

Organizing Responsibility and Profitability in the (Sea)Food Chain

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(Sea)food for thought, thoughts about sea(food)

Three main points next 20-25 minutes:

A. Out of the blue: 'fish as the surprising gamechanger'

B. It's a small world after all: 'think global, act local'

C. Zero waste, 100% taste: 'circular potential in seafood chains'



Anyone who believes in indefinite growth on a physically finite planet is either mad or an economist

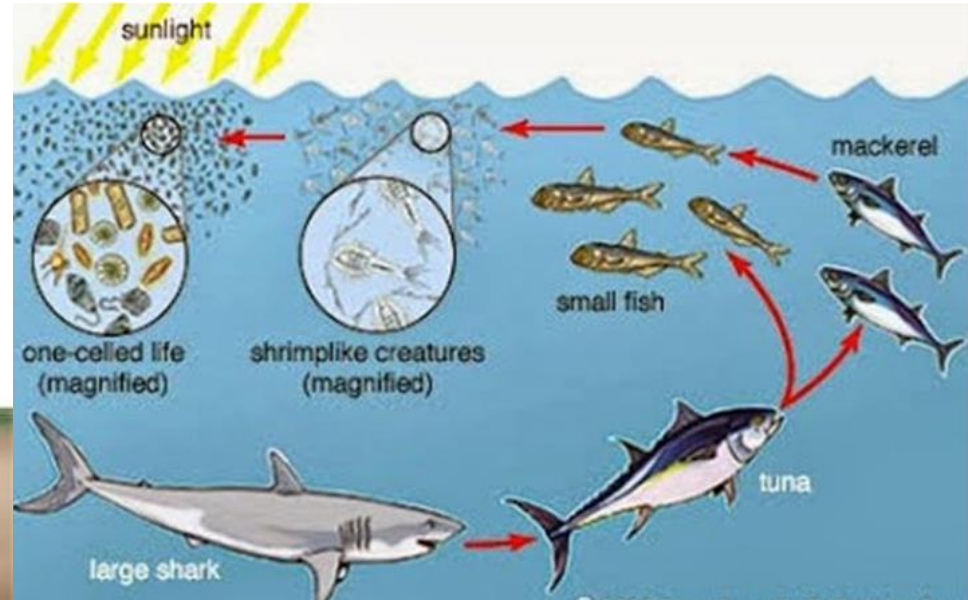
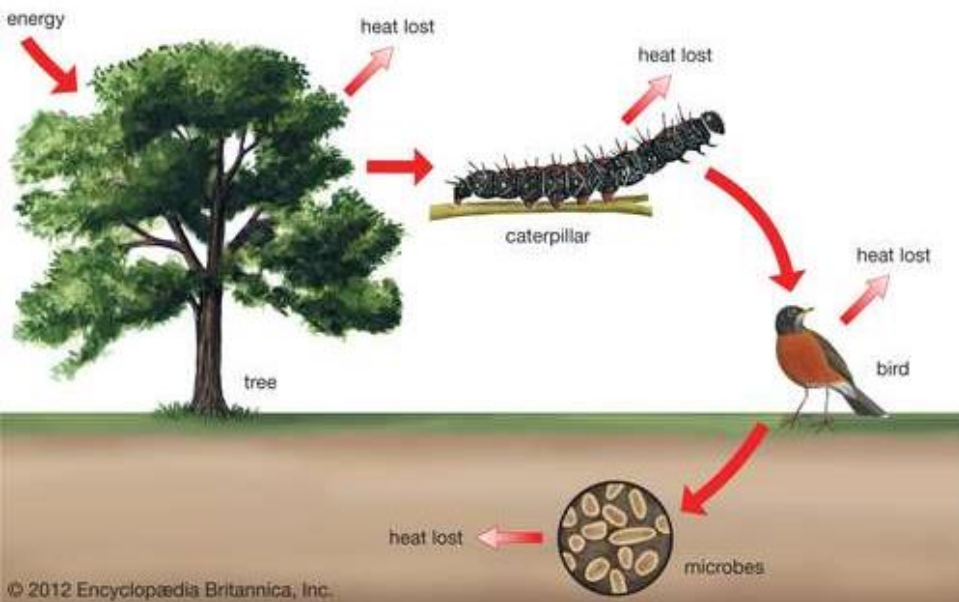
— *David Attenborough* —

AZ QUOTES

Back to the roots



Circular 'new' or 'renewed'?



