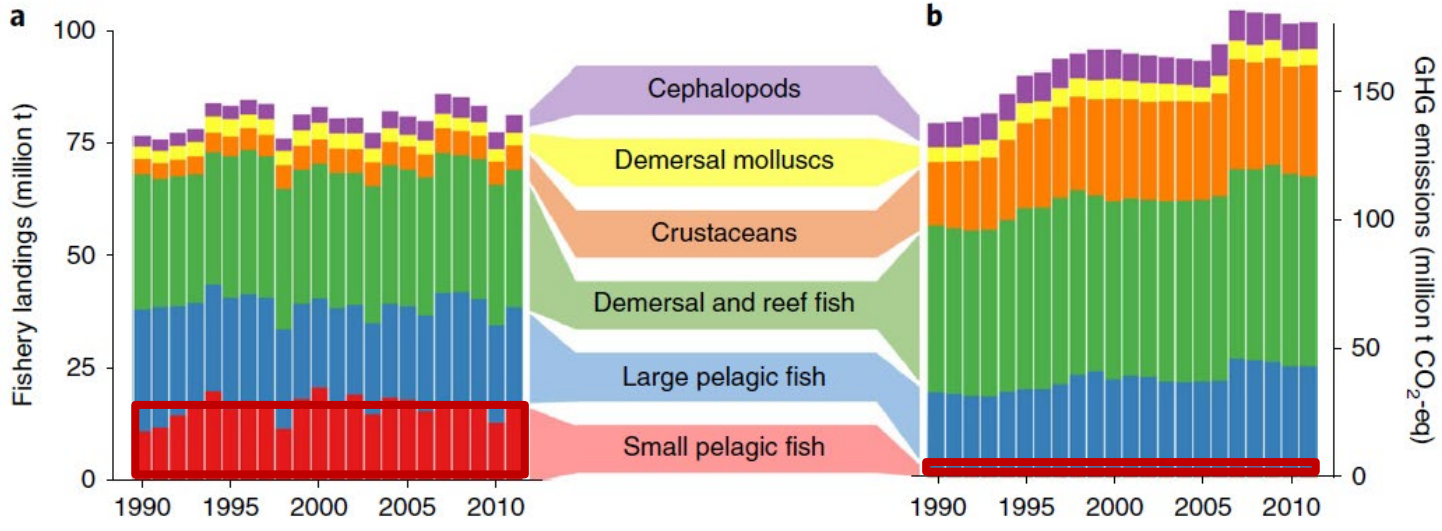
Seafood – more to consider



Common and unique pressures

Gephart et al. (2021) Environmental performance of blue foods. Nature 597; 360-366

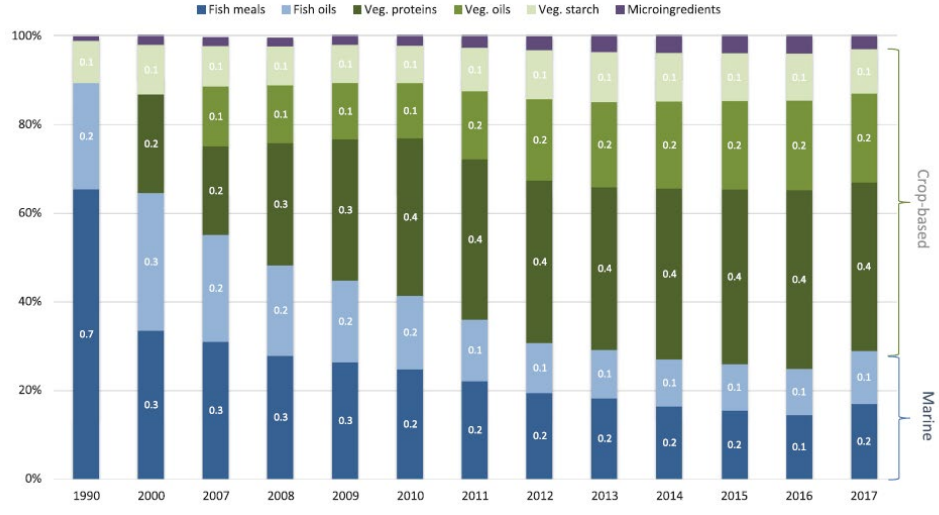
GHG emissions of global capture fisheries - trends

