



Introduction to cultivated seafood

March 30th, 2023
MAC Working Group
Elena Walden, Senior Policy Manager, GFI Europe

Agenda



- 1 Introduction to GFI Europe
- 2 Whistlestop tour of the science, industry and regulatory ecosystem for cultivated seafood
- 3 Role of cultivated seafood in relation to conventional seafood
- 4 Q&A

The Good Food Institute

GFI is an international nonprofit organisation helping to build a more sustainable, secure and just food system. We focus on three areas of work:



Science and Technology

Advancing foundational, open-access research in alternative proteins and creating a thriving research and training ecosystem around these game-changing fields.



Corporate Engagement

Partnering with companies and investors across the globe to drive investment, accelerate innovation, and scale the supply chain—all faster than market forces alone would allow.



Policy

Advocating for fair policy and public research funding for alternative proteins.



GFI officially earned GuideStar's Platinum Seal of Transparency the past four years—obtained by less than 1% of nonprofits—reflecting our commitment to maximum impact, efficiency, and inclusion.

We work as a force multiplier, bringing the expertise of our departments to the rest of the world.



United States
Brazil
India

Europe
Asia Pacific
Israel

140+ staff in 6 regions



Overview of the science, industry and regulatory ecosystem for cultivated seafood



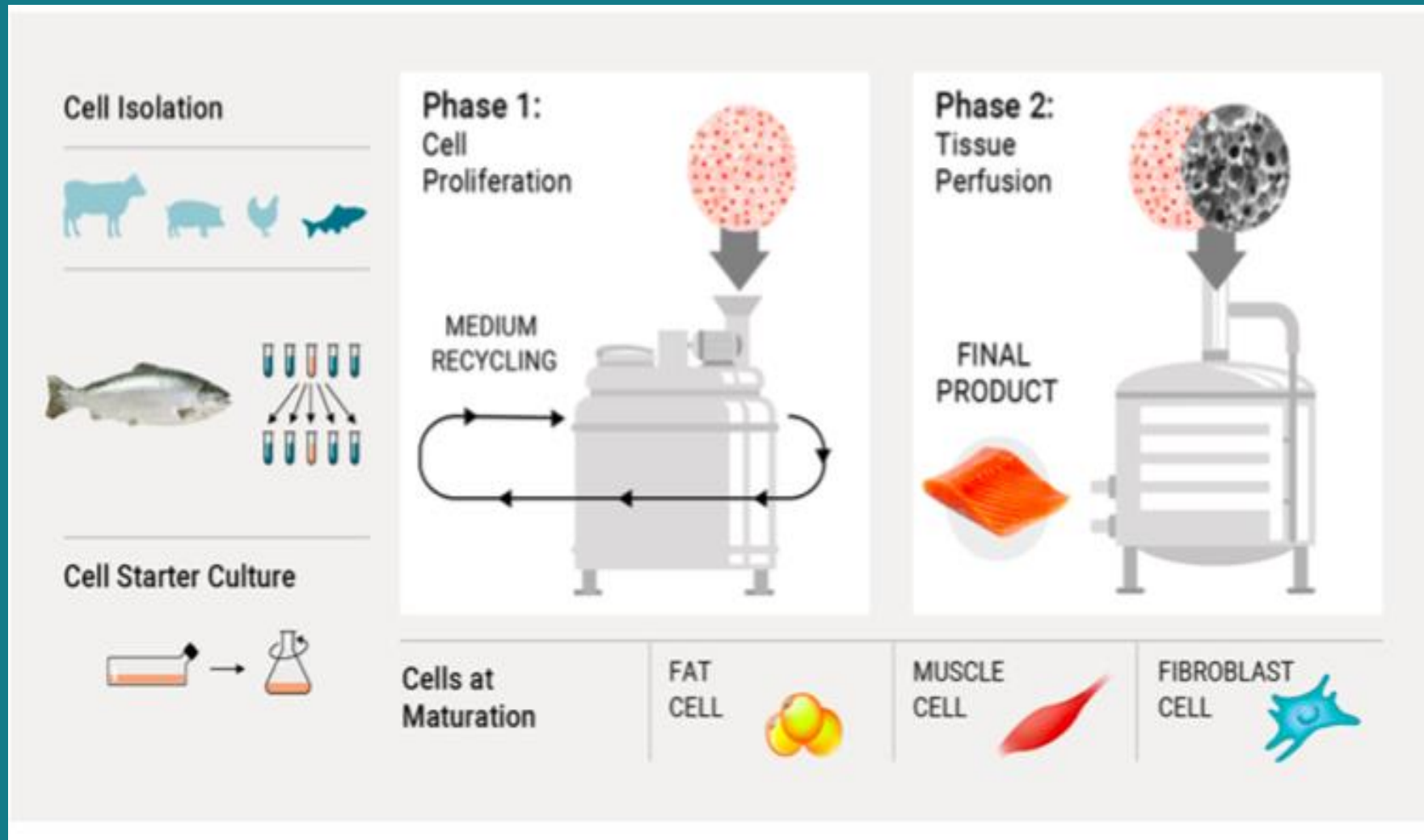
Cultivated seafood

Also called: cell-cultured or cell-based seafood

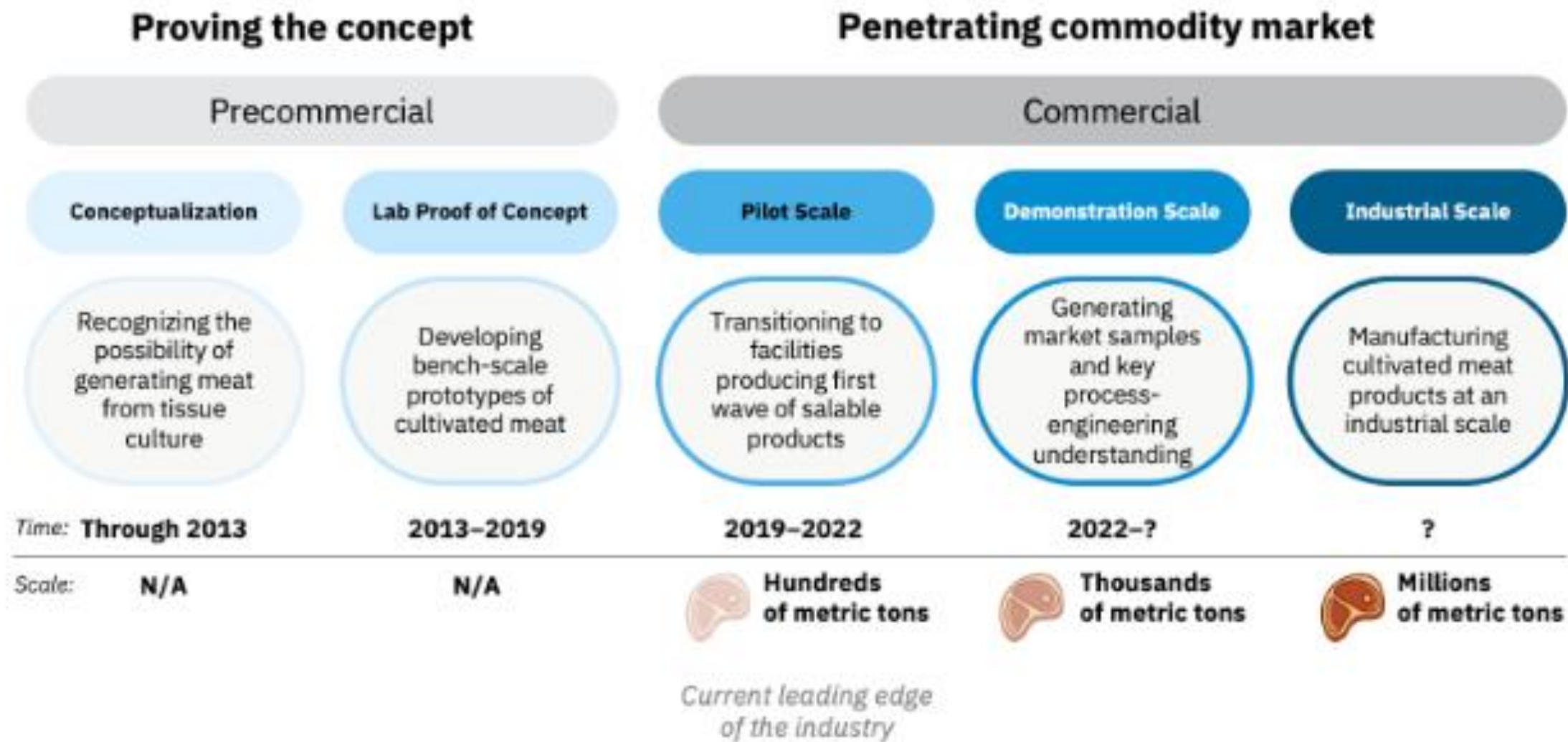
Seafood that is grown directly from cells, instead of from catching or farming fish and other seafood.



The process of cultivating seafood



Trajectory of the cultivated seafood industry



Scale-up underway

B Bloomberg.com

Eat Just to Build Cultured-Meat Plant in Qatar Amid Global Push

Eat Just Inc., a San Francisco-based startup making cultured chicken and vegan eggs, plans to build a commercial facility in Qatar to...

31 Aug 2021



Cultivated Seafood

Shiok Meats Partners With Conventional Shrimp Company for Cultivated Seafood R&D

July 27, 2022



SCIENCE

World's first lab-grown-meat factory opens in Israel

By Nick Lavars
June 24, 2021

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Upside Foods opens plant capable of making 50K pounds of cultivated meat a year

The largest facility of its kind in North America, located near San Francisco, brings cell-based meat closer to reality.

Published Nov. 4, 2021



Megan Poinski
Senior Reporter



PRESS RELEASE: CULTIVATED FISH BIOTECHNOLOGY COMPANY ANNOUNCES STRATEGIC INVESTMENT FROM LEADING SEAFOOD AND FUNCTIONAL PROTEIN PRODUCER

25 January 2021

Avant and Vinh Hoan Corporation to establish strategic partnership to accelerate commercialization of cultivated fish proteins