Land and marine Food chain © Encyclopedia Britannica, Inc.

From linear to circular food production chains

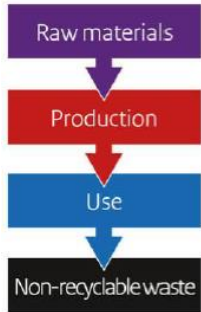


Source: Channel fish



Source: Icefishnews

Linear economy



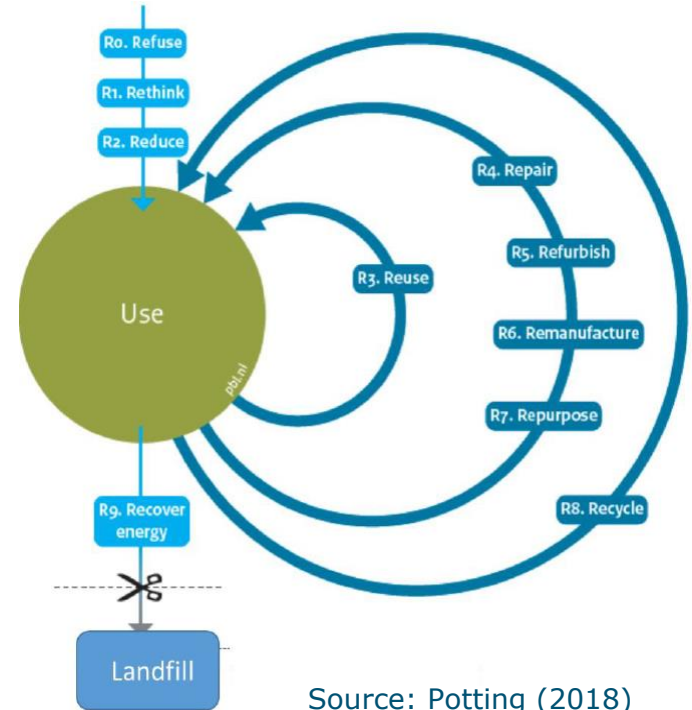
Reuse economy



Circular economy



Source: Governments of the Netherlands (2019)



Source: Potting (2018)

A. Out of the blue: 'fish as the surprising gamechanger'

Earth surface (current state origin of protein)

30% land, 98% of proteins for human consumption

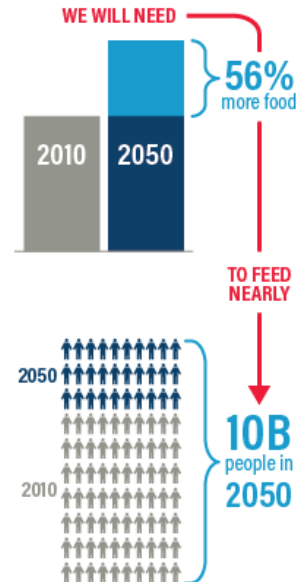
70% water, 2% of proteins for human consumption



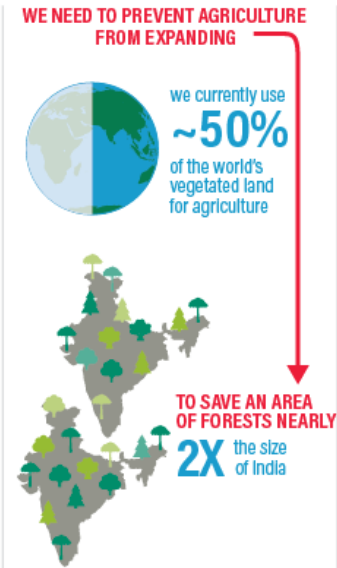
Source: Google Earth

CREATING A SUSTAINABLE FOOD FUTURE BY 2050

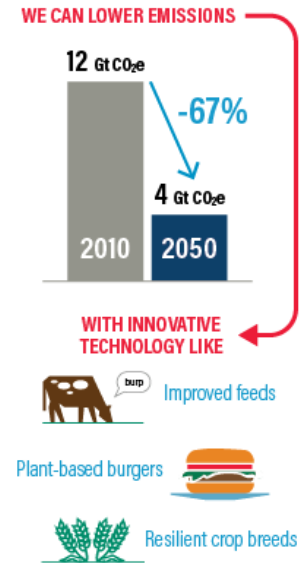
How do we feed
10 billion people...



