

JUNE 1 - 3
SKAGEN
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Frank Trearty

Chairman of European
Fishmeal, CEO of Pelagia
Killybegs

Conference Start and
Welcome



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DENMARK

Anna
Rindorf

Professor, Head of section,
Danish National Institute of
Aquatic Resources, Section for
Ecosystem based Marine
Management

The Industrial Fishery 10
Years from now





The industrial fishery in 10 years

Anna Rindorf, DTU Aqua

SEAWise has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101000318





What so special about industrial fishing?

- Industrial fishing targets large densities of fish with high oil content
- So does a wide range of fish, seabirds and mammals
- Fish with high oil content occurring in large densities exploit zooplankton prey in a highly variable environment
- As a result, their biomass varies greatly from year to year



**Fishing
For
Forage
Fish**

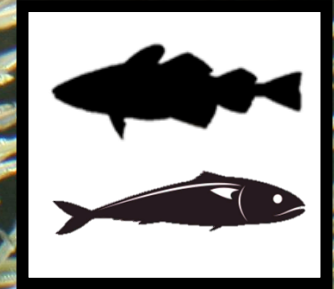
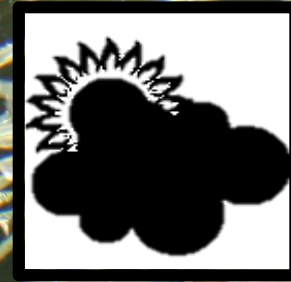
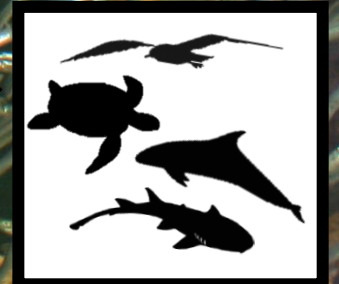
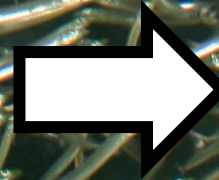
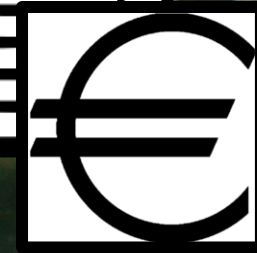
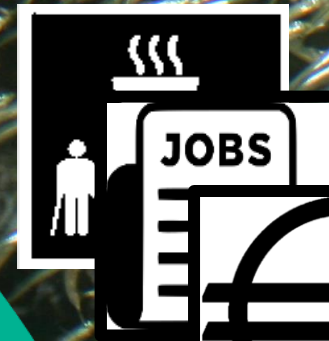


What affects the future of these stocks and their management?

- Climate, climate, climate
- Density and predator stocks
- Quest for stable high catches
- MPAs and BREXIT
- Renewable energy
- Shifting policy objectives?



In the
crystal
ball

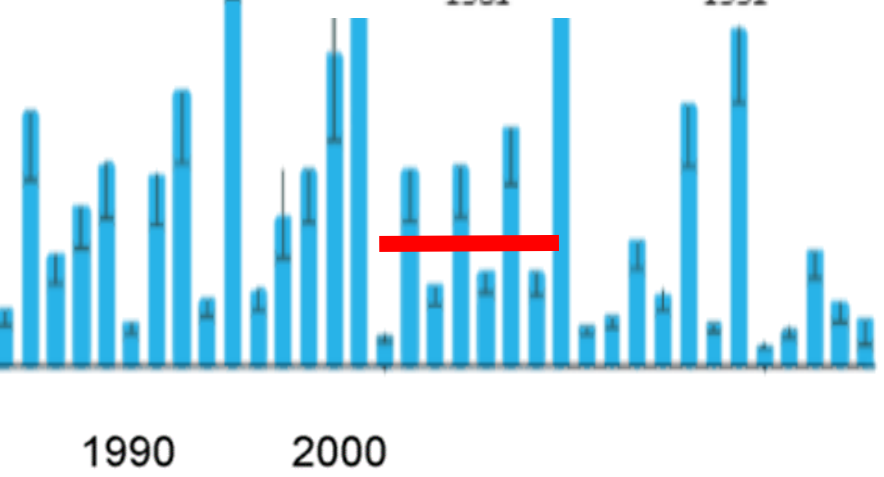
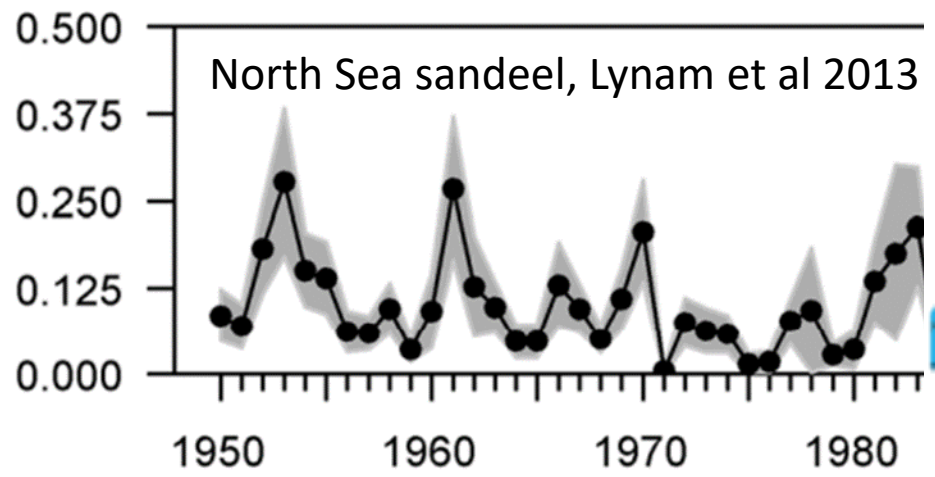
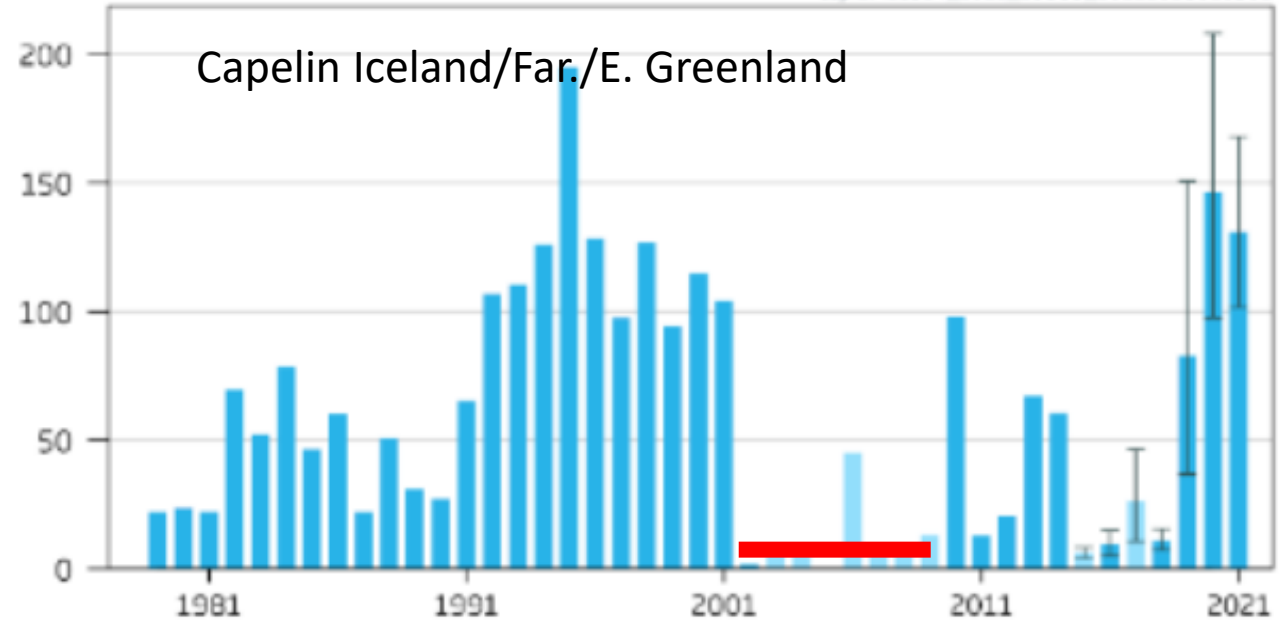


Stable high catches in a variable environment:

Were they always there in high densities?



Sandeel Dogger Bank



Blue bars: recruitment from ICES assessment 2021/2022

Less spawners= less new fish? More spawners=less new fish?

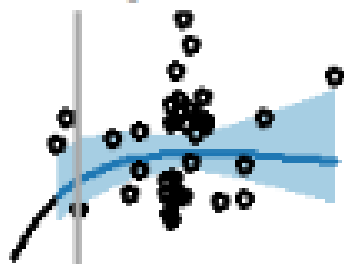
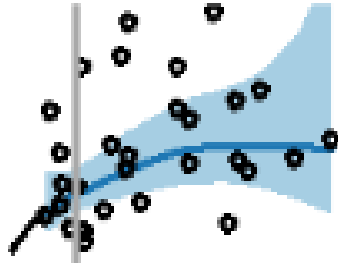
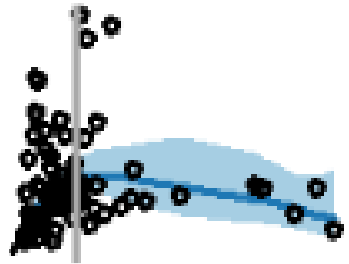
But do they grow the same way?



NE Arctic cod

Anchovy

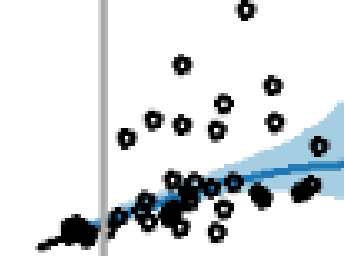
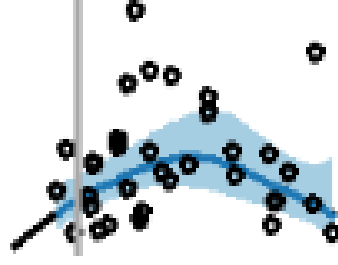
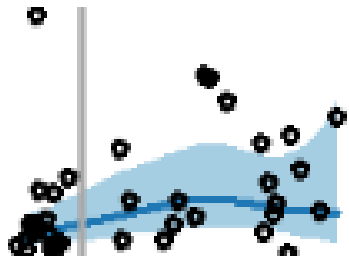
Capelin iceland



Capelin NE Arctic

Norway pout

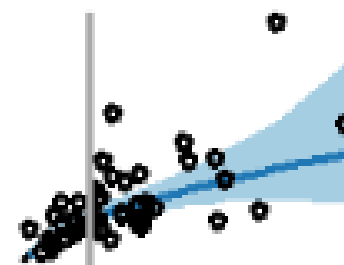
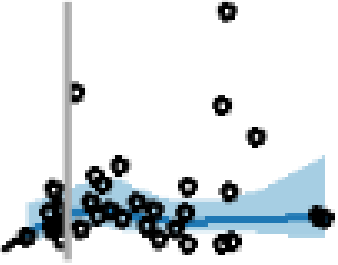
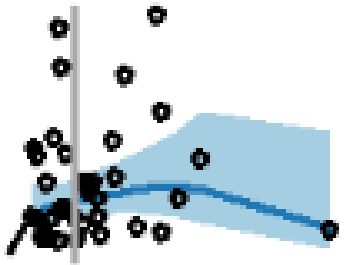
Sardine



