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Environmental impacts and benefits of seafood

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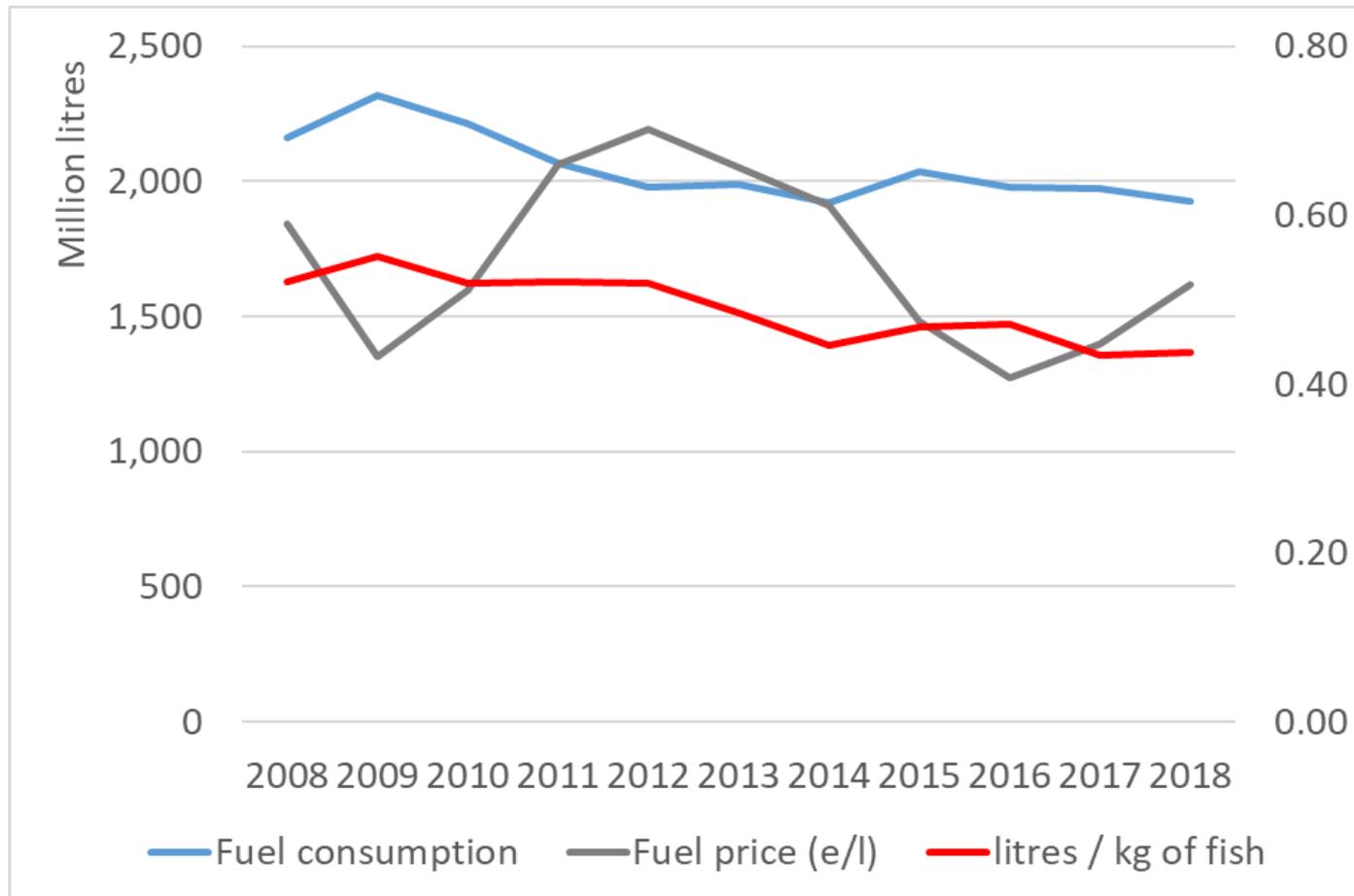


Setting the scene

- The European Green Deal (EGD) aims to be climate-neutral by 2050: an economy with net-zero greenhouse gas (GHG) emissions. This goal is in line with the EU's commitment to global climate action under the Paris Agreement.
- The EGD sets a comprehensive package of measures ranging from ambitious GHG emission reductions, to research and innovation for the development of low carbon technologies, and the preservation of Europe's natural environment.
- The need for sustainable fishing is highlighted by the CFP and the F2F, including not only the need to ensure the sustainable management of wild fish populations, but also of assessing the environmental footprint of fish products.