...without using
more land...

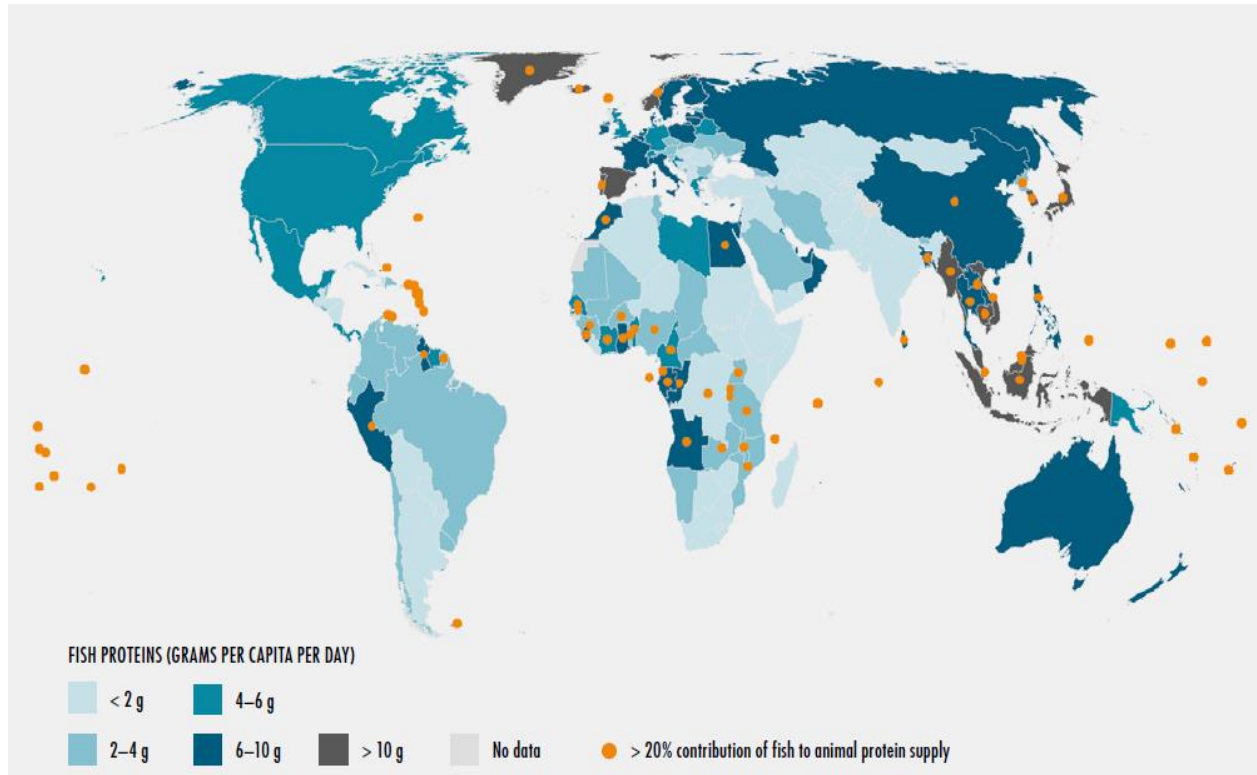


...while lowering
emissions?



Source: World Resources Institute (2019)

A. Out of the blue: 'fish as the surprising gamechanger'



- Affordable for developing countries
- 3.3 billion people, fish >20% daily animal protein (orange dots)
- Omega 3 and micronutrients
- Alternative if agriculture hardly or no option