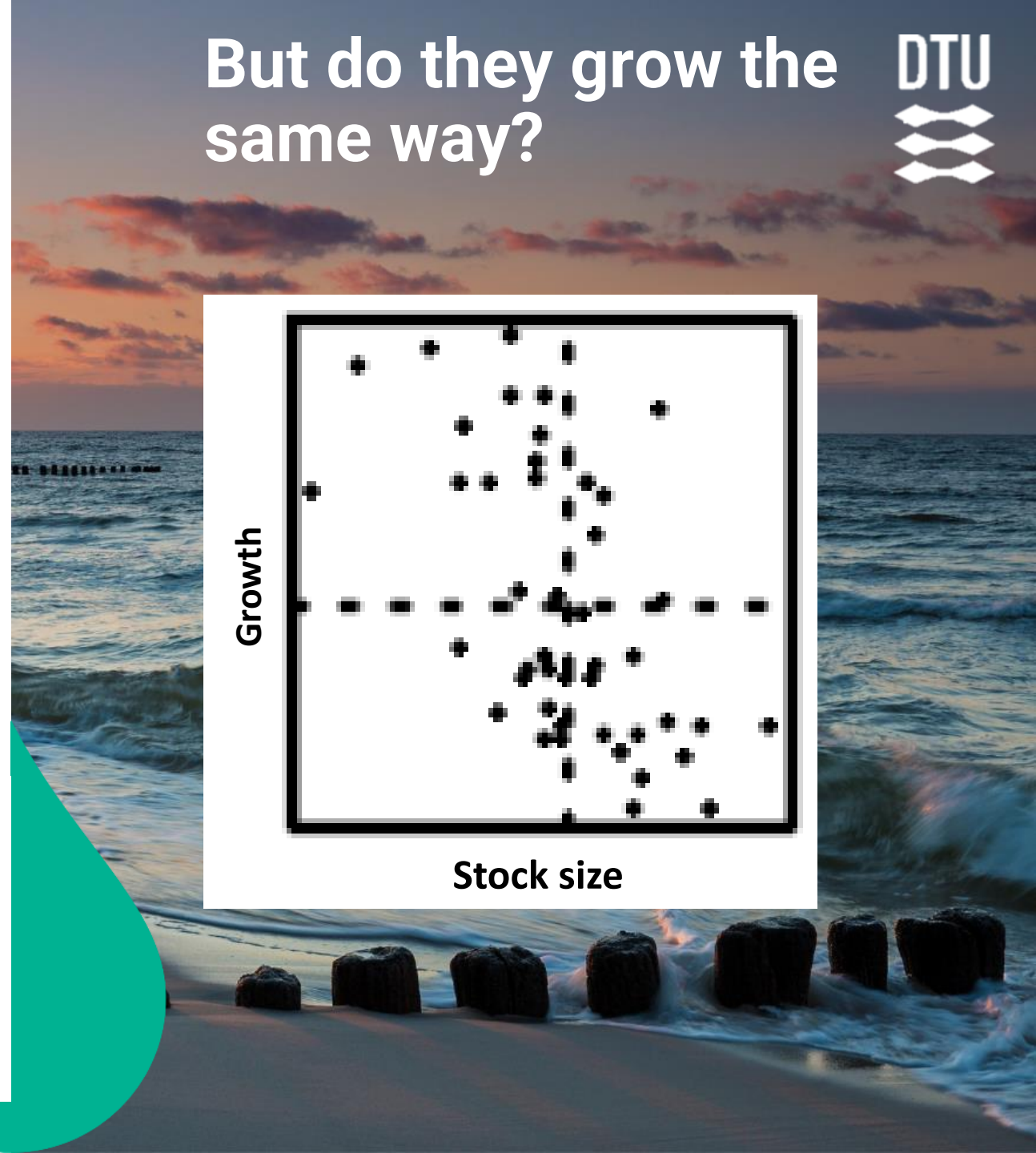
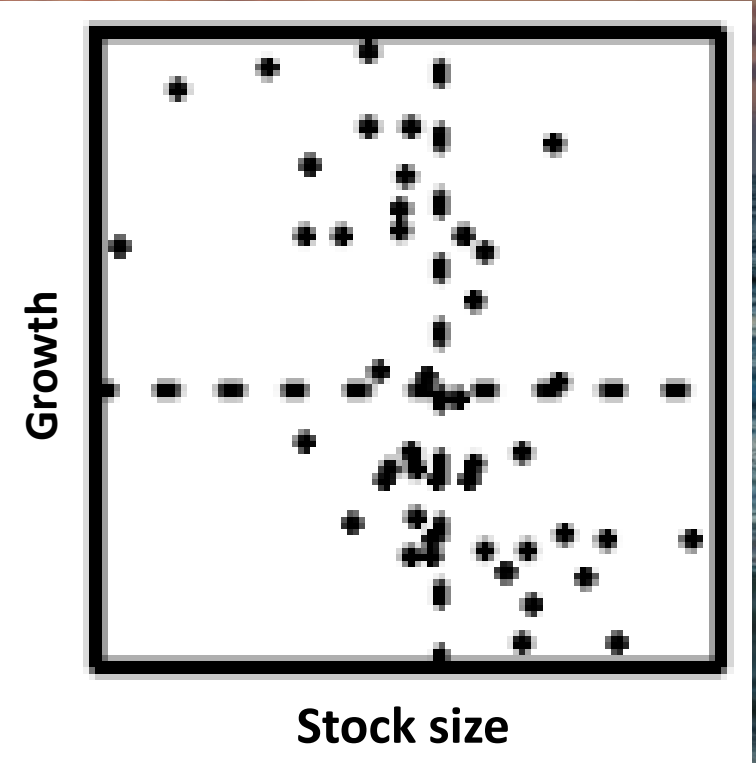
Dogger sandeel

Northeast sandeel

North sea sprat

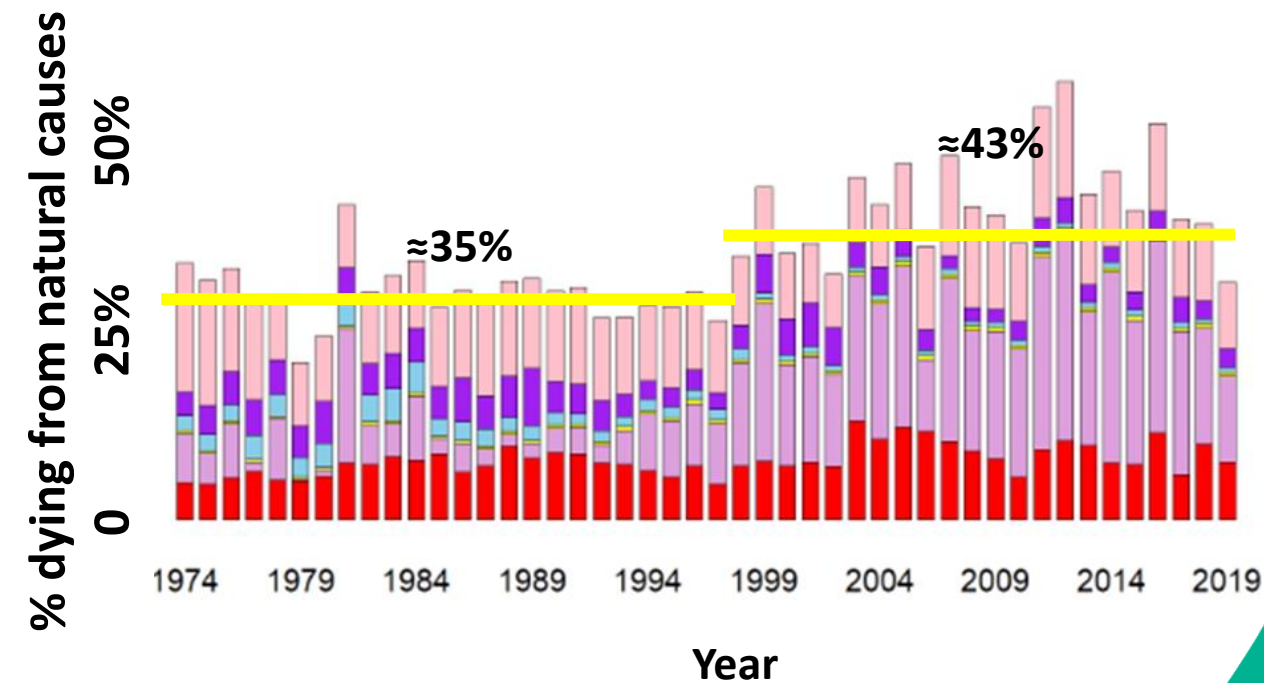


Spawning stock



More predators=less fish? Less fish=less predators?

- Most predators rely mainly on recruitment
- Public perception is not burdened by the need for evidence!



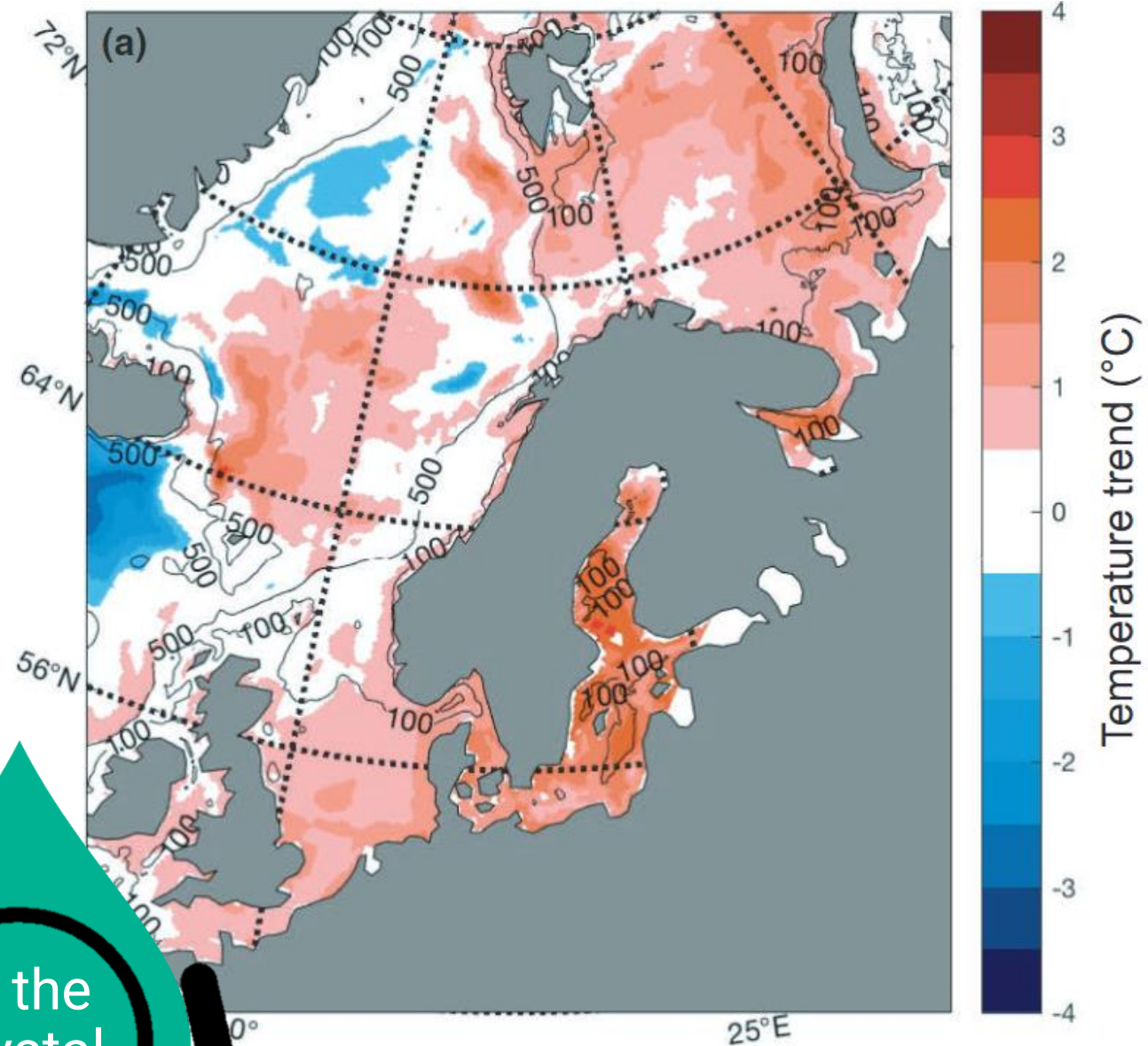
- lots of evidence of effects of forage fish on predator diet
- Not much evidence of effects on growth outside seabirds and other one-species-of-forage-fish-systems

Forage
fish and
their
predator
s



Looking into the productivity future

- A few stocks are expected to increase (NS sprat) or remain at present level (capelin)
- Most are expected to decrease (sandeel, Norway pout)
- In the North Sea, retaining present productivity results in 45-70% decrease in yield
- We cannot expect to gains to be compensated by other fisheries in the same year
- It is possible that new (southern) species will increase to fishable levels



In the
crystal
ball

Clausen et al. 2017,
Kjesbu et al 2022

Looking into the policy future

- Policy focus will likely increase on assigning MPAs and maintaining stocks in spite of low productivity
- This means that all stock advice will feel the impact of decreases
- There are efforts to increase the acceptable risk to recruitment a bit
- MPAs, BREXIT and renewable energy will decrease the area for fishing
- Effects of these on stock productivity are unknown





Thank you for
listening

Shaping Ecosystem Based Fisheries Management
<https://seawiseproject.org/>

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Henrik Sparholt

Dr. scient., Project Leader at the
FMSY-project, University of
Copenhagen

Why should we start talking about
Maximum Sustainable Yield?



European Fishmeal and Fish Oli Producers (EFFOP) Conference, June 2022



Why should we start talking about maximum sustainable yield?