Fuel consumption

- The EU fishing fleet consumed 2.02 billion litres of fuel (roughly 5.2 million tonnes of CO₂) to land 4.5 million tonnes of fish valued 6.7 billion at the first sale in 2018 (AER, 2020).

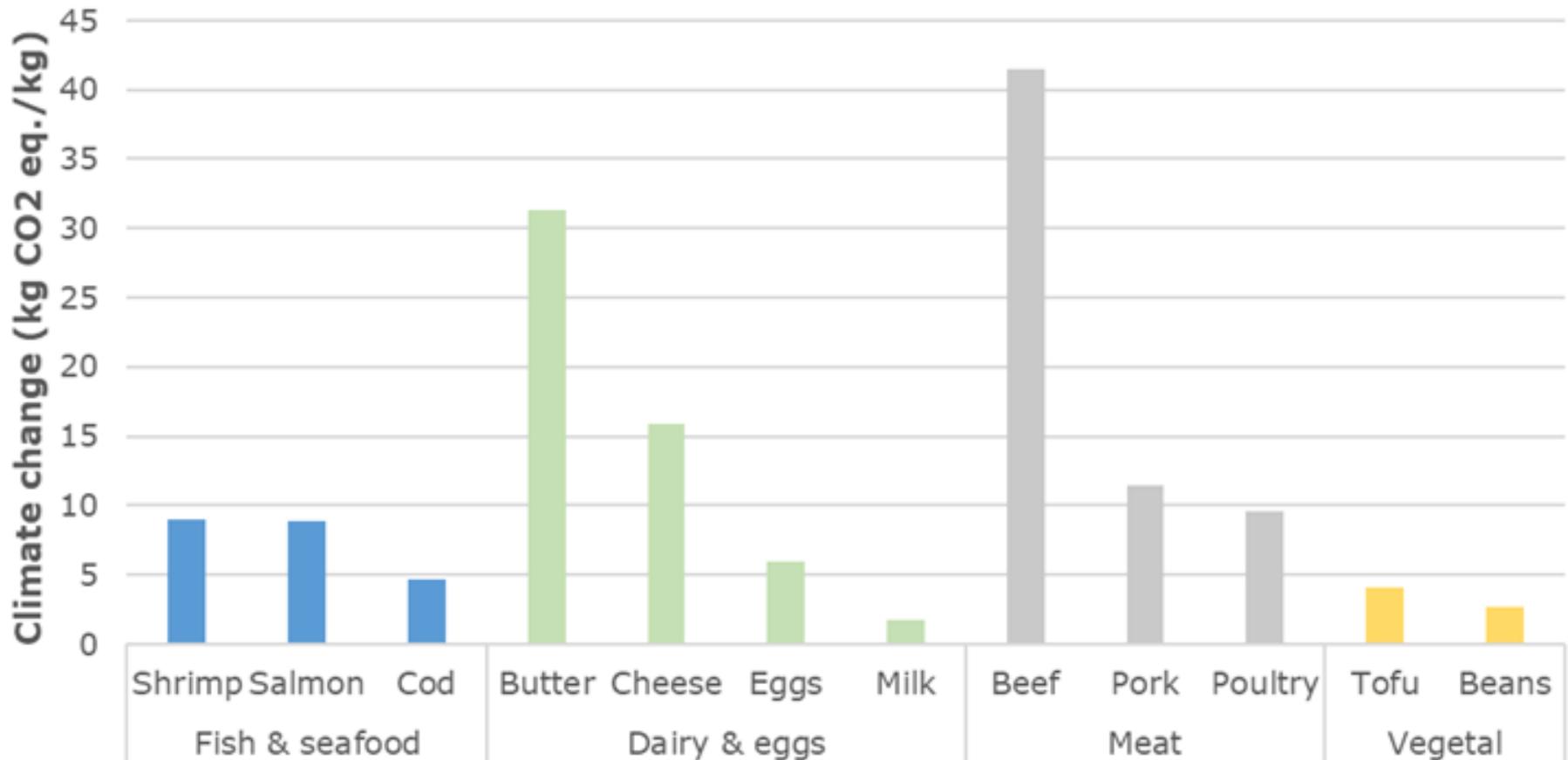


LCA: a tool to measure impacts

- The environmental footprint of fisheries can be assessed by means of Life Cycle Assessment (LCA).
- LCA is a method to systematically and holistically assess the environmental impacts of the life cycle of products and processes, from raw material extraction to waste management.
- LCA allows assessing a multitude of environmental impacts highlighting possible trade-offs and burdens shifting between not only environmental impacts but also life cycle stages.