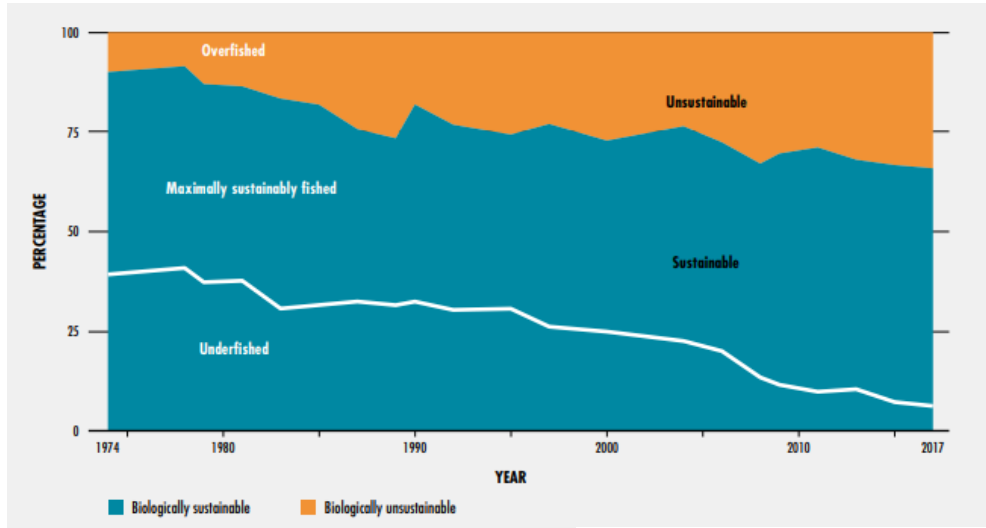
A. Out of the blue: 'fish as the surprising gamechanger'

	Ranking	Energy	GHG	Acidification	Eutrophication	Land use	Fresh Water	Pesticides	Antibiotics	Erosion
Shellfish	1.7	6	2	1	1	1	1	1	1	1
Sm Pelagic	2.9	3	1	2	3	13	1	1	1	1
Lg Pelagic	4.2	8	5	5	2	14	1	1	1	1
Whitefish	4.8	11	6	4	4	14	1	1	1	1
Salmonid	6.3	9	3	3	8	2	8	8	8	8
Invert	6.3	12	11	11	5	14				
Finfish	7.6	2	12	7	7	8	8	8	8	8
Milk	7.8	1	4	8	6	3	12	12	12	12
Carp	9.7	14	10	6	15	10	8	8	8	8
Tilapia	9.8	15	13	9	13	6	8	8	8	8
Shrimp	10.1	13	14	12	11	9	8	8	8	8
Eggs	10.3	4	7	10	16	4	13	13	13	13
Pork	11.0	5	8	15	10	5	14	14	14	14
Catfish	11.2	16	16	13	12	12	8	8	8	8
Chicken	11.3	7	9	14	9	7	14	14	14	14
Beef	13.6	10	15	16	14	11	14	14	14	14

The environmental cost of animal source foods.
Source: Hilborn, R. et al. (2018)

- Environmental cost of our dinner
- Decide by (y)our fork
- 148 LCAs compared for animal protein food products
- Shellfish and small pelagics winners

A. Out of the blue: 'fish as the surprising gamechanger'

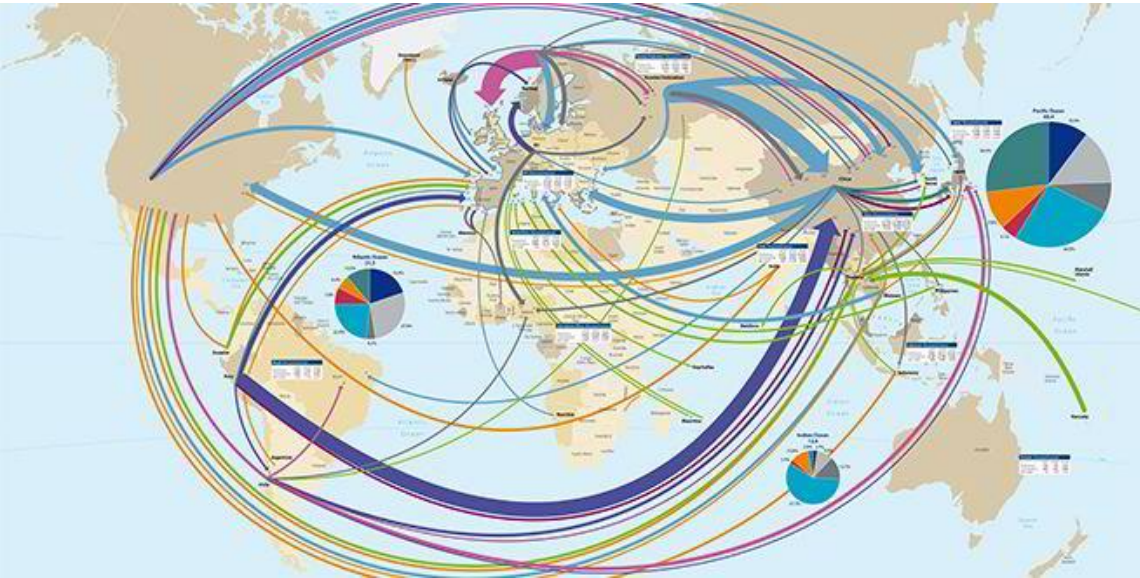


Source: FAO, SOFIA (2020)