Henrik Sparholt

B.Sc., M.Sc., Dr.Sc. University of Copenhagen



Nordic Marine Think Tank



Nordic Council
of Ministers



European Union
European Maritime and Fisheries Fund

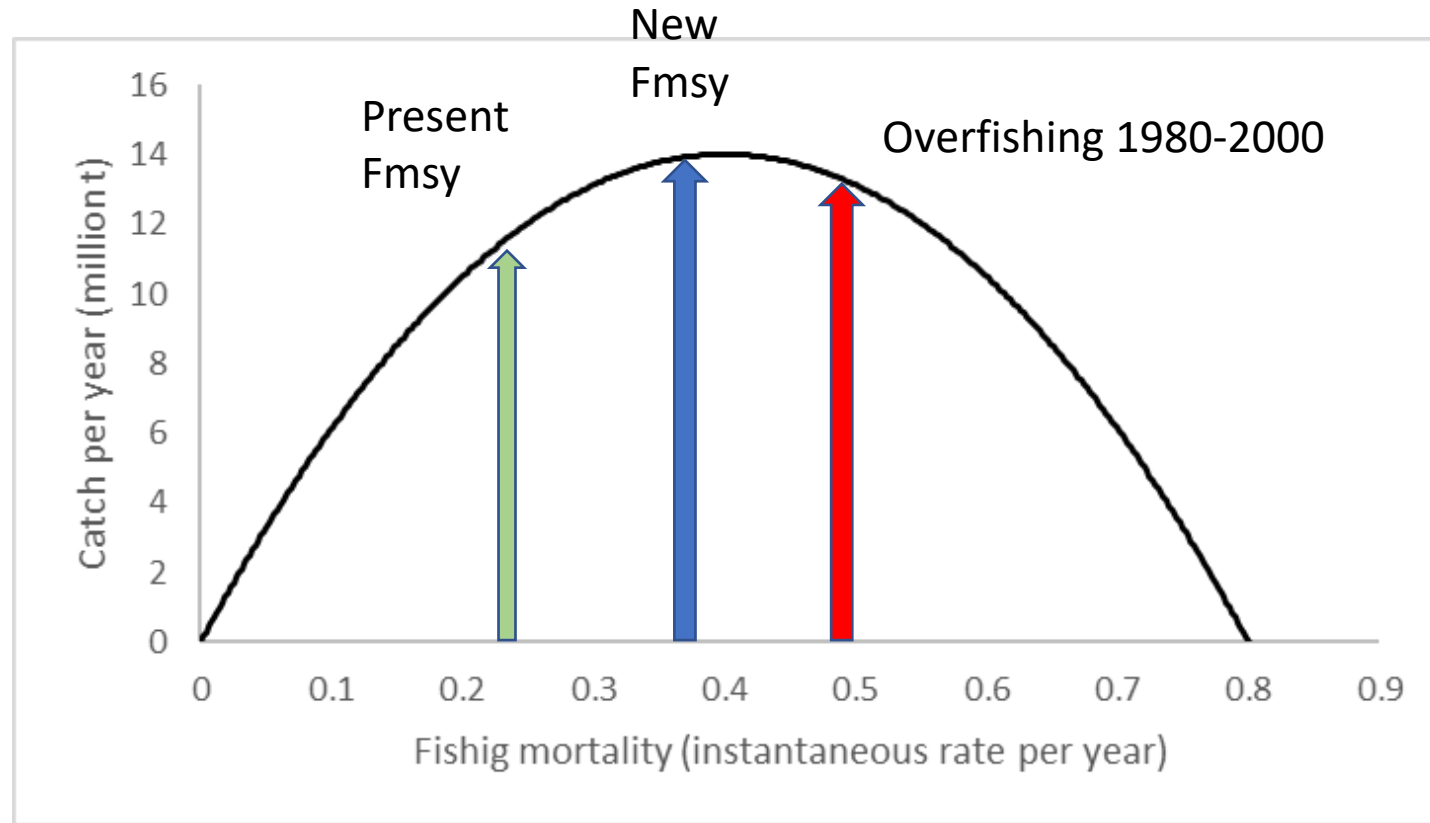


**Ministry of Environment
and Food of Denmark**
Danish Veterinary and
Food Administration

My background

- DTU AQUA 1983-1992
- International Council for the Exploration of the Sea (ICES) 1992-2016
- Nordic Marine Think Tank 2016-2019
- University of Copenhagen 2020-present
- Scientific advice on fisheries management - 39 years

What is Maximum Sustainable Yield?



Density dependence is important when fish stocks rebuild...

Like thinning the radish....

...you get a higher yield by having fewer radish/fish in the population



Because individual fish:

1. Grow better
2. Has reduced natural mortality
3. Produce more eggs

When the stock is small, individual fish:

1. Grow better
2. Have reduced natural mortality
3. Produce more eggs



Challenge

- ICES current Fmsy estimates ignores elements of density dependence → a systematic downward bias.
- The Fmsy-project found: the real Fmsy values are 50% higher than the current values.

This does not only have academic relevance.

It means that managers - following the ICES advice in the belief they get something close to the maximum sustainable yield in the long term - in fact get several million tons less per year. This represents several billion Euros per year in lost income.

Urgent change needed

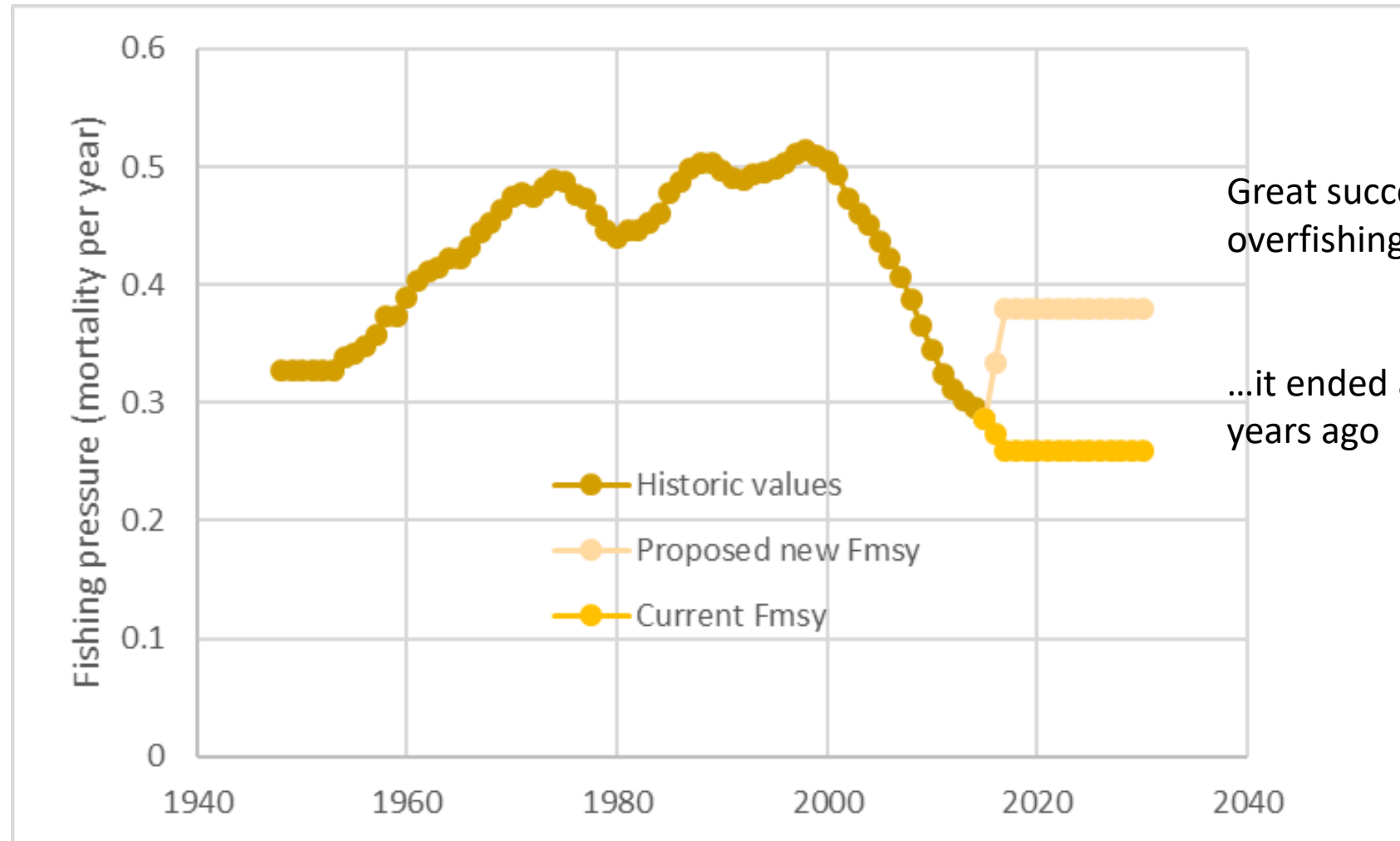
- ICES is a "super tanker" - changing ICES approach takes about 10 years – you have to reach out to 4000 scientists.
- Can society afford waiting?
- One solution is to use the new Fmsy values now.
- ...and let ICES refine the new Fmsy values over the coming 10 years.

The Fmsy-project proposes a new set of Fmsy values for 53 data rich stocks in the North Atlantic

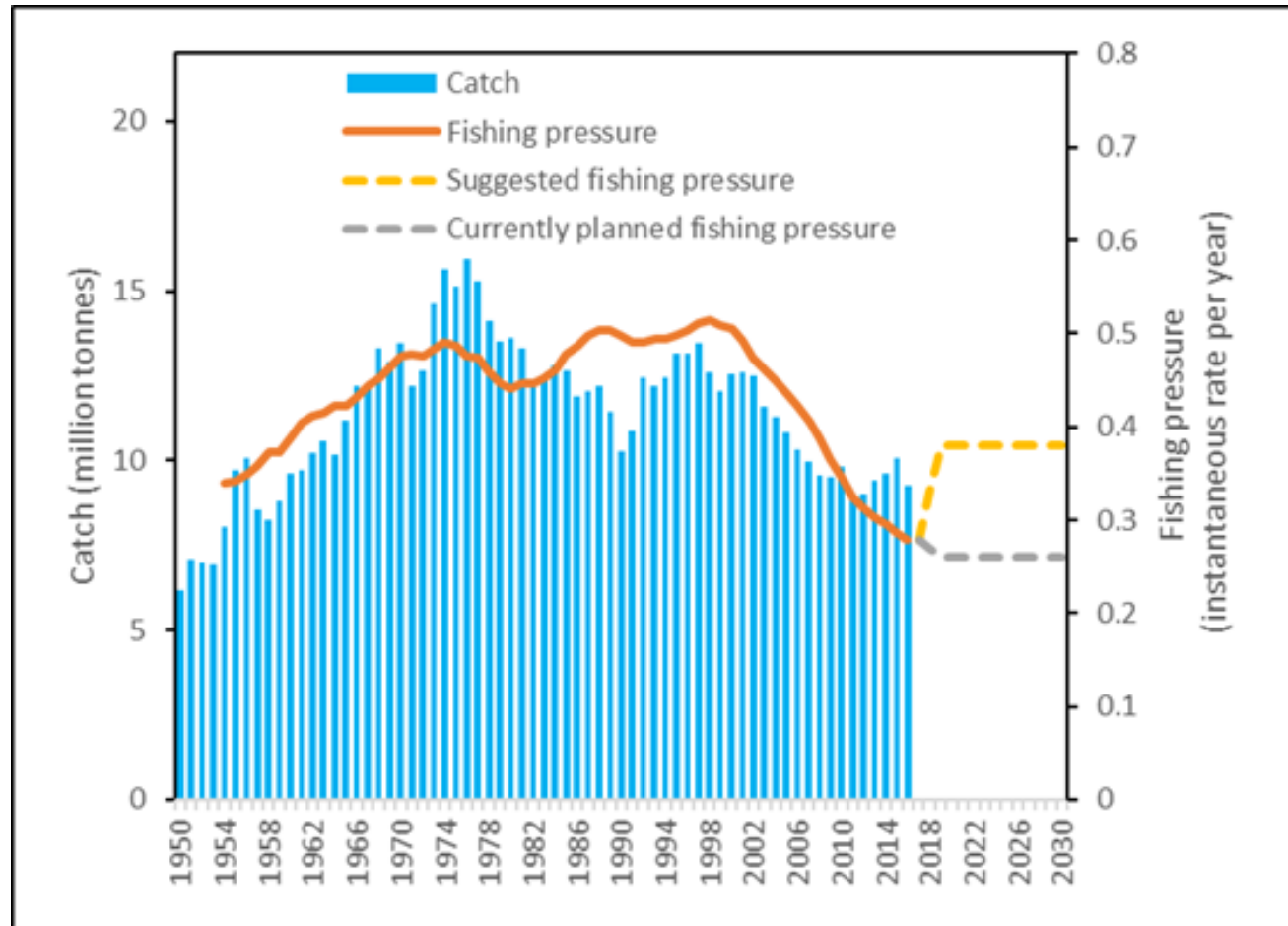
They are:

- with no systematic bias known to science
- verified by the available science on ecosystem functioning

Historic fishing pressure in the Northeast Atlantic — indexed by the 53 ICES stocks in the Fmsy project.