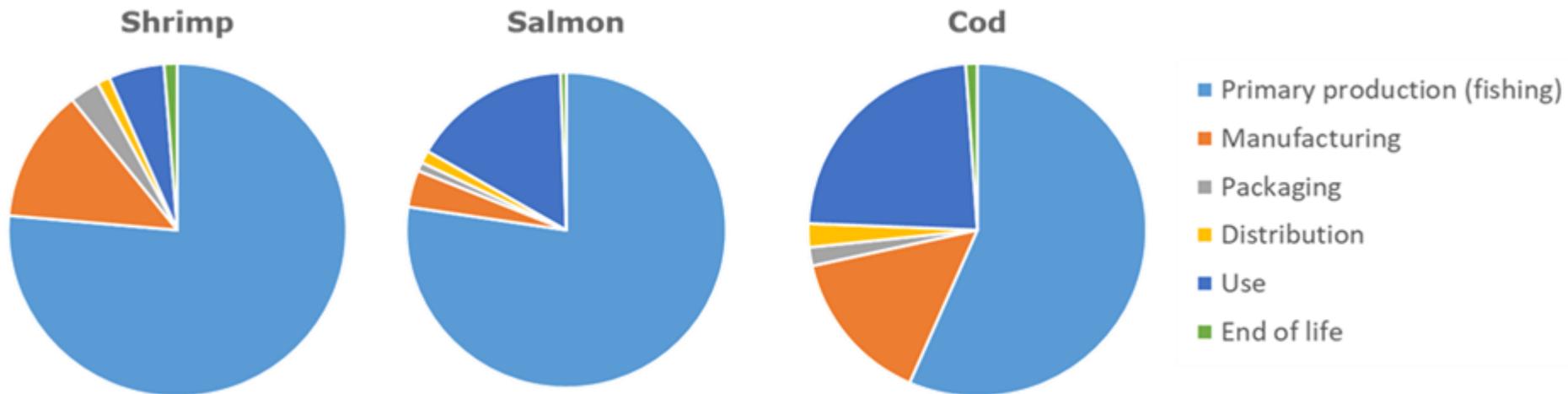
Emissions per product

- The LCA for GHG emissions (i.e., contribution to climate change) for fish and seafood products ranged between 4.6 and 9.0 kg CO₂ eq. per kg of product.



Contribution by cycle stage

- For fish and seafood products, most of the impacts are generated during the primary production (i.e. fishing activities), which represents between 57% (cod) to 77% (salmon).



Some thoughts

- LCA shortcomings are because of data shortcomings rather than methodological ones: need to include more products, the exact origin of fish matters (country, fisheries vs aquaculture), different fish products may mix (e.g. in processing), and information should not be 'years old'.
- Let's not forget that EU-27 imports about 70% of the fish we eat. Difficult to collect data from third countries.
- GHG emissions is only one of the impacts. But it is easy to measure, impartial, monitor overtime, compare with other sectors and is high on the agenda.
- Hence, the need to incorporate other impacts. But they need to be measured in a reliable way.

STECF EWG 20-05

- On Criteria and indicators that could contribute to incorporating sustainability aspects in the marketing standards under the CMO

Dimension	Criteria	Product 1	Product 2	Product 3
Environment	Fishing pressure	A	D	A+
	Fisheries management	A	No score	A
	Impact on ETP and sensitive species	A	No score	B
	Unwanted landings and discards	B	D	A
	Impacts on the seabed	D	E	A+
	Impact on marine food webs	B	No score	A
	Carbon footprint	C	E	A+
	Waste and pollution	A+	D	A
Social	Working condition (production)	A+	C	B
8 Final score		A or B	D or E	A+

Looking forward: the Consumption Footprint

- The Consumption Footprint indicator is a set of 16 LCA-based indicators (also available as single score), whose purpose is to quantify the environmental impacts of an average EU citizen, based on the consumption of goods in five areas (Food, Mobility, Housing, Household goods, and Appliances) and a total of around 150 representative products.