- 1974: 90% of fish stocks at biological sustainable levels, 2017: 66%.
- Fortunately, in North Sea better picture. Most fish stocks be fished at MSY (ICES, 2020).
- High potential aquaculture, but more and more land based.
- Social issues: slavery, poverty, gender inequality
- Climate change: rising water temperature, plastics

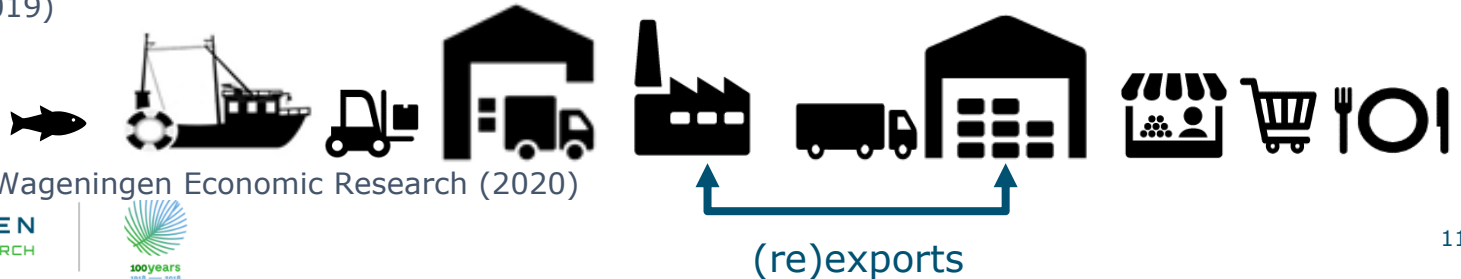


B. It's a small world after all: 'think global, act local'



Source: Rabobank (2019)


- 56% of fish (US dollars) exported vs. 18% beef, 14% pork, 12% poultry
- Long and complex value chain
- Globalized → countless transport movements
- Large impact COVID

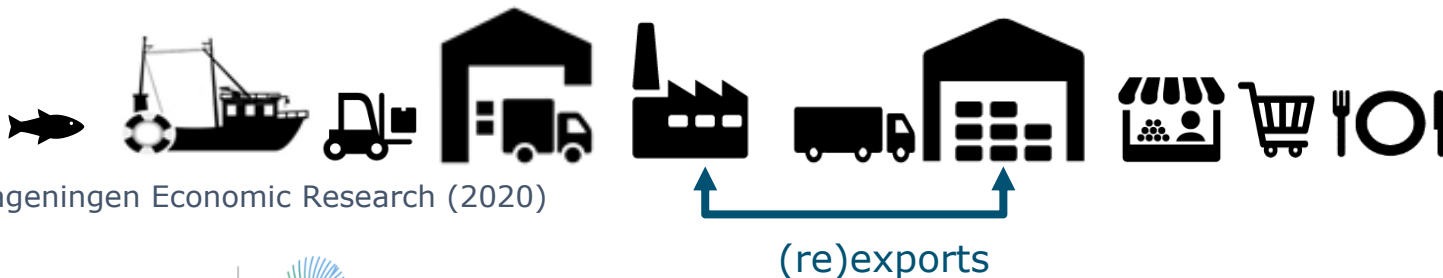


B. It's a small world after all: 'think global, act local'

Any of the challenges in the EU **linear** seafood chains

- Raw materials supply (EU import rates 60-65% of total supply)
- Price inputs/raw materials
- Trade wars/tariffs/duties
- Qualified employees
- International price competition/labor costs
- Another pandemic (lockdowns=no trade)

 **1/3** of fish biomass is wasted through the chain



Source: Wageningen Economic Research (2020)

C. Zero waste, 100% taste: 'circular potential in seafood chains'



1. More harvesting, but different (aquaculture + lower trophic)
2. Food before feed
3. Other consumption patterns (more local species)
4. Valorization 100% side streams and by products (zero waste) → 3Rs: Reduce, reuse, recycle