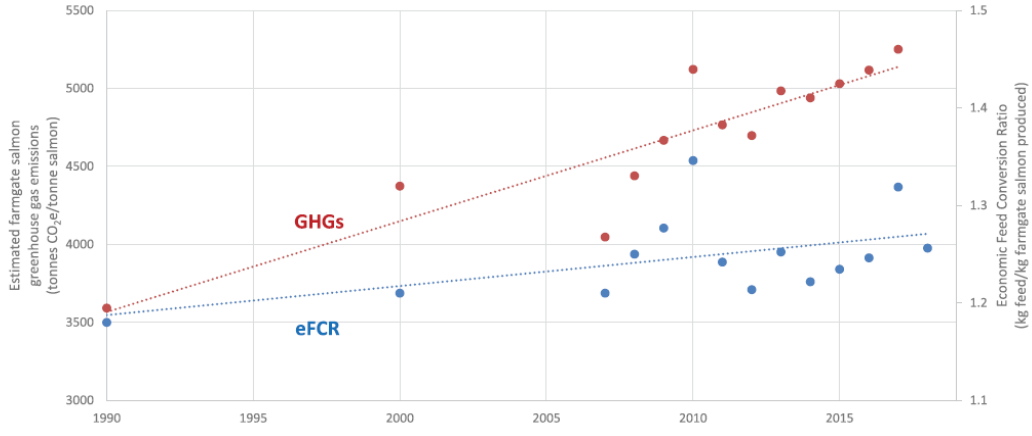


Parker et al. (2018) Fuel use and greenhouse gas emissions of world fisheries. *Nature climate change* 8; 333-337

Feed: composition and amount

Norwegian salmon farming



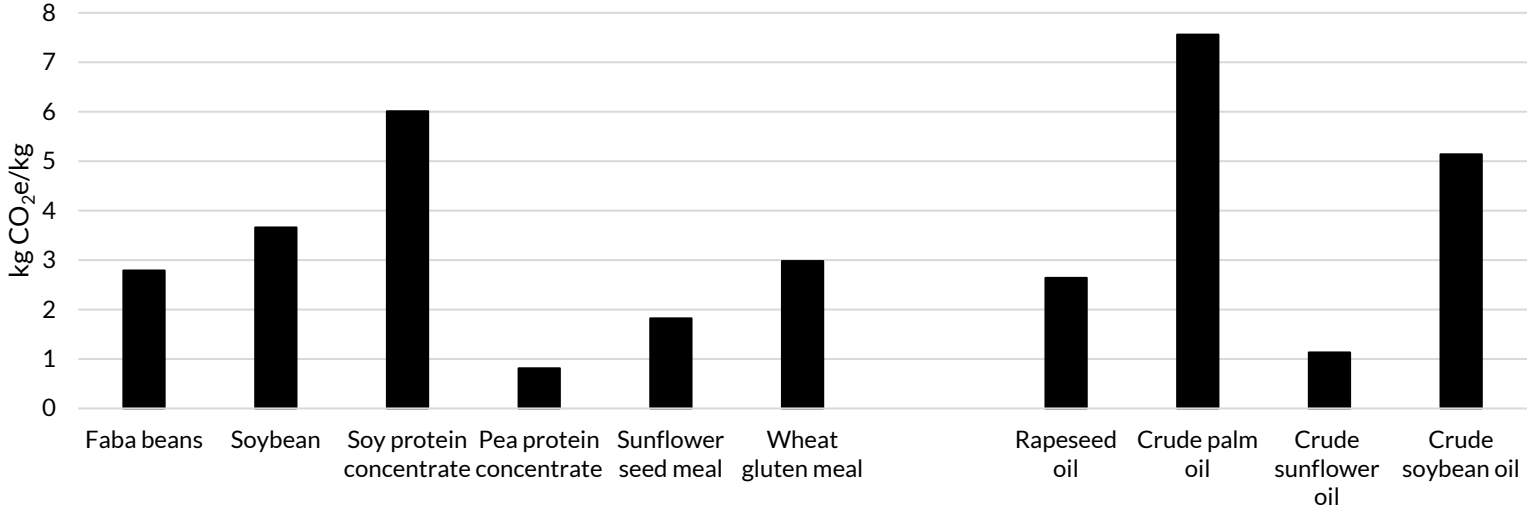


Ziegler et al. (2021) Greenhouse gas emissions of Norwegian seafoods. From comprehensive to simplified assessment. J Ind Ecol 1-12