Wildtype's New Facility Can Make 200,000 Pounds Of Cell-Based Salmon Per Year



By Sally Ho — Last updated Jun 29, 2021

CELL-BASED NEWS

ALT PROTEIN

FUTURE FOODS

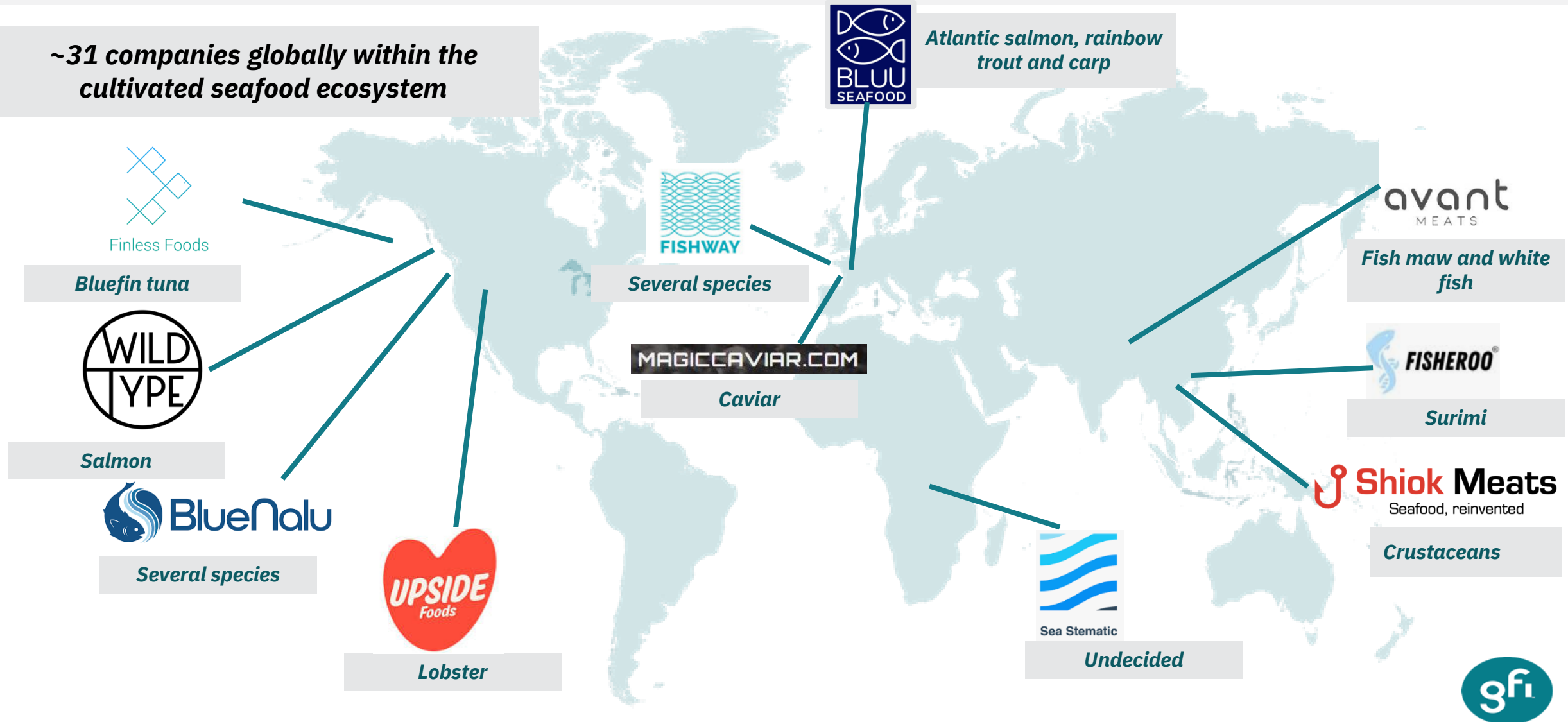
Thai Union Corporate Venture Fund invests in cell-based seafood

- Thai Union has invested in BlueNalu, joining other industry-leading strategic and financial partners in backing the start-up
- BlueNalu, based in California, is one of the world's leading cell-based seafood start-ups

Snapshot of global landscape

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~31 companies globally within the cultivated seafood ecosystem





Regulatory process for cultivated seafood in the EU

- Novel Foods Regulation or GM Food and Feed Regulation will apply (**we expect mostly the former**)

Request for Authorisation

- Preparation of dossier and submission by applicant company to European Commission



Risk Assessment: Scientific opinion

- European Food Safety Authority (EFSA) analyses nutritional and toxicological properties of product.
- EFSA then prepares scientific opinion on safety of product.

Risk Management: Implementing act

- The European Commission drafts the implementing act, approving the food.
- Standing Committee for Plants, Animals, Food, and Feed (PAFF) votes on implementing act. Depending on regulatory framework, this is either in Novel Foods or GM PAFF subgroup.