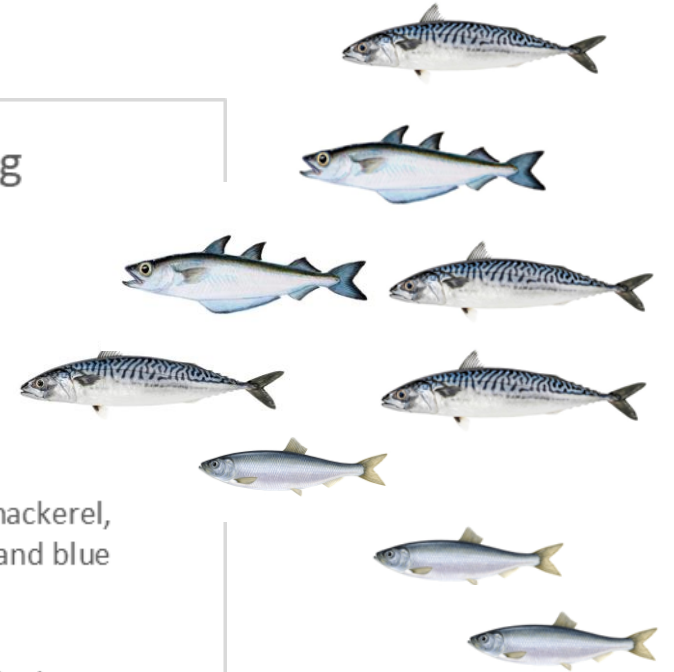
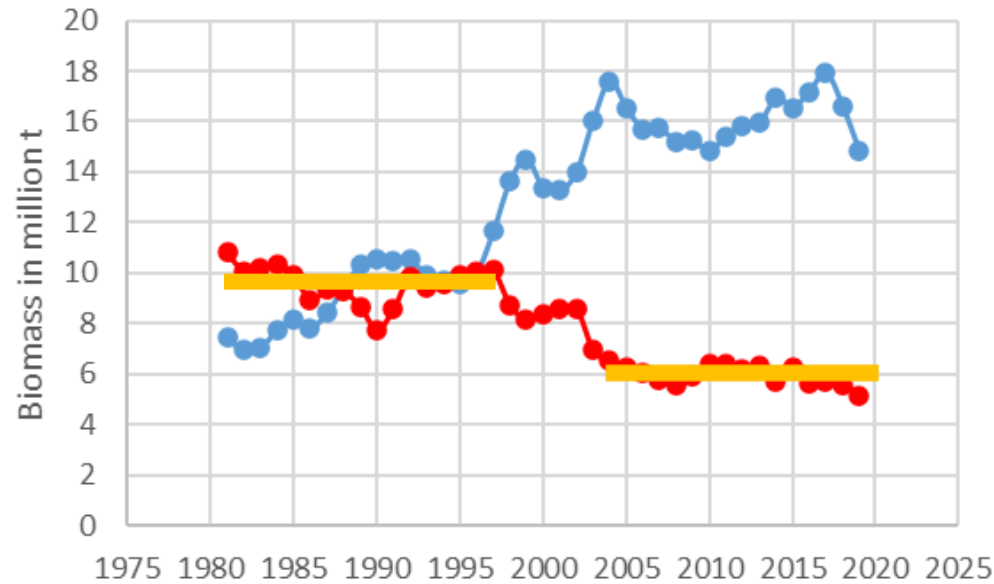
...overlayed with catch in Northeast Atlantic...



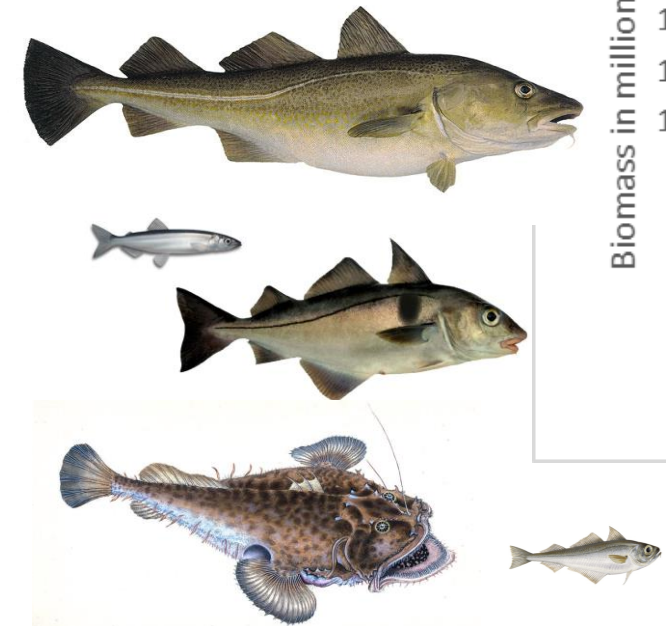
Where is the "long-term gain" for the "short-term pain"???

The "three big pelagics" likely too abundant...

Biomass (SSB) of mackerel, herring and blue whiting and catch of other species in the NE Atlantic



When the pelagics goes up → the catch of other species goes down



We suggest, managers still do not need to consider the balance between species for using the proposed set of F_{MSY} values.

- The Fmsy-project does not suggest a full multispecies approach, ...but is much closer to it than the current approach.

Example blue whiting: A sustainable gain can be obtained already in 2022 – new Fmsy = 0.44

ICES Advice on fishing opportunities, catch, and effort
whb.27.1-91214

Published 30 September 2021

Table 2 Blue whiting in subareas 1–9, 12, and 14. Annual catch scenarios. All weights are in tonnes.

Basis	Total catch (2022)	F (2022)	SSB (2023)	% SSB change *	% catch change **	% advice change ***
ICES advice basis						
Long-term management strategy F = F _{MSY}	752736	0.32	4052163	19.1	-39.4	-19.0
Other scenarios						
MSY approach: F _{MSY}	752736	0.32	4052163	19.1	-39.4	-19.0
F = 0	0	0	4738902	39.2	-100	-100
F _{pa}	752736	0.32	4052163	19.1	-39.4	-19.0
F _{lim}	1695700	0.88	3214818	-5.5	36.4	82.5
SSB ₂₀₂₃ = B _{lim}	3797974	3.93	1500000	-55.9	205.6	308.7
SSB ₂₀₂₃ = B _{pa}	2838799	2.03	2250000	-33.9	128.4	205.5
SSB ₂₀₂₃ = MSY B _{trigger}	2838799	2.03	2250000	-33.9	128.4	205.5
F = F ₂₀₂₁	1113313	0.51	3728501	9.5	-10.4	19.8
SSB ₂₀₂₃ = SSB ₂₀₂₂	1479984	0.73	3403629	0	19.1	59.3
Catch ₂₀₂₂ = Catch ₂₀₂₁	1242727	0.58	3613292	6.2	0	33.7
Catch ₂₀₂₂ = Catch ₂₀₂₁ -20%	994181	0.44	3834987	12.7	-20	7.0
Catch ₂₀₂₂ = Catch ₂₀₂₁ +25%	1553483	0.78	3339158	-1.9	25	67.2
Catch ₂₀₂₂ = Advice ₂₀₂₁ -20%	743434	0.32	4060575	19.3	-40.2	-20

* SSB 2023 relative to SSB 2022.

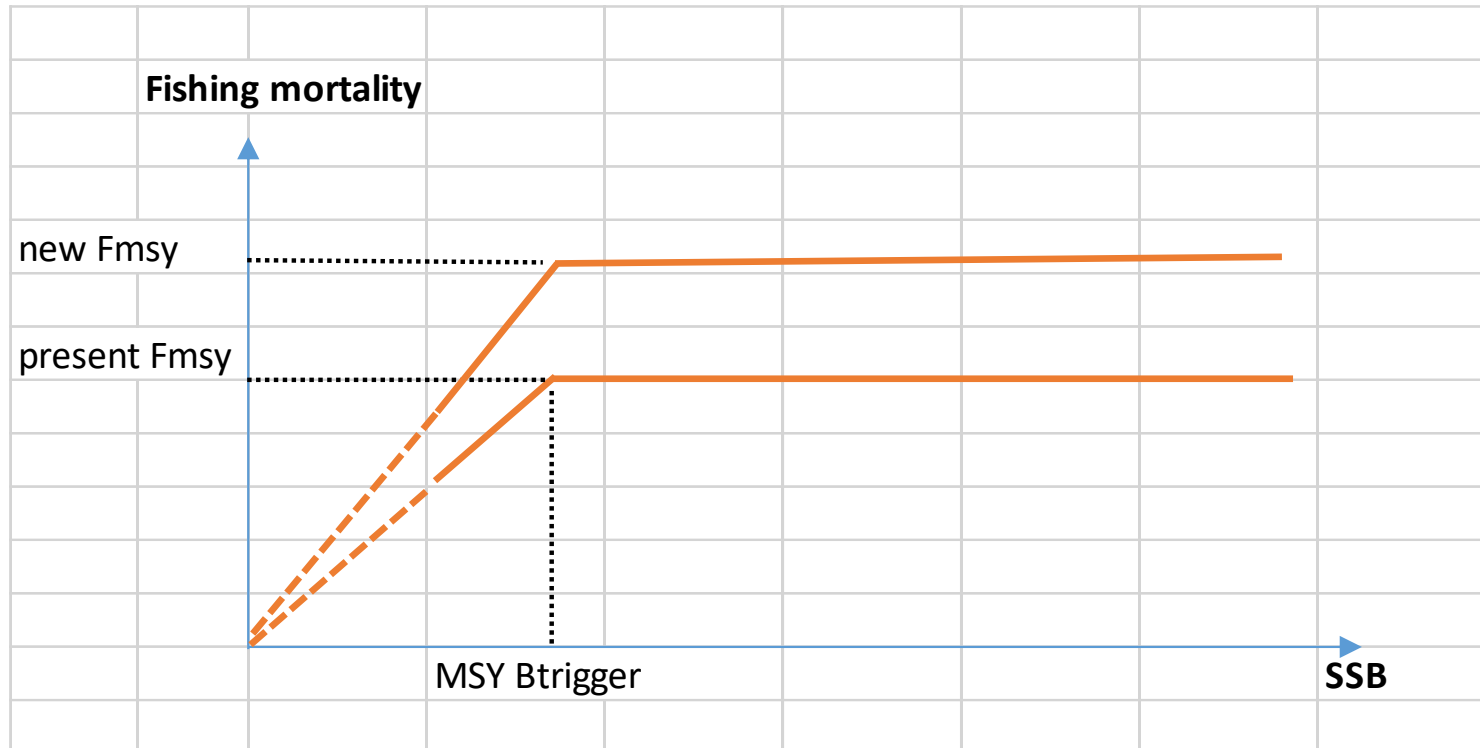
** Catch 2022 relative to expected catch in 2021 (1 242 727 tonnes).

*** Catch 2022 relative to advice for 2021 (929 292 tonnes).

This means a 241000 t higher TAC in 2022 than based on the current Fmsy

- No short term pain!
- The pain has already been taken over the past decades where overfishing was overcome.

ICES Harvest Control Rule still applies and will take care of the "precautionary approach"



Argument against the new Fmsy values

”ICES Fmsy includes a precautionary element, the new ones does not...”

Yes, right... ...and the reasons are:

- We don't think it is correct to include a management objective in a scientific concept like Fmsy. Science should be neutral, unbiased and non-political.
- The present Fmsy is not the fishing pressure that gives msy (maximum sustainable catch) – very confusing and non-transparent.
- Inconsistent with what is done on other parts of the World.
- Will make the management in the Northeast Atlantic look worse than it is, because fishing pressures will be compared with too low Fmsy values (See e.g. FAO The State of Worlds Fisheries, 2020).

But the management is still precautionary, because F is reduced when the stock is small (see previous slide) - only a 5% risk to get below Blim.

ICES use the Fmsy-project approach routinely for data-poor stocks

- Why should data rich stocks have a higher degree of precautionarity?
- It should rather be the other way around - the less data you have about a stock, the more precautionary you should be!!

Urgently need to change

— loosing at least 2-3 million t in foregone catch per year!

...not like a too low TAC in one year, where the extra amount of surviving fish can be added to the TAC the following year, because:

- the fish has been eaten by larger fish;
- reduced individual fish growth has already been realised due to food competition.

With an average price of about 1 Euros per kg, 2-3 million t is equal to a loss of 2-3 billion Euros for each year the switch to the new Fmsy values is postponed.

1. The new Fmsy values are without any bias known to science
2. Ecosystem functioning is much better accounted for
3. It can be implemented now
4. There is a long-term gain for yield
5. There is also a short-term gain for yield
6. ICES already use the approach for data-poor stocks

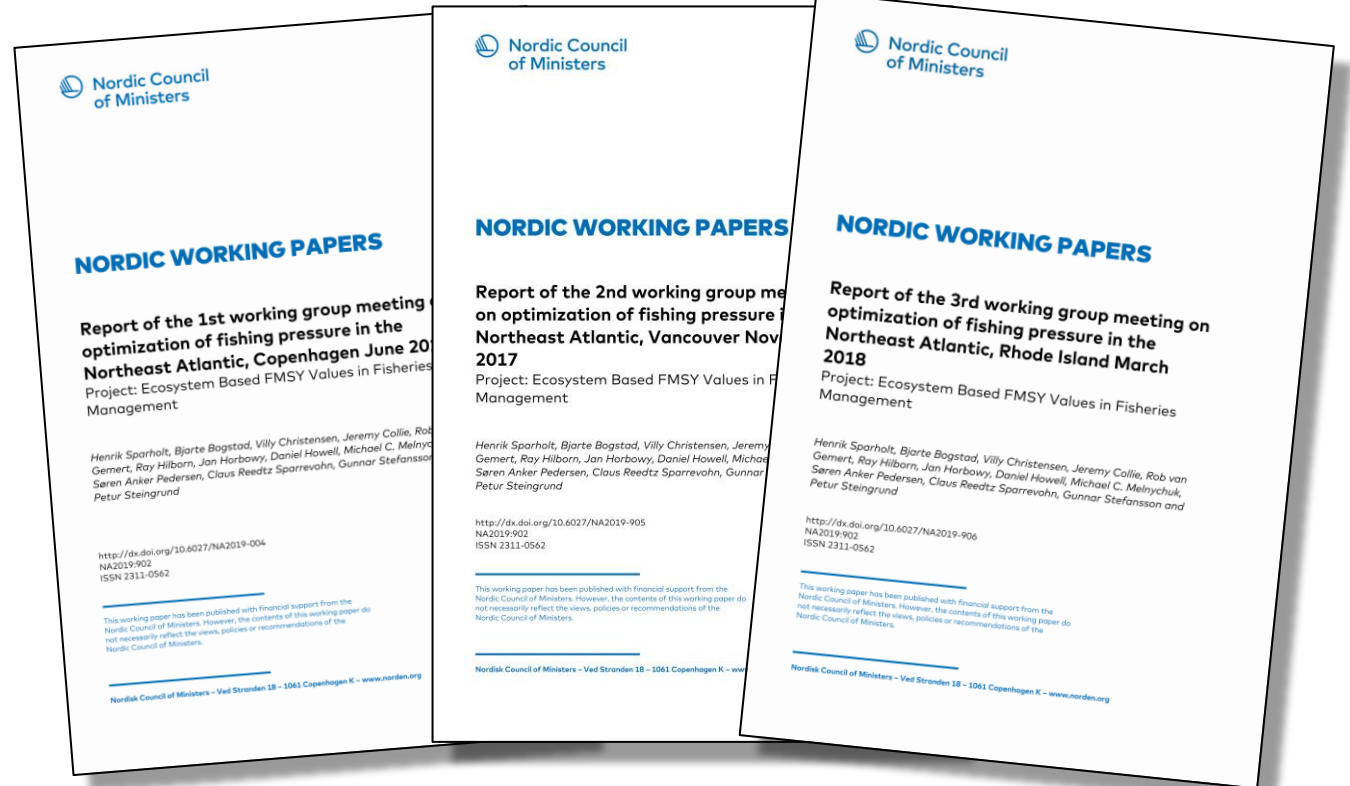
General:

Avoid a loss of 2-3 million t foregone catch per year by applying the new Fmsy values now.