LCA of 1 kg Danish fish meal and oil

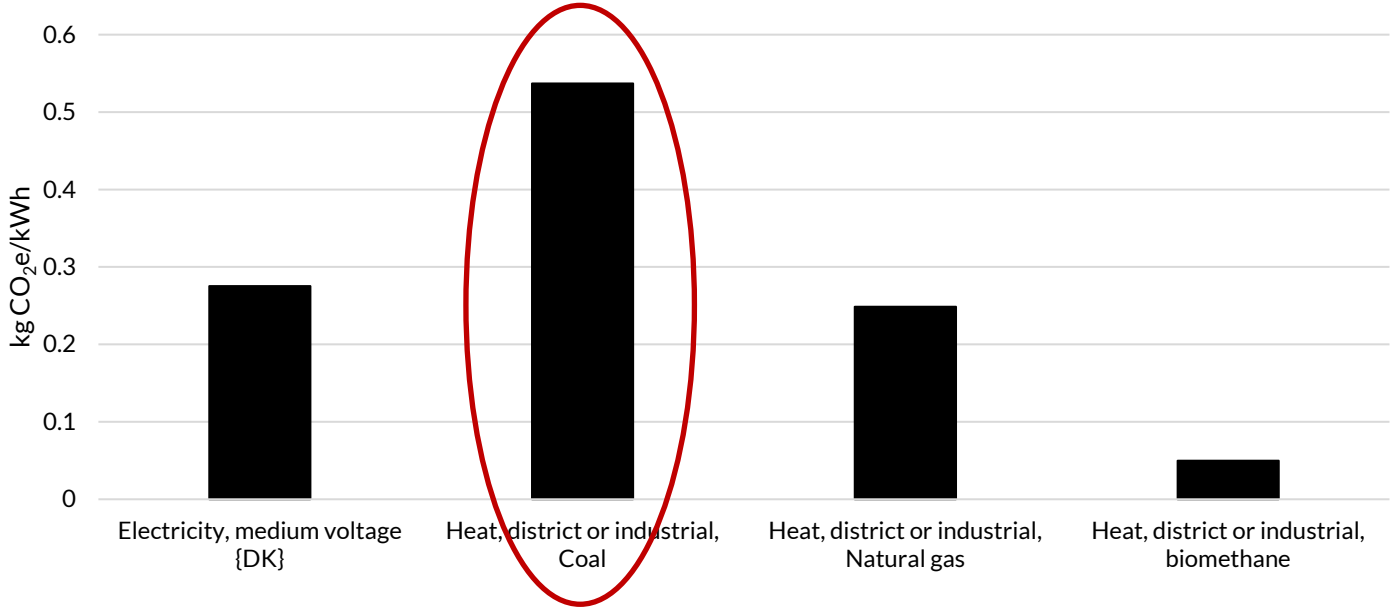
- **Fish raw material input driver of GHG emissions**
  - Pelagic fisheries highly efficient
  - Yield important
- **Processing into fish meal and oil the second largest driver**
  - Dominated by energy use and source
- **Use of trimmings may have a higher contribution to emissions compared to reduction fisheries**
  - Depends on species and fishery they originate from, and LCA allocation choices

Comparison with other common aquaculture feed ingredients



Data for other ingredients: Winther et al. (2020) 'Greenhouse gas emissions of Norwegian seafood products in 2017', SINTEF Ocean, 2020. Available at: https://www.sintef.no/contentassets/25338e561f1a4270a59ce25bcbc926a2/report-carbon-footprint-norwegian-seafood-products-2017_final_040620.pdf/

Energy source during processing important



IPCC 2013 GWP 100a

Opportunities and challenges for fish meal and oil

Issue	Opportunities	Challenges
Greenhouse gas (GHG) emissions	• Low emissions compared to e.g. soy • Focus on energy efficiency and yield • Switch to green energy on land	• Ability to switch to green energy (TRL, alternative fuels, available infrastructure on land, costs, …)
Feed-food conflict	• Use in aquaculture instead of e.g. pigs and pets allows for more resource efficient food systems • Utilize all trimmings • **Baltic Sea**: opportunity to use of fish less suitable as food (contaminants, small sizes)	• Public perception of fish meal and oil • Would be preferable to use as food for increased availability of nutritious seafood, but is in conflict with raw material availability • **Baltic Sea**: satisfying needs for i) stock recoveries, ii) ecosystem, iii) food production and the iv) fish meal and oil industry

Thank you for your attention!

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Want to know more about our seafood work at RISE?

https://www.ri.se/en/what-we-do/expertises/seafood