Example of resource efficiency

Results of explored *scenarii* through Sardine bioresource Material Flow Analysis in the system

Legend : DEU : Domestic Extraction Used, TMR : Total Material Requirement, DMC : Domestic Material Consumption according Barles (2014); FTE : Full Time Employment ; VAT : Total added value

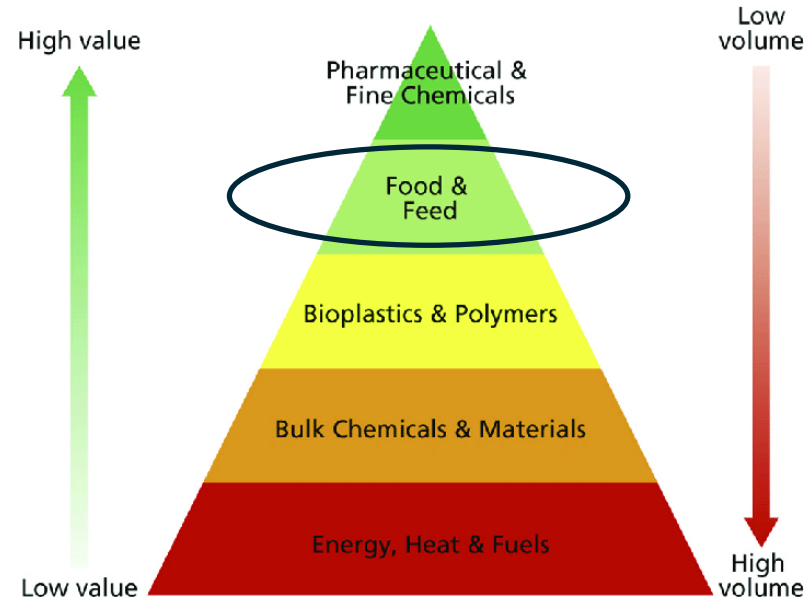
	Current situation	Business as usual	Circularity with biotechnology
Local production in t	15038	15038	15038
Importations in t	12910	16009	8005
FTE _{Sardine}	1140	1155	1126
		+1%	-1%
VAT sardine (10 ⁶ €)	68.3	69.3	67.5
		+1%	-1%
Material Intensity Requirement/FTE (t/FTE)	25.30	27.85	20.97
		+10%	-17%