Published here:

- <https://www.fmsyproject.net/reports>



Original Article

Estimating F_{msy} from an ensemble of data sources to account for density dependence in Northeast Atlantic fish stocks

Henrik Sparholt^{1*}, Bjarne Bogstad², Villy Christensen³, Jeremy Collie⁴, Rob van Gemert⁵, Ray Hilborn⁶, Jan Horbowy⁷, Daniel Howell², Michael C. Melnychuk^{3,6}, Søren Anker Pedersen⁸, Claus Reedtz Sparrevoth⁹, Gunnar Stefansson¹⁰, and Petur Steingrund¹¹

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³Institute for the Oceans and Fisheries, The University of British Columbia, 2202 Main Mall, Vancouver, BC V6T 1Z4, Canada

⁴Graduate School of Oceanography, University of Rhode Island, Narragansett, RI 02882, USA

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⁷School of Aquatic and Fishery Sciences, University of Washington, Box 355020, Seattle, WA 98195, USA

⁸National Marine Fisheries Research Institute (NMFRI), Kollafataja 1, Gdynia 81-332, Poland

⁹European Fishmeal, Axelborg, Axeltorv 3, 6th Floor, Copenhagen V 1609, Denmark

¹⁰Danmarks Pelagiske Producentorganisation (DPPO), Axeltorv 3, 6, Copenhagen V 1609, Denmark

¹¹Science Institute, Tæknigáttur, University of Iceland, Dunhaga 5, 107, Reykjavík, Iceland

¹²Faroe Marine Research Institute, P.O. Box 3051, Nøatún 1, Tórshavn 110, Faroe Islands

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Sparholt, H., Bogstad, B., Christensen, V., Collie, J., van Gemert, R., Hilborn, R., Horbowy, J., Howell, D., Melnychuk, M. C., Pedersen, S. A., Sparrevoth, C. R., Stefansson, G., and Steingrund, P. Estimating F_{msy} from an ensemble of data sources to account for density dependence in Northeast Atlantic fish stocks. – ICES Journal of Marine Science, 78: 55–69.

Received 20 January 2020; revised 1 September 2020; accepted 2 September 2020; advance access publication 15 October 2020.

A new approach for estimating the fishing mortality benchmark F_{msy} (fishing pressure that corresponds to maximum sustainable yield) is proposed. The approach includes density-dependent factors. The analysis considers 53 data-rich fish stocks in the Northeast Atlantic. The new F_{msy} values are estimated from an ensemble of data sources: (i) applying traditional surplus production models on time-series of historic stock sizes, fishing mortalities and catches from the current annual assessments; (ii) dynamic pool model (e.g. age-structured models) estimation for stocks where data on density-dependent growth, maturity, and mortality are available; (iii) extracts from multispecies and ecosystem literature for stocks where well-tested estimates are available; (iv) the “Great Experiment” where fishing pressure on the demersal stocks in the Northeast Atlantic slowly increased for half a century; and (v) linking F_{msy} to life history parameters. The new F_{msy} values are substantially higher (average equal to 0.38 year⁻¹) than the current F_{msy} values (average equal to 0.26 year⁻¹) estimated in stock assessments and used by management, similar to the fishing pressure in the 1960s, and about 30% lower than the fishing pressure in 1970–2000.

Keywords: density dependent, ecosystem, F_{msy} , fisheries, meta-analysis, management

Introduction

Overfishing has been, and still is, a major problem worldwide. In previous decades, when many stocks in the Northeast Atlantic were overexploited and fisheries managers became increasingly

pressured to reduce effort, it became clear that management approaches had to be precautionary to promote rebuilding and limit the risk of collapses under sustained fishing pressure. More recently, this precautionary approach has been supplemented by

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- <https://academic.oup.com/icesjms/issue/78/1> if you have access right – alternatively by contacting henrik.sparholt@gmail.com

Presented at
several conferences

ICES Theme session Q
(co-sponsored by PICES) --

Sustainability thresholds and
ecosystem functioning: the selection,
calculation, and use of reference
points in fisheries management

ICES 2018
**ANNUAL
SCIENCE
CONFERENCE**

24-27 September 2018
University of Hamburg, Germany

KEYNOTES

Integrating ecological and economic perspectives on regime shifts in harvested marine ecosystems
Martin Quast, Kiel University, Germany & Christian Müllmann, University of Hamburg, Germany

Unexpected outcomes and unpredictable managers, fishers, and scientists
Ingrid van Putten, CSIRO Oceans and Atmosphere, Australia

Understanding deep-sea Atlantic ecosystems at ocean basin scale
Murray Roberts, University of Edinburgh, United Kingdom

#ICESASC18
WWW.ICES.DK/ASC2018

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CIEM

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Federal Ministry
of Food
and Agriculture



Conference 10-11 October 2018

With managers,
stakeholders and scientists



CONFERENCE ON IMPROVED FISHERIES MANAGEMENT MODELS Copenhagen 8th October 2019

Stakeholders, managers, scientists, NGOs

Discussion points for the panel:

1. Should we implement the new Fmsy values now? – it will give a higher short-term yield as well as a higher long-term yield, but probably needs to revert to ICES default HCR.
2. Should ICES continue to apply a precautionary cut of Fmsy or is it “double” precautionarity? – it mean that the risk for the stock to get below Blim will in most years be substantially lower than 5% (which is not needed) and the cost is reduced long-term yield.



Thank you!

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DENMARK

Jónas R.
Viðarsson

Director of Division of value
creation, Matis OLF

Status of the Seals' Population in
the North Atlantic and Arctic Ocean





Nordic
Co-operation

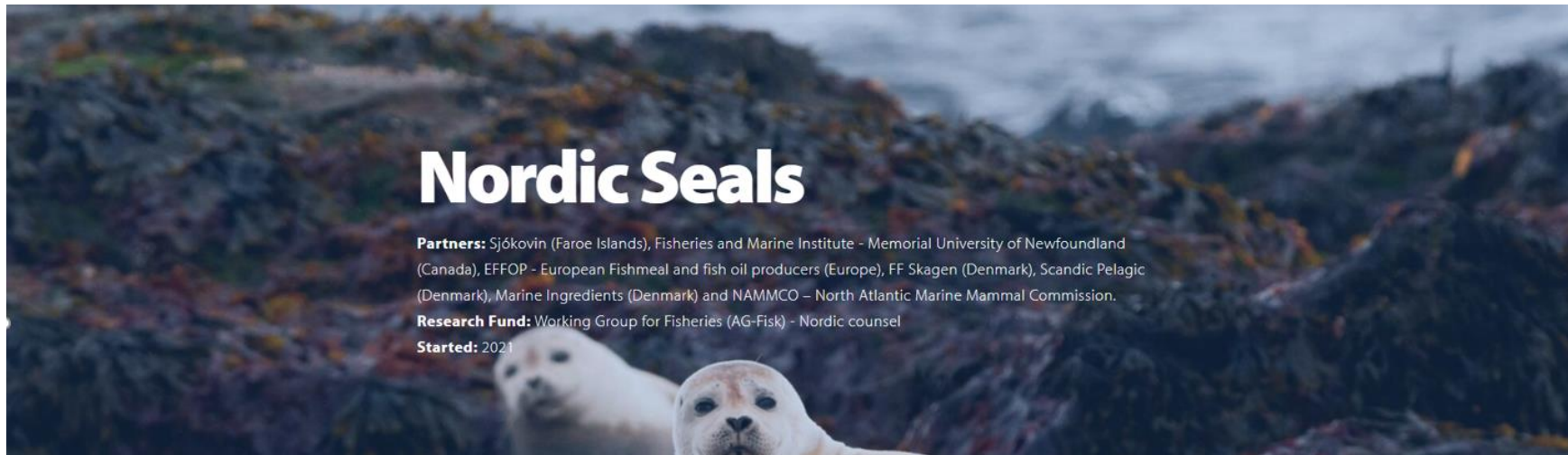


EUROPEAN
FISHMEAL AND FISH OIL
PRODUCERS



The Nordic Seals project

Project presentation at EFFOP conference in Skagen 2 June 2022



Jonas R. Viðarsson
Director of division of value creation at Matis

Introducing Jónas R. Viðarsson

Jónas R. Vidarsson

Director of Division of Value Creation at Matís

Education:

- Fisheries Science,
- Environmental Science
- Resource Management

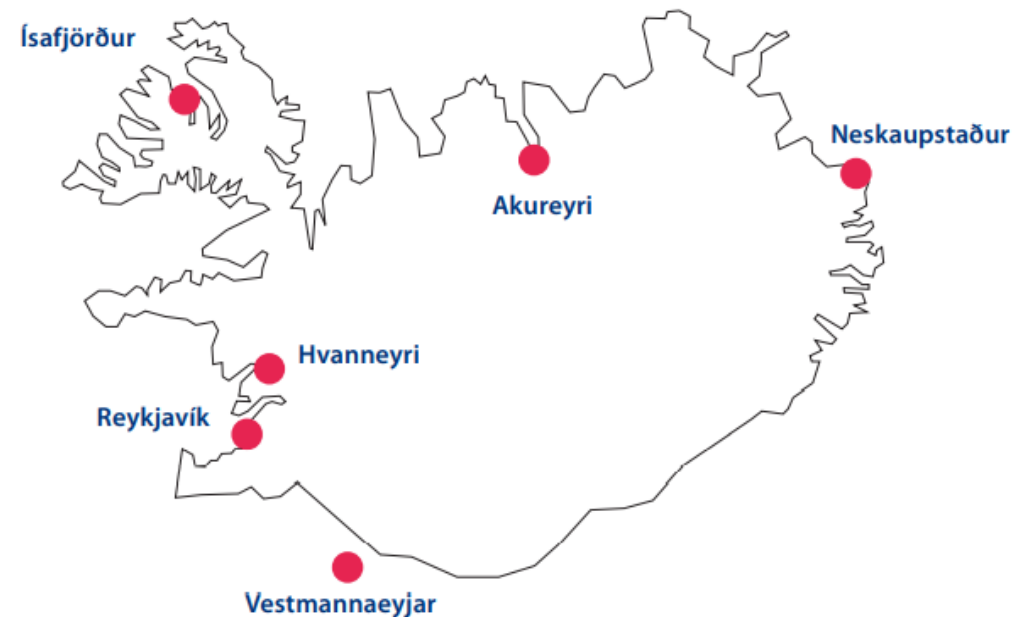
Experience:

- At Matís for 15 years working on improving quality and value of food & feed.
- Fisherman on Icelandic trawlers for 13
- Fish processing plants, net making & other service to the seafood industry



Matís

- Matís is a governmentally owned Ltd. Non-profit food & biotech R&D company
- Matís has obligations to safeguard **food safety**, contribute to improved **public health** and increased **value creation** in the Icelandic food & biotech sectors
- 93 employees in 6 locations
 - 23% PhD, 54% MSc



The Nordic Seals project

- Research & Networking project funded by Nordic Council of Ministers Working Group for Fisheries (AG-Fisk)
- Project objective: To identify, discuss and analyse the opportunities and challenges associated with the moratorium on seal hunting, and explore alternatives for how to utilise and manage seal populations in the future.
 - present the results in an easily understandable form (for laymen) in a report and a workshop.
- The specific objectives of the project are:
 - gather facts about seal populations and distribution in the N-Atlantic,
 - analyse the effects of the seal populations on the Nordic seafood industry,
 - explore utilization alternatives, including:
 - tourism
 - sustainable harvesting, potential products and markets,
 - consider barriers such as animal welfare, policy & political correctness,
 - food safety & toxins

The team

- Matís – Iceland
- Marine & Freshwater Institute – Iceland
 - Icelandic Seal Center
- Sjókovin – Faroe Island
- Fisheries and Marine Institute of Memorial University of Newfoundland – Canada
- FF Skagen – Denmark
- Marine Ingredients – Denmark
- EFFOP