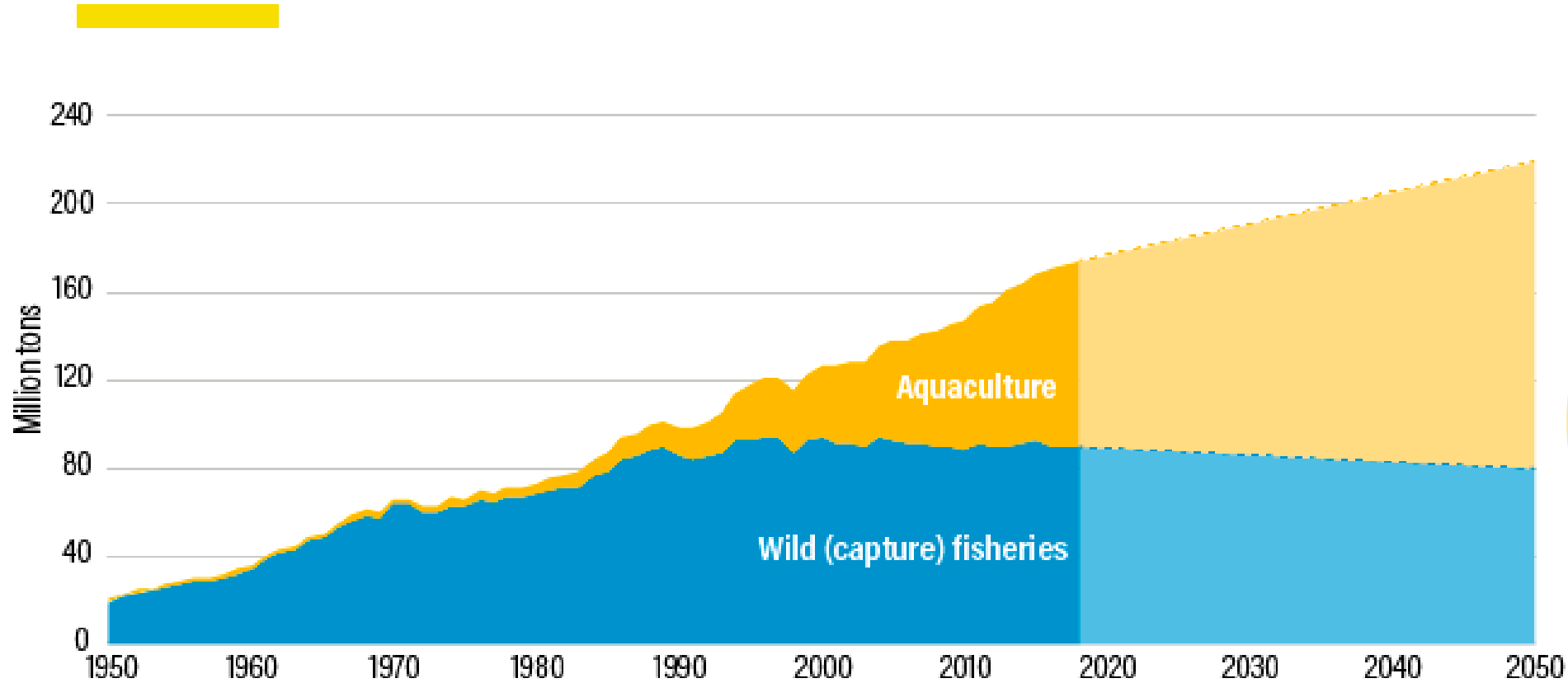
Overall expected timeline from application to approval decision: 18 months to 36 months

Role of cultivated seafood in relation to conventional seafood



Meeting excess demand whilst protecting wild fish stocks

13



Aquaculture growth is only anticipated to keep pace with increased demand for 17 countries, while around **170 countries** will be left with **substantial unmet demand** (2017 FAO study).

Sources: Historical data, 1950–2016: FAO (2017b) and FAO (2018).

Projections to 2050: Calculated at WRI; assumes 10 percent reduction in wild fish catch from 2010 levels by 2050, linear growth of aquaculture production of 2 Mt per year between 2010 and 2050.