FTE : Full Time Employment
VAT : Total Added Value

Ressource sparing

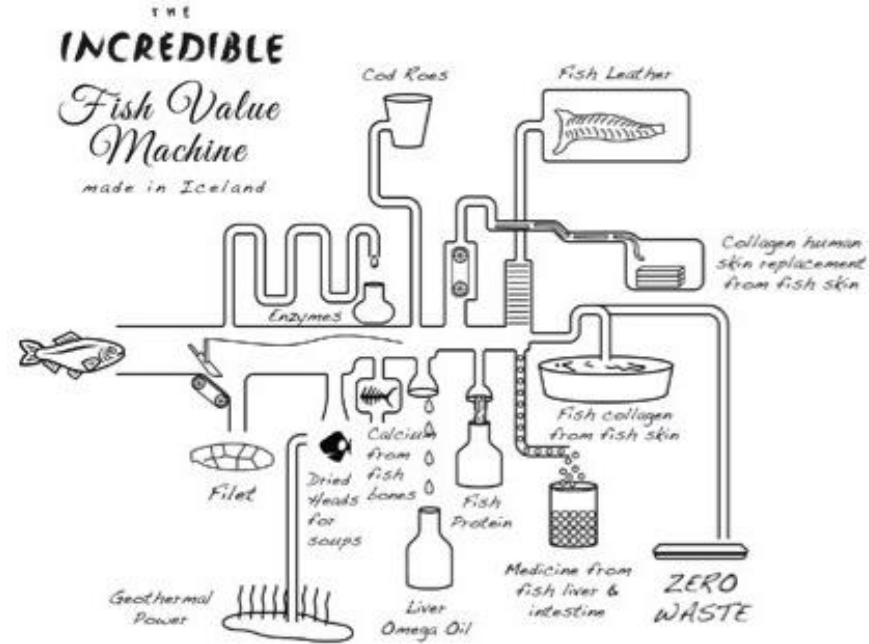
Source: R. le Gouvello, 2019

Bio-based value pyramid



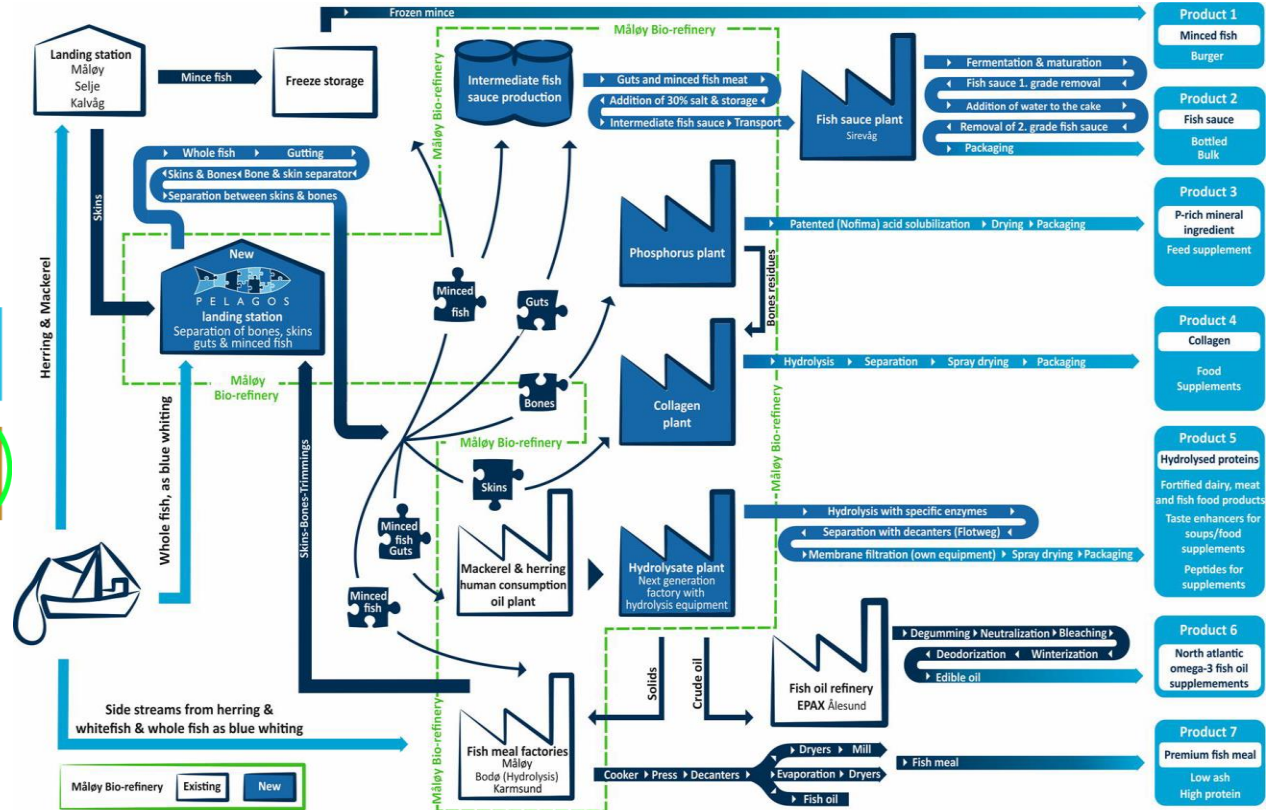
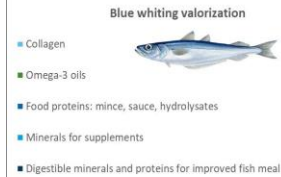
Source: Davis et al., 2017

100% taste, zero waste (Cod from Iceland)



Source: Icelandic Ocean Cluster

100% taste, zero waste



Thank you for this dive in circular seafood chain!

(sea)food for thought and thoughts about (sea)food.

Questions/discussion later on:

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Questions? Otherwise we challenge you ;)

Bold statements:

- Not the producer but end consumer is responsible for a responsible supply of products (no say, no pay)
- True pricing is the way to separate the 'desirable' from the 'undesirable' products
- If you reward circular and sustainable responsible food producer and B2C players with a robust business model, circular food chains is just a matter of time
- We as a society should tax via our governments products with a highly negative climate and social impact
- Circularity is not the ideal way to produce food within planetary boundaries and in a responsible social and economic way on the long term. It's a matter of supply and demand as circular food chains could not solve this but rather complicate this generique function of markets.