- Associated partner: NAMMCO



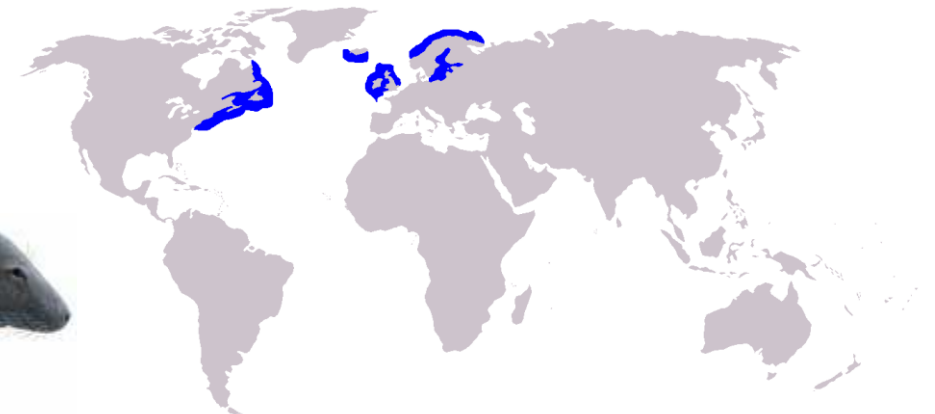
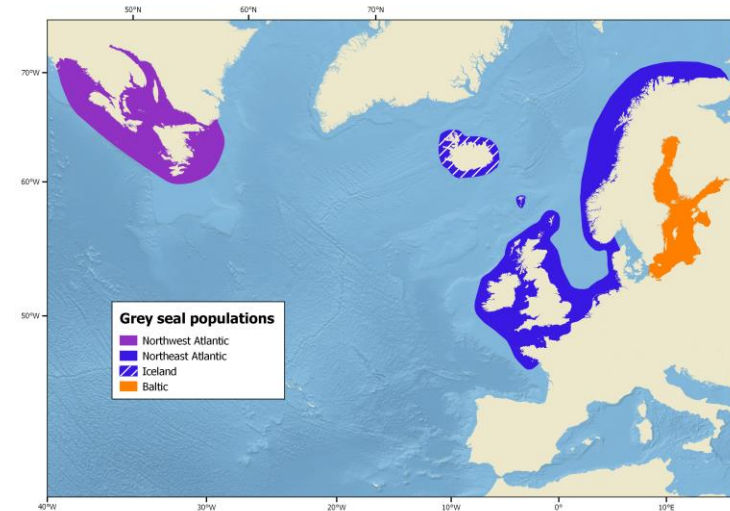
Nordic
Co-operation



Seal populations and distribution

• Grey Seals

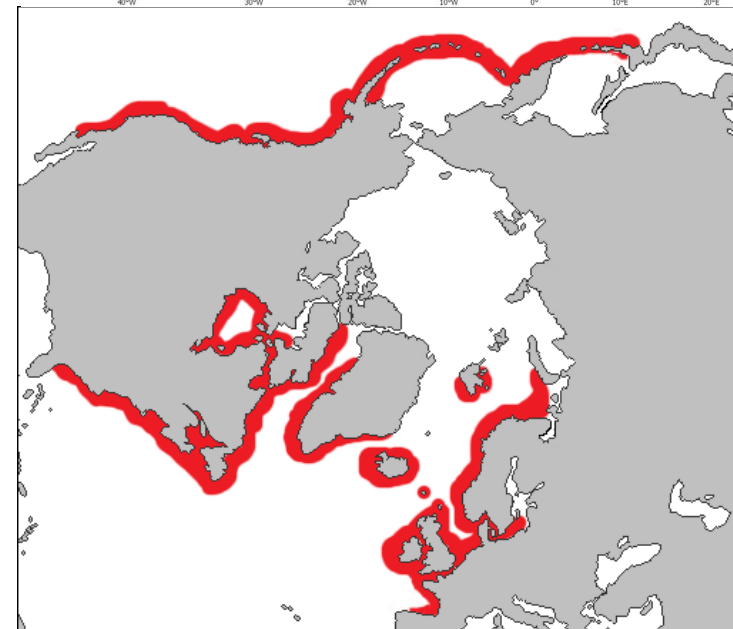
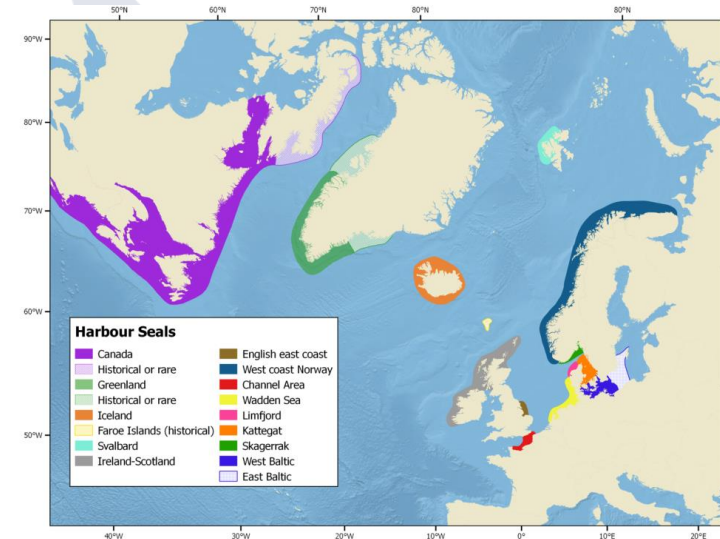
- Three stocks/subspecies NW-Atlantic, NE-Atlantic & Baltic
- Population 650,000+ and growing (NW-Atlantic 450,000, NE-Atlantic 160,000 & Baltic 40,000 seals)
- IUCN: Least concern
- Stock size varies depending on spatial distribution e.g. Icelandic grey seal population is classified as vulnerable
- Grey seal lifespan is 25-35 years and weight of adult seal is 200-400 kg
- 650,000 seals at average weight of 300 kg is 195,000 ton
- Grey seals eat 4-6% of their body weight each day
 - $195,000 * 5\% * 365 = 3.6$ million ton/year
- Grey seals distribution overlaps commercial fishing grounds
 - Grey seals and fishermen are competitors



Seal populations and distribution

• Harbour Seals

- 17 stocks in N-Atlantic
- Population 200,000+ and growing
- IUCN: Least concern globally (critically endangered in Greenland, Iceland and Svalbard)
- Harbour seal lifespan is 25-30 years and weight of adult seal is 70-130 kg
- 200,000 seals at average weight of 100 kg is 20,000 ton
- Harbour seals eat 5-6% of their body weight each day
 - $20,000 * 5\% * 365 = 365$ thousand ton/year
- Harbour seals distribution overlaps commercial fishing grounds
 - Grey seals and fishermen are competitors



Seal populations and distribution

- **Harp Seals**

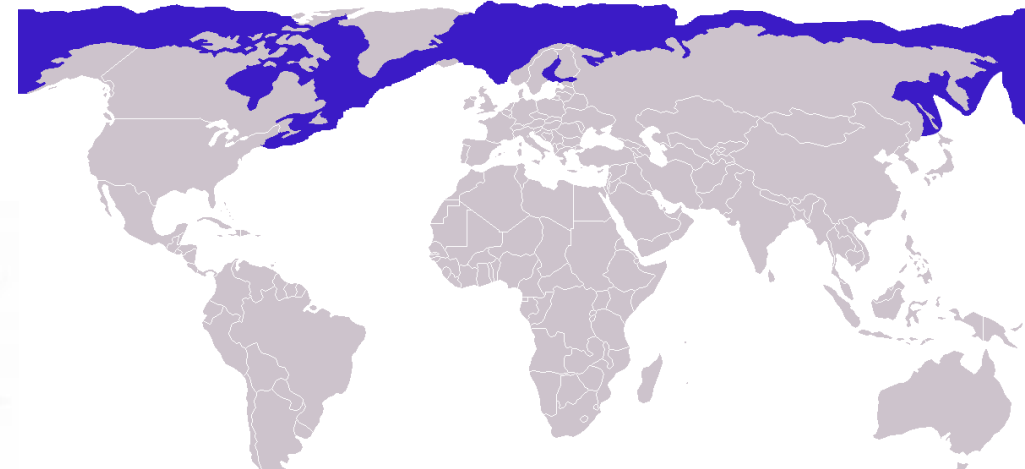
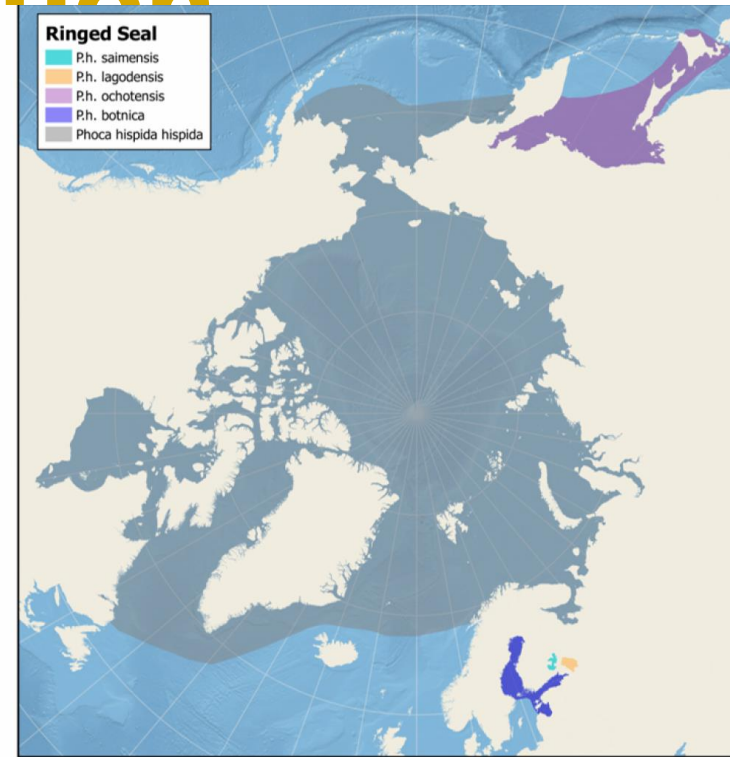
- Considered one stock, but there are four whelping patches in N-Atlantic
- Population 7,400,000+ and growing
- IUCN: Least concern globally
- Harp seal lifespan is 25-35 years and weight of adult seal is around 130 kg
- 7.4 million seals at average weight of 130 kg is 962,000 ton
- Harp seals eat 4-6% of their body weight each day
 - $962,000 * 5\% * 365 = 17.5$ million ton/year
 - Krill, amphipods, shrimp, polar cod, cod, capelin, Greenland halibut etc.
 - Cod accounts for 3% of the diet = 520,000 t
- Harp seals distribution does not significantly overlap commercial fishing grounds
 - Harp seals and fishermen are rarely competing



Seal populations and distribution

- **Ringed Seals**

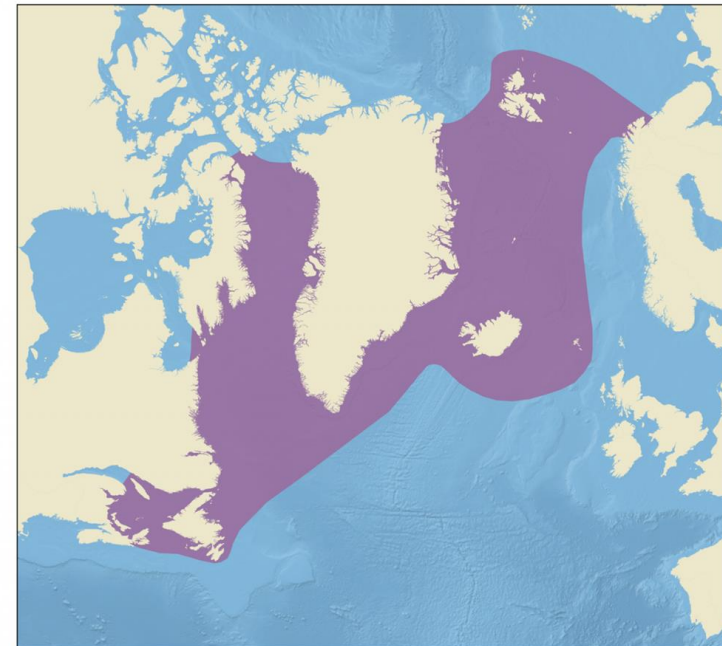
- Population 5,000,000
- IUCN: Least concern globally
- Ringed seal lifespan is 15-20 years and weight of adult seal is 80 – 95 kg
- 5.0 million seals at average weight of 90 kg is 450,000 ton
- Ring seals eat 4-6% of their body weight each day
 - $450,000 * 5\% * 365 = 8.2$ million ton/year
 - Krill, amphipods, scrimp, polar cod etc.
- Ringed seals distribution does not significantly overlap commercial fishing grounds
 - Ringed seals and fishermen are in some areas competing
 - N-Norway, Barents Sea, Baltic