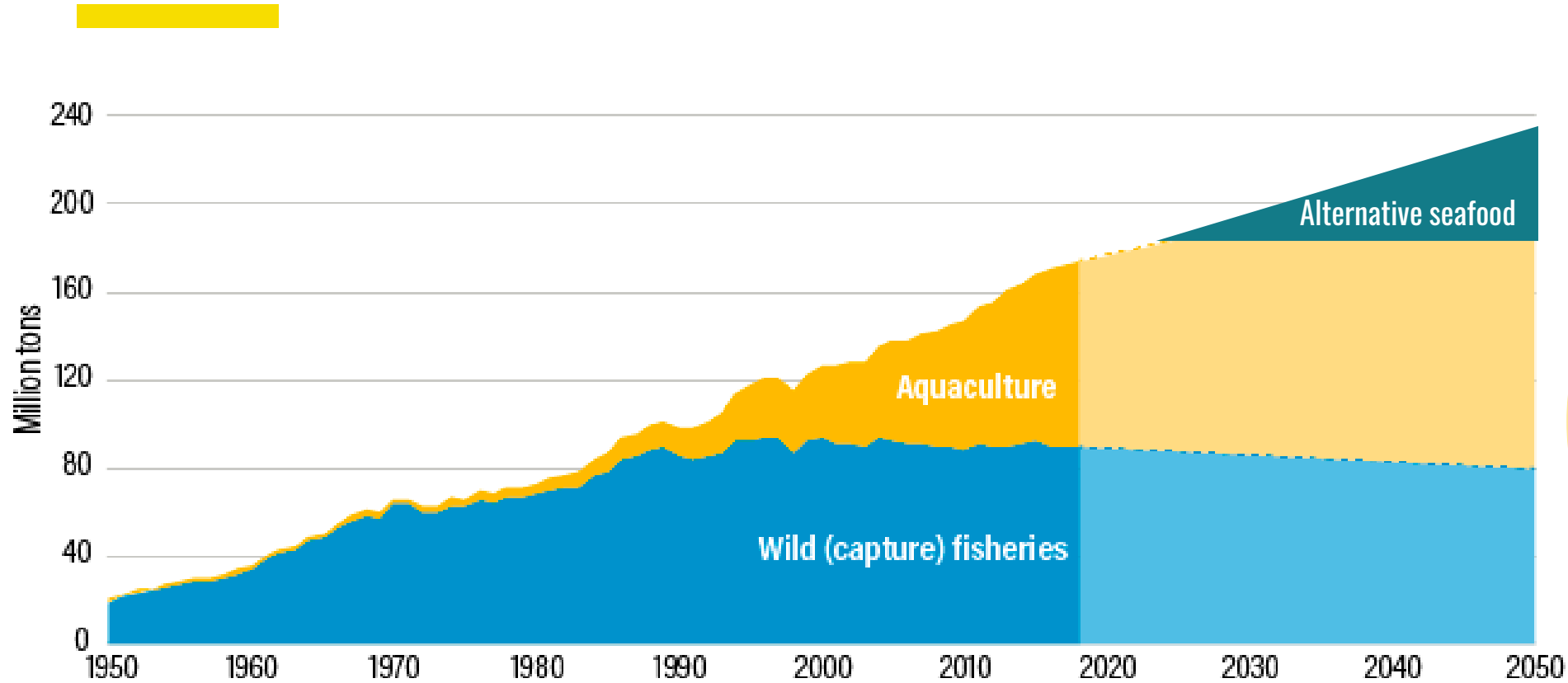


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Meeting excess demand whilst protecting wild fish stocks

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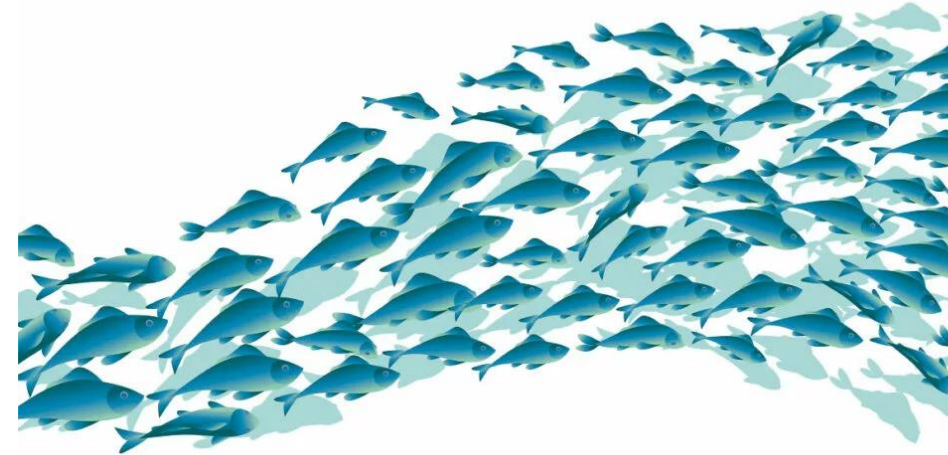
Opportunity to be demand-led to ensure resilience and sustainability of fish stocks

- Cultivated seafood production could be directed consistently to species whose:
 - Stocks are most volatile (higher trophic levels)
 - Where most consumer demand is anticipated
 - Cannot be farmed as easily
- Cultivated seafood production could also be directed in an ad hoc way accommodate rapid shifts in species type to respond to fluctuations in wild stocks
- Managed correctly, this could help ensure long-term stability and protection of wild stocks



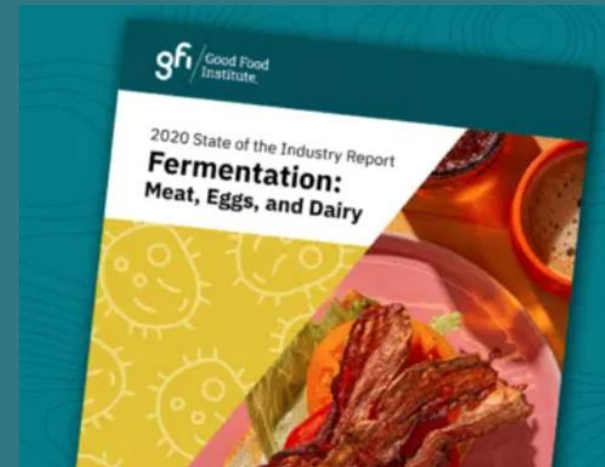
Key takeaways

- Whilst we are still in the early stages, given the pace of global development in this field, it is ultimately not a question of if, but when, this industry will arrive in Europe
- Potential benefits of cultivated seafood include helping to protect wild stocks to ensure long-term stability and sustainability
- NGOs, industry but above all **policymakers** should think ahead **now** how to reap the benefits of the arrival of this sector in Europe



For deep insights on alternative seafood,
check out our website:

 gfi.org/seafood



Reach out to me at elenaw@gfi.org

Annex

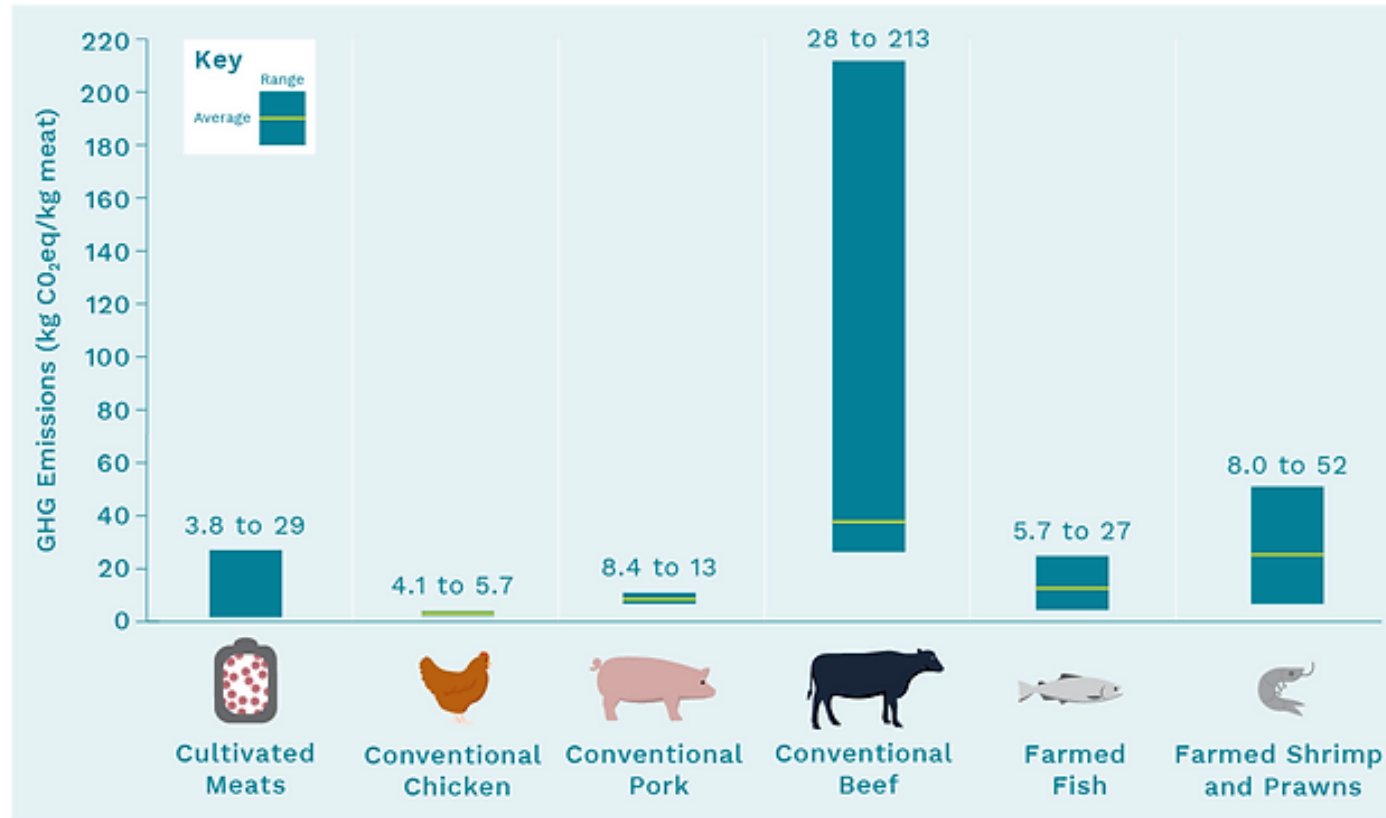


Environmental benefits of cultivated seafood: Analogies from cultivated meat LCA



- ❖ **No environmental life cycle analysis specifically for cultivated seafood** has been conducted as of April 2022
- ❖ Roughly similar production methods of cultivated meat and seafood allow us to **draw on insights from cultivated meat LCAs**

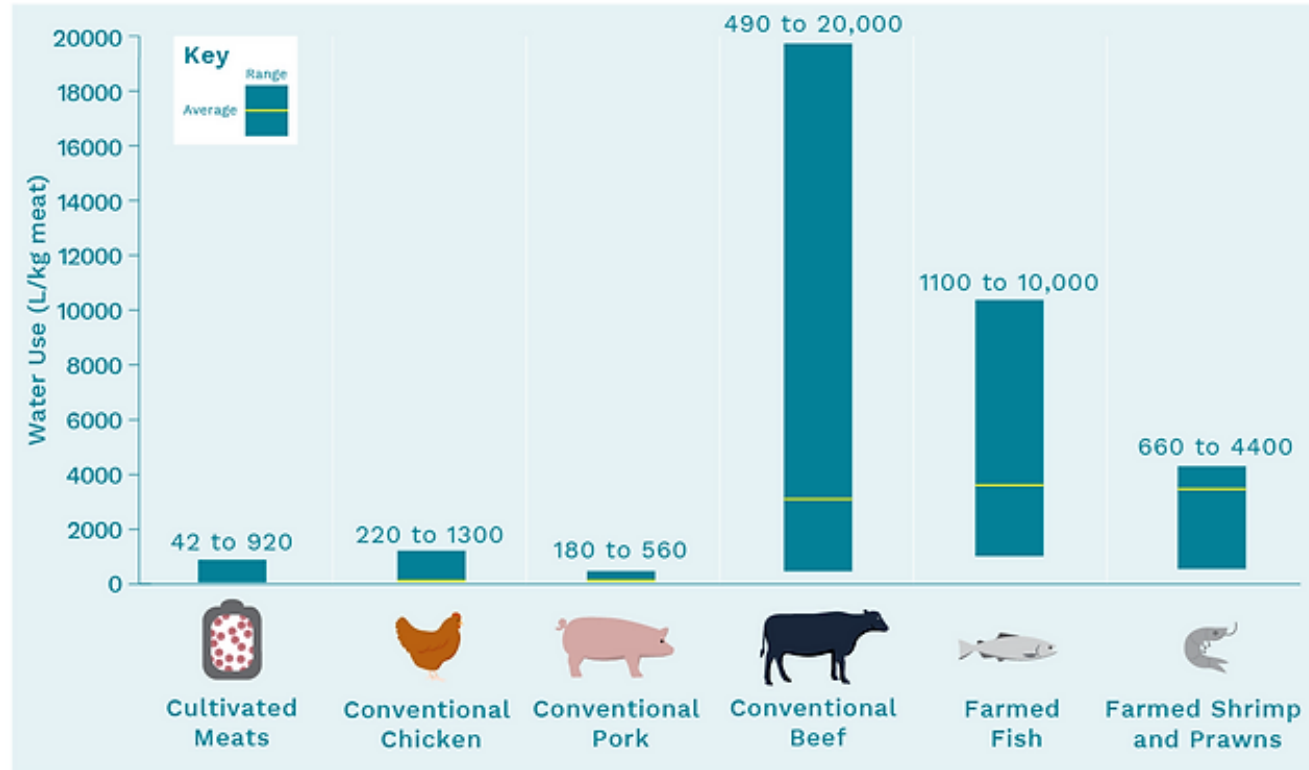
Analogies from cultivated meat LCA: GHG emissions