TRADE-OFFS			Fish & seafood			Dairy & eggs			Meat		
Impact category		Unit	Shrimp	Salmon	Cod	Butter	Cheese	Eggs	Beef	Pork	Poultry
Climate change	CC	kg CO2 eq	100%	99%	52%	348%	176%	66%	461%	127%	106%
Ozone depletion	ODP	kg CFC11 eq	100%	144%	104%	193%	195%	11%	281%	263%	258%
Particulate Matter	PM	Disease incidence	100%	72%	24%	565%	243%	169%	739%	204%	147%
Ionizing radiation HH	IR	kBq U235 eq	100%	121%	78%	169%	163%	109%	49%	95%	83%
Photochemical ozone formation	POF	kg NMVOC eq	100%	65%	137%	85%	50%	27%	131%	42%	32%
Acidification	AC	molc H+ eq	100%	94%	78%	935%	405%	258%	1174%	334%	213%
Terrestrial eutrophication	TEU	molc N eq	100%	127%	111%	1333%	567%	363%	1669%	474%	301%
Freshwater eutrophication	FEU	kg P eq	100%	104%	6%	31%	27%	12%	50%	21%	17%
Marine eutrophication	MEU	kg N eq	100%	112%	28%	140%	76%	36%	231%	64%	40%
Water scarcity	WU	m3 water eq	100%	65%	828%	147%	110%	93%	513%	118%	78%
Land use global	LU	Pt	100%	161%	5%	615%	251%	196%	1138%	300%	213%
Resource use (fossil)	FRD	MJ	100%	58%	59%	82%	63%	32%	95%	42%	35%
Resource use (minerals and metals)	MRD	kg Sb eq	100%	23%	22%	44%	28%	14%	18%	15%	14%
Humantox cancer_weight	HTOXC	CTUh	100%	76%	30%	347%	180%	80%	330%	118%	63%
Humantox non cancer_weight	HTOXnc	CTUh	100%	193%	120%	276%	581%	166%	328%	162%	152%
Ecotoxicity_weight	ECOTOX	CTUe	100%	79%	64%	73%	170%	66%	96%	76%	63%
Single weighted score			100%	95%	58%	274%	154%	78%	361%	113%	84%

What about benefits?

- Fish is more than just proteins.
- If impacts have to be accounted, probably benefits too. But how and where?
- Too much information can be bad? What consumers need/want to know?
- Also less impacts can be perceived as beneficial (compared to imports, other products?).
- Potential development of 'low impact' products (e.g. low trophic levels such as algae). What about the market?

Some (further) references

- STECF EWG 20-05 and EWG 20-06 reports: <https://stecf.jrc.ec.europa.eu/reports>.
- International Organization for Standardization (ISO) (2006a) ISO 14040. Environmental management – Life cycle assessment – Principles and framework. Geneva, Switzerland.
- International Organization for Standardization (ISO) (2006b) ISO 14044. Environmental management – Life cycle assessment – Requirements and guidelines. Geneva, Switzerland.
- European Commission (EC) (2013) Commission Recommendation of 9 April 2013 on the use of common methods to measure and communicate the life cycle environmental performance of products and organisations, 2013/179/EU.
- Sala S., Benini L., Castellani V., Vidal Legaz B., De Laurentiis V., Pant R. (2019) Suggestions for the update of the Environmental Footprint Life Cycle Impact Assessment. Impacts due to resource use, water use, land use, and particulate matter. Luxembourg, Publications Office of the European Union.
- Sala S., Benini L., Beylot A., Castellani V., Cerutti A., Corrado S., Crenna E., Diaconu E., Sanyé Mengual E, Secchi M., Sinkko T., Pant R. (2019) Consumption and Consumer Footprint: methodology and results. Indicators and Assessment of the environmental impact of EU consumption. Luxembourg: Publications Office of the European Union.
- Beylot A., Ardente F., Penedo De Sousa Marques A., Mathieux F., Pant R., Sala S. and Zampori L. (2020) Abiotic and biotic resources impact categories in LCA: development of new approaches, Luxembourg, Publications Office of the European Union.



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