Seal populations and distribution

- **Hooded Seal**

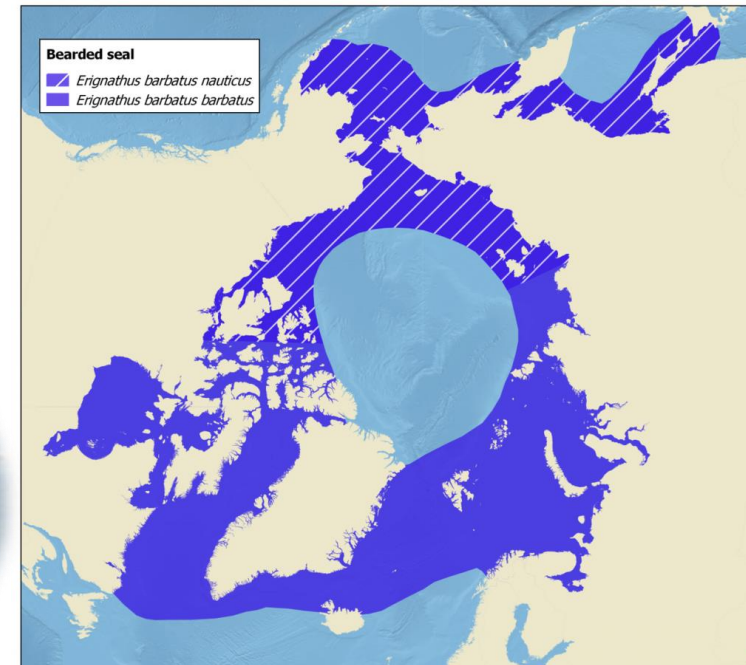
- Population 600,000
- IUCN: Vulnerable
- Hooded seal lifespan is 25-30 years and weight of adult seal is 160 – 300 kg
- 600,000 seals at average weight of 200 kg is 120,000 ton
- Hooded seals eat 4-6% of their body weight each day
 - $120,000 * 5\% * 365 = 2.2$ million ton/year
 - Mainly pelagic fish (capelin) and squid, but also cod, polar cod, redfish, Greenland halibut, sand eel
- Hooded seals distribution overlap some commercial fishing grounds
 - Hooded seals and fishermen are in some areas competing, but do for the most parts avoid each other.
 - By-catches of hooded seals is very uncommon



Seal populations and distribution

- **Bearded Seal**

- Population 500,000 – 1,000,000
- IUCN: Least concern
- Bearded seal lifespan is 25-30 years and weight of adult seal is 200 – 430 kg
- 700,000 seals at average weight of 300 kg is 210,000 ton
- Bearded seals eat 4-6% of their body weight each day
 - $210,000 * 5\% * 365 = 3.8$ million ton/year
 - Whelk, shrimp, arctic cod, capelin, cephalopods, sea cucumbers etc.
- Bearded seals distribution does not significantly overlap commercial fishing grounds
 - Bearded seals do mostly stick to the arctic on/close to icy waters



Seal populations and distribution



Species	Population	Biomass (t)	IUCN	Feeding (t)	Effect on fisheries
Grey Seals	650.000	195.000	Least concern	3.558.750	Considerable
Harbour Seals	200.000	20.000	Least concern	365.000	Considerable
Harp Seals	7.400.000	962.000	Least concern	17.556.500	Little
Ringed Seals	5.000.000	450.000	Least concern	8.212.500	Some
Hooded Seal	600.000	120.000	Vulnerable	2.190.000	Little
Bearded Seal	700.000	210.000	Least concern	3.832.500	Little
Total	14.550.000	1.957.000		35.715.250	

Seal populations effect on Nordic seafood industry

- **Interaction between seals and fishermen/seafood industry**

- Competition for commercial fish
- Seals compete for feed with commercial fish species
- What is the role of seals in the ecosystem/foodweb?
- Seals often eat catches from stationary fishing gear (line, nets and traps)
- Damage to fishing gear
- By-catches of seals can cause market restrictions
- Nematodes (ringworms)

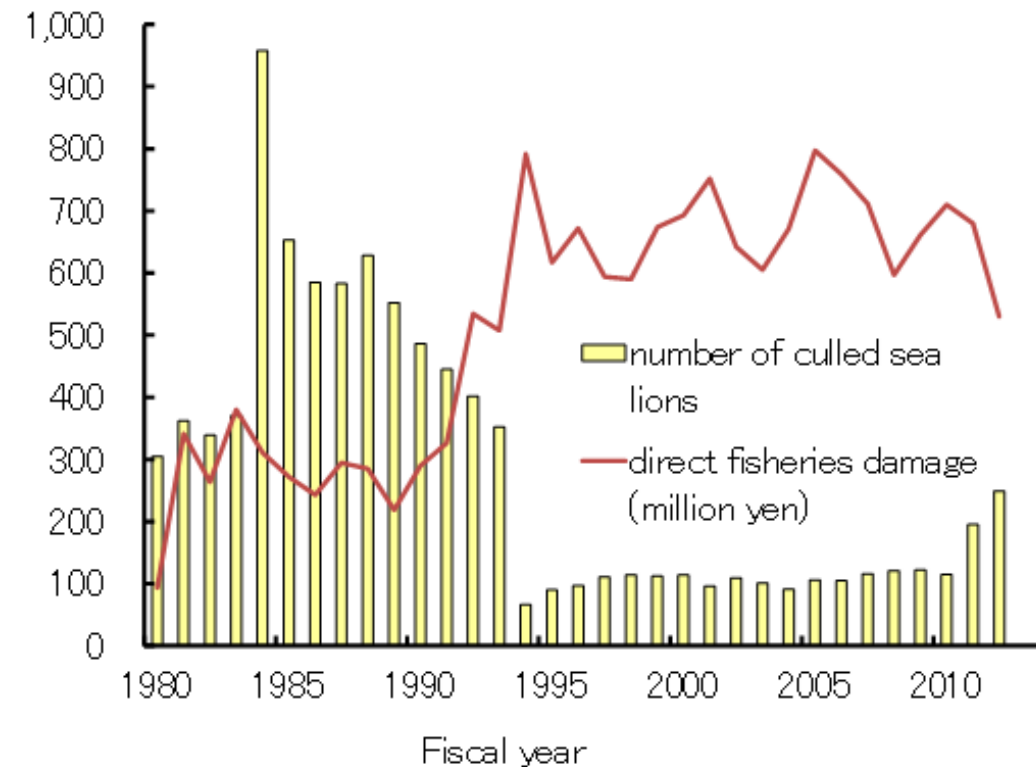


Seal populations effect on Nordic seafood industry

- **Coastal fisheries in some places are severally effected by seal predation as seals eat catches from the fishing gear and cause damages to the gear.**
 - Skagerrak & Kattegat for example
- **Some areas are so heavily infected by nematodes that fish buyers refuse to source from those areas**
 - Húnaflói in Iceland for example
- **Some fisheries face import restrictions and loss of MSC certifications because of seal by-catches**
 - Lumpfish fisheries for example
- **Damage to fishing gear & cost of avoiding seal by-catches**
 - Damage to fishing gear has not been quantified in N-Atlantic, but Matsuda *et. al* 2015 quantified the cost of “direct fisheries damage” of Steller sea lions in the Hokkaido Prefecture (Japan) and linked with sea lion management efforts

Seal populations effect on Nordic seafood industry

- **Until 1993 an average of around 400 Steller sea lions were culled in the waters around Hokkaido each year.**
- **From 1994 the culling was reduced down to around 100 sea lions a year.**
- **Direct fisheries damage more than doubled in the same time from around 300 million Yen to 700 million Yen**
 - 2.2 M EUR -> 5.2 M EUR
 - 16.5 M DKK -> 38.5 M DKK



Utilization / commercialization of seals

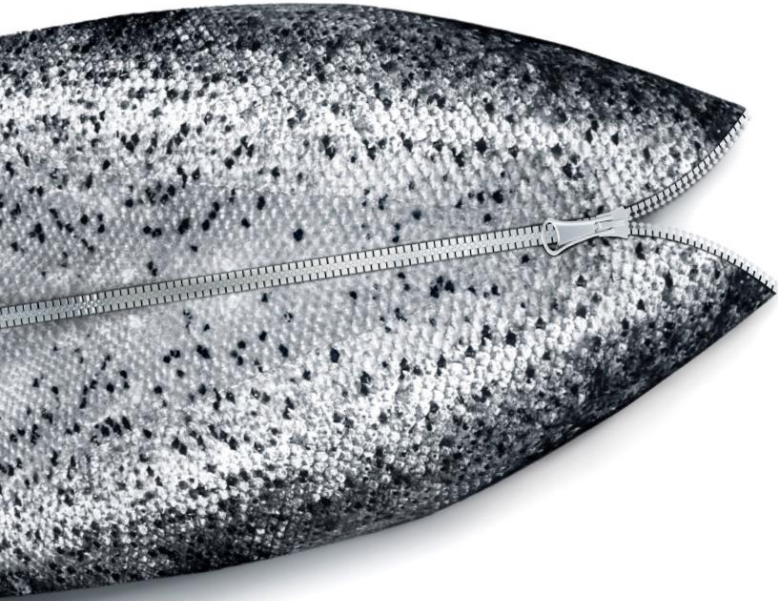
- EU sealskin ban in 1983 and EU ban on seal products in 2009 changed the economy and incentives for commercial utilisation.
- Seal watching and tourism has become an important part of the economy in some areas
- Little commercial hunting of seals ongoing
 - Minor seal hunting currently taking place in NW-Atlantic (Nova Scotia, Gulf of St. Lawrence & Greenland)
 - Mostly subsistence hunting for indigenous people (and their dogs)
 - Grey seal commercial hunting of 60,000 seals/year in NW-Atlantic (Canada)
 - Harp seal commercial hunting of 60,000 seals/year in NW-Atlantic (Canada)
- Commercial products include Omega-3 oil, fur & leather, meat for human consumption, meat & intestines for pet food (treats)
 - Difficult markets for fur & leather
 - Meat is high in contaminants e.g. heavy metals like mercury and selenium.
 - Persistent organic contaminants like PCBs, DDT & CHL are also found in seal meat.
 - Regulations for use in feed is very strict

Utilization / commercialization of seals

- **Other barriers to utilization**

- Animal welfare: Practices have changed in recent years, and the Canadian seal hunting is now for example approved/supported by environmental NGOs such as WWF, Jacques Cousteau and CITES.
- Sustainability: Almost all seal species are classified as “least concern” by IUCN, but some sub-stocks are vulnerable or endangered.
- Policy: EU has a ban on imports of seal products and many countries outside EU have followed. There seems to be a wide scale consensus among policy makers that commercial sealing is not acceptable (Political correctness). Changes could however be on the horizon, due to seal population increase and impact on the ecosystem.
 - Food security issues could also become an issue, now that concerns of how to feed 10 Billion people is imminent.

Thank you – Takk fyrir



Think inside the box ...

Most innovation involves identifying new opportunities from what we already have. Finding a use for what we used to throw away. To make those connections others cannot see. Our role is to facilitate those who can make these connections, package and implement them to benefit us all.

Matis is a dynamic knowledge company that provides research and innovation services.



jonas@matis.is
 @JonasVidarsson

JUNE 1 - 3
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Ken Haste
Andersen

Professor, Head of section,
National Institute of Aquatic
Resources Centre for Ocean Life

**Challenges for European Pelagic
Fisheries**

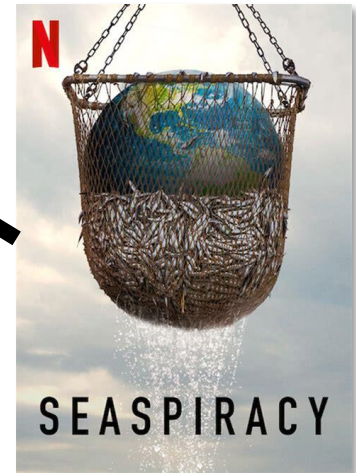
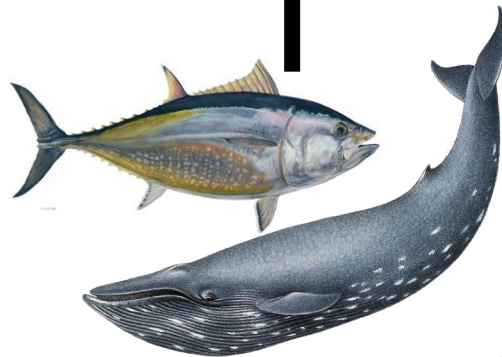


Challenges for European pelagic fisheries

Ken H. Andersen

Prof. in theoretical marine ecology

Technical University of Denmark (DTU Aqua)



International Council for the Exploration of the Sea (ICES)

ICES Advice on fishing opportunities, catch, and effort
Greater North Sea ecoregion
Published 29 May 2020



Herring (*Clupea harengus*) in Subarea 4 and divisions 3.a and 7.d, autumn spawners (North Sea, Skagerrak and Kattegat, eastern English Channel)