WhatIsCultivatedMeat.com, 2021

The carbon footprint of cultivated meat^[6,9,10] could be lower than or similar to the carbon footprints of industrially-produced conventional meat. The above data represent US production of chicken^[11], pork^[11], and beef^[12], and global data for farmed fish^[11], shrimp, and prawns^[11]. Carbon emissions will depend on the amount of energy and inputs needed to produce cultivated meat and whether the energy used comes from renewable sources. "Climate Change" by WhatIsCultivatedMeat.com can be reused under the CC BY 4.0 license.

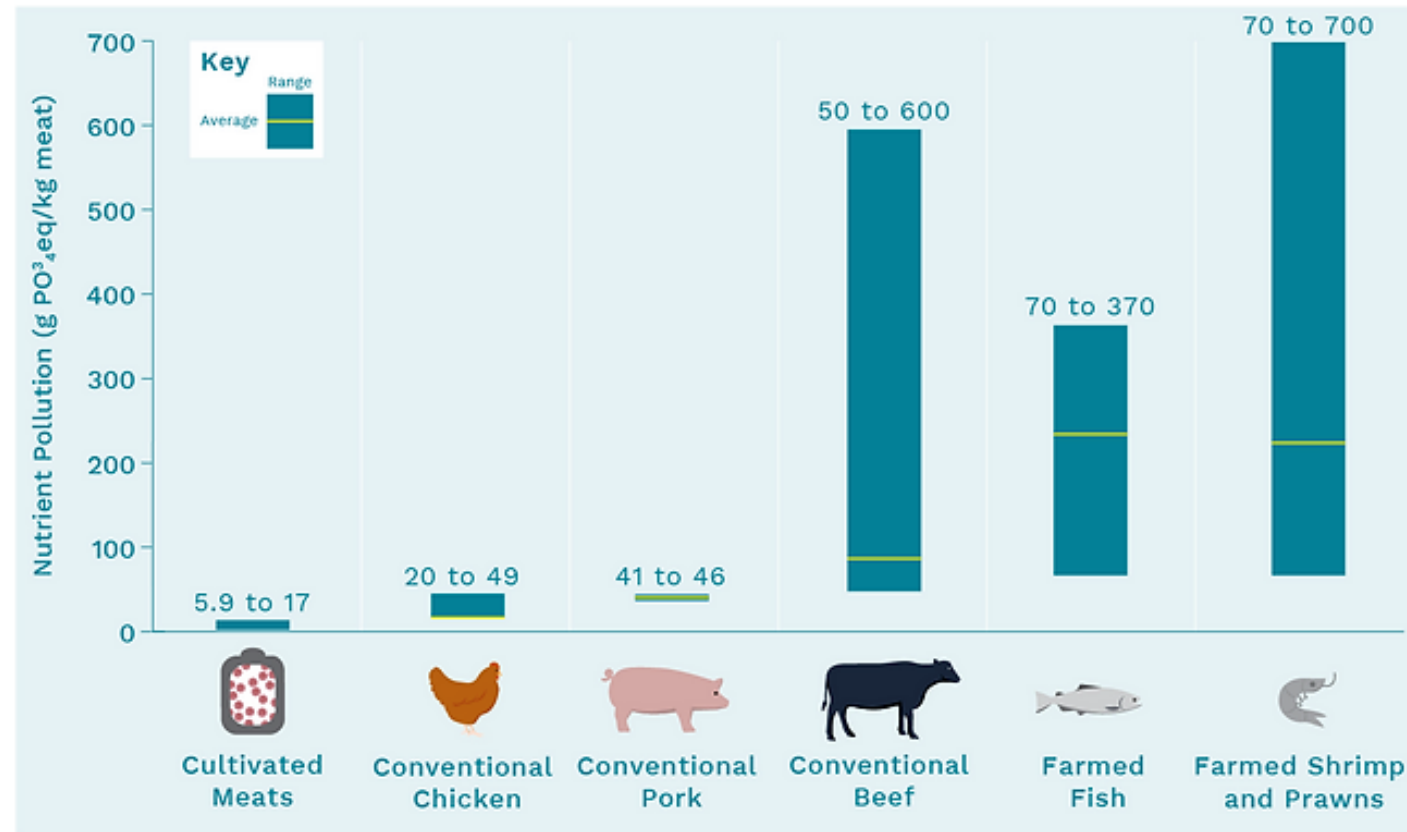
Analogies from cultivated meat LCA: Water use



WhatIsCultivatedMeat.com, 2021

The water use of cultivated meat^[6,7,9] will probably be similar to industrially produced conventional meats. The above data represents water use for conventional production of chicken^[15,17] and pork^[11] in the US and Europe, US beef^[12], and global production of farmed fish, shrimp, and prawns^[11]. But the environmental and human impacts of water use have more to do with where water is used than how much. Cultivated meat has the potential to reduce water use impacts if it is produced in areas with plentiful water resources. "Water Use" by WhatIsCultivatedMeat.com can be reused under the CC BY 4.0 license.

Analogies from cultivated meat LCA: Nutrient pollution



WhatIsCultivatedMeat.com, 2021

The nutrient pollution impacts of cultivated meat^[6,7,9] will probably be much lower than industrially-produced conventional meats. The above data represents the nutrient pollution conventional US chicken^[11,15], pork^[11], and beef^[12] production, and global production of farmed fish, shrimp, and prawns^[11]. "Nutrient Pollution" by WhatIsCultivatedMeat.com can be reused under the CC BY 4.0 license.

Energy demand at the facility

Active cooling accounts for 75% of the carbon footprint.

It is unclear if cooling will be needed at all.

If it is needed, less energy-intensive *passive* cooling can be used, substantially lowering the energy demand at the facility.

More research into cell metabolism and oxygen consumption is needed to best inform cooling requirements during production.

Figure 9 - Electricity use per process stage, % of total

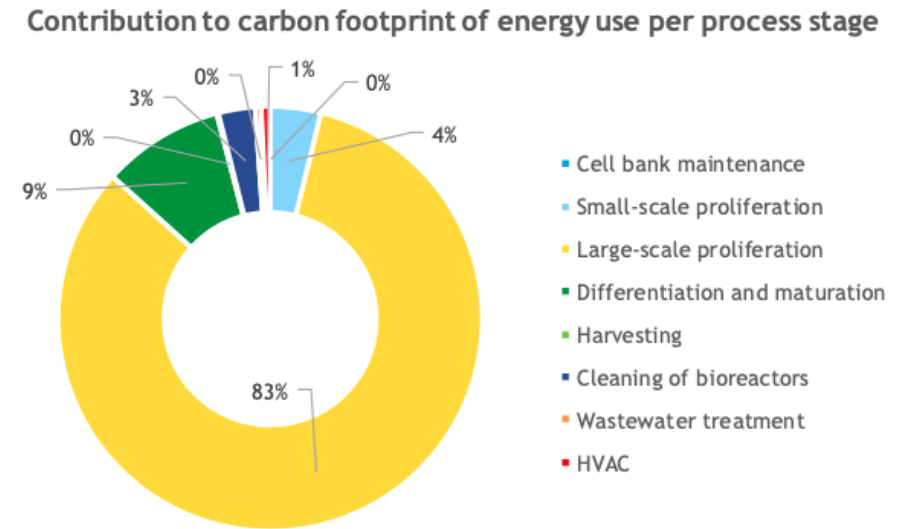
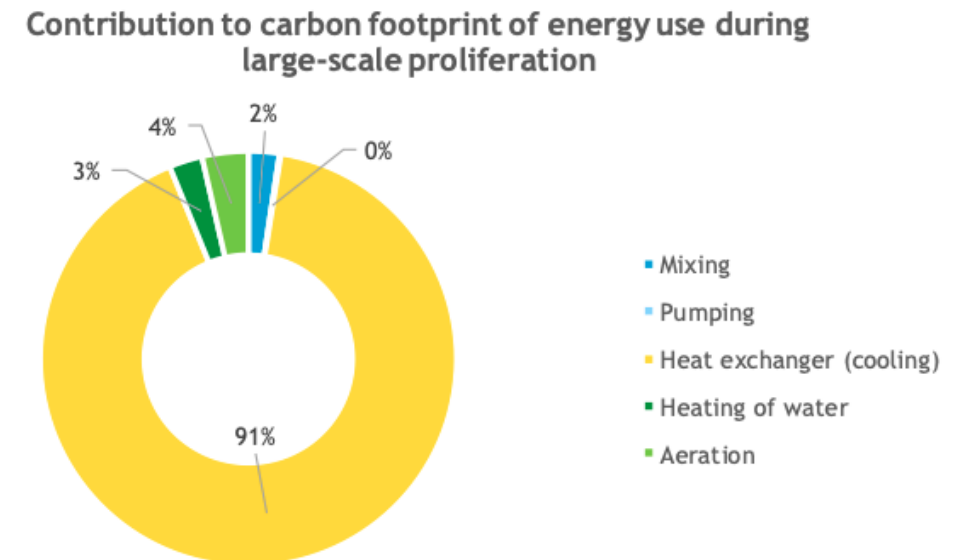


Figure 10 - Electricity use for large-scale proliferation, % for different parts of the process



Analogies from cultivated meat LCA: Conclusions

The environmental impacts of cultivated meat & seafood production are driven by:



**the amount
and sourcing
of energy used
at the facility**



**the sourcing and
production of
inputs in the
medium**



**the efficiency
of medium
use**

Sustainable energy use is the key to unlocking cultivated meat & seafood's huge climate and environmental impact mitigation potential and mutually reinforces global efforts toward decarbonization.