ICES advice on fishing opportunities

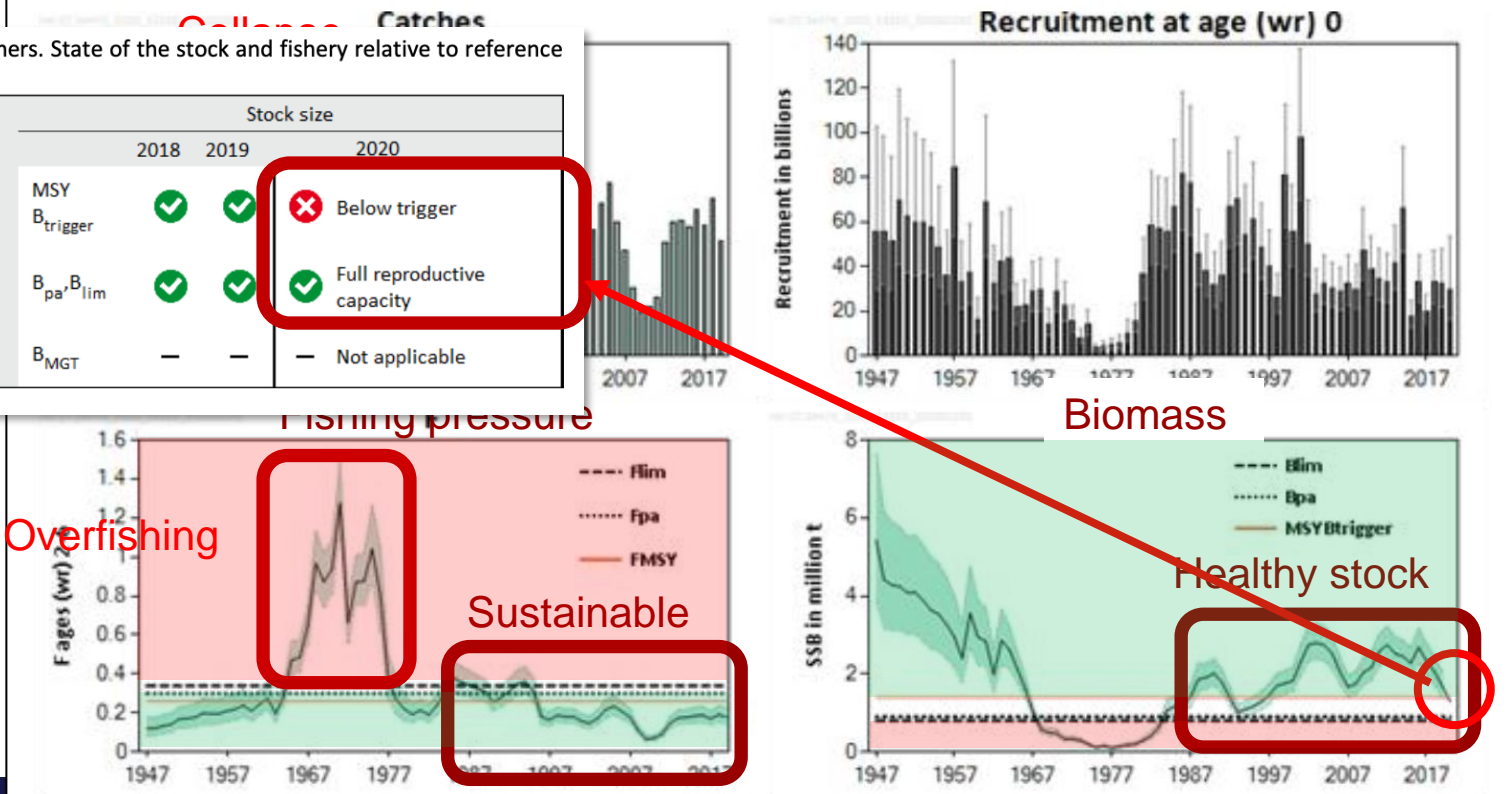
ICES advises that when the MSY approach is applied, catches in 2021 should be no more than 365 792 tonnes.

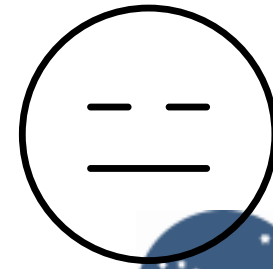
Note: This advice sheet is abbreviated due to the Covid 19 disruption. Last year's advice is attached as Annex 1.

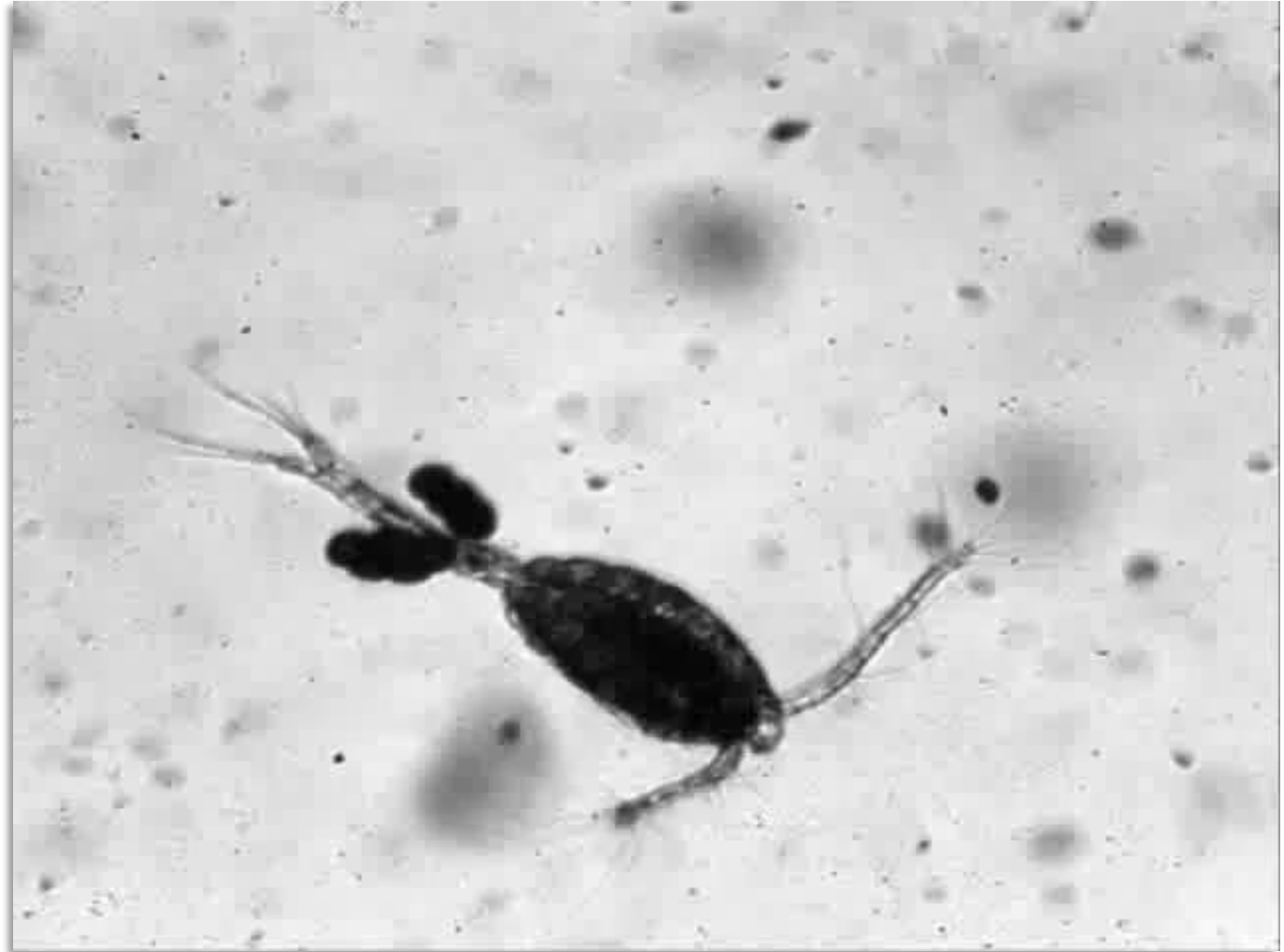
Stock development over time

Table 1 Herring in Subarea 4 and divisions 3.a and 7.d, autumn spawners. State of the stock and fishery relative to reference points.

		Fishing pressure				Stock size			
		2017	2018	2019		2018	2019	2020	
Maximum sustainable yield	F_{MSY}	✓	✓	✓	Below	MSY	✓	✓	✗ Below trigger
Precautionary approach	F_{pa}, F_{lim}	✓	✓	✓	Harvested sustainably	B_{pa}, B_{lim}	✓	✓	✓ Full reproductive capacity
Management plan	F_{MGT}	—	—	—	Not applicable	B_{MGT}	—	—	— Not applicable



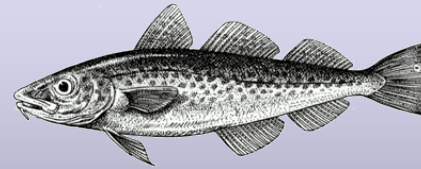
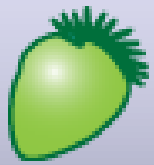
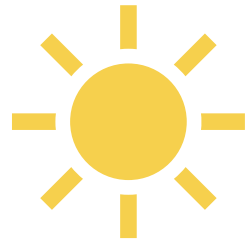
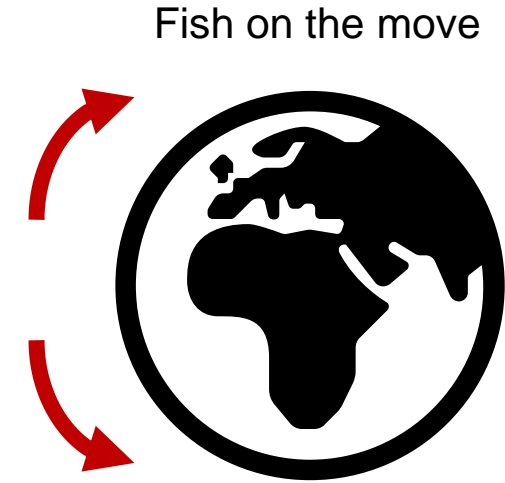




Xu et al.: Unpalatable Plastic: Efficient Taste Discrimination of Microplastics in Planktonic Copepods. *Environmental Science and Technology* (2022).



Climate change and fish



Stronger storms

Faster turn-over

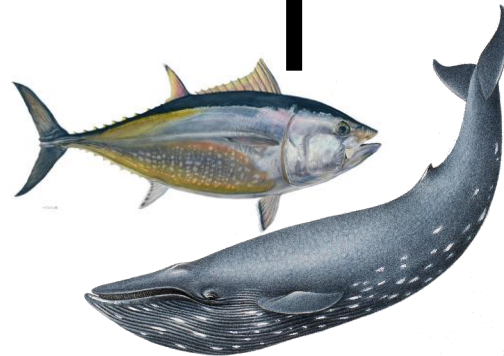
Stronger stratification

Faster metabolism

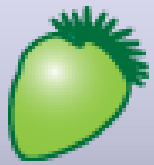
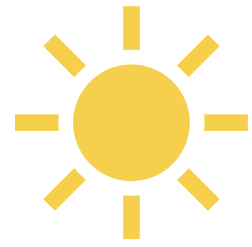
Less nutrients
More nutrients



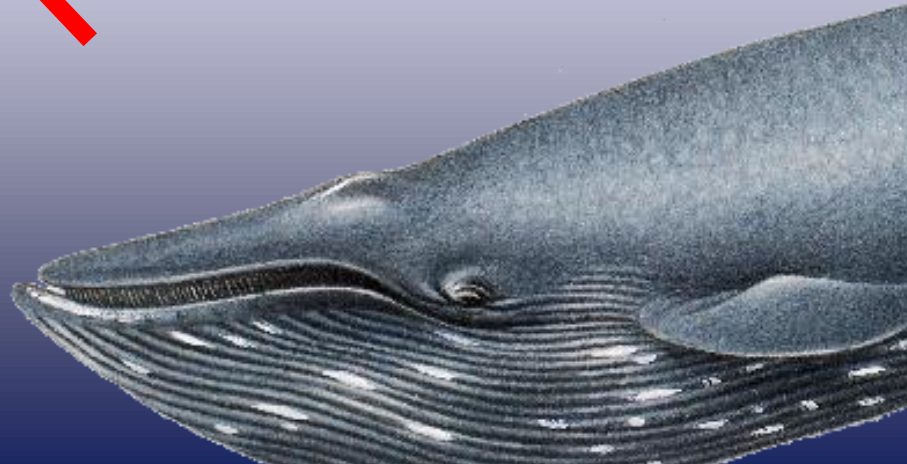
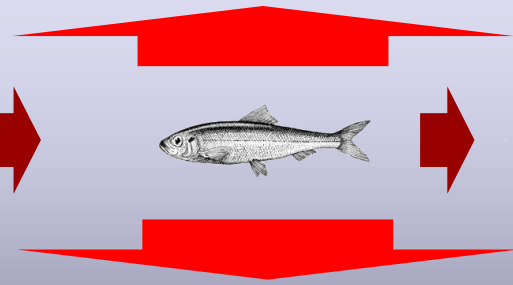
Nutrients

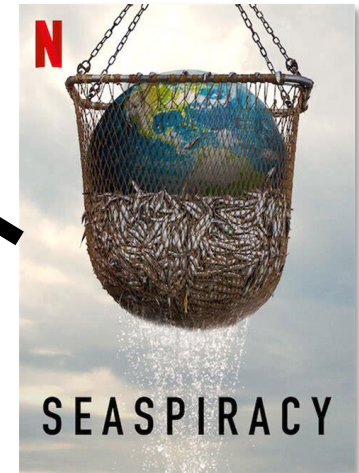
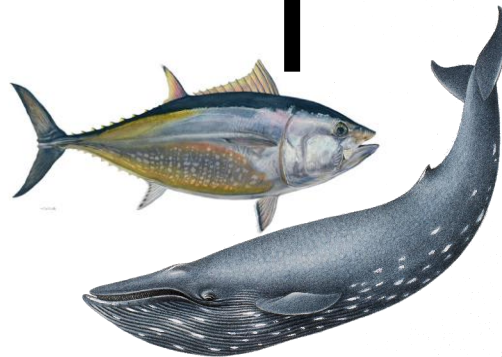


Predators on fish



Næring





The battle for the story



Don't kill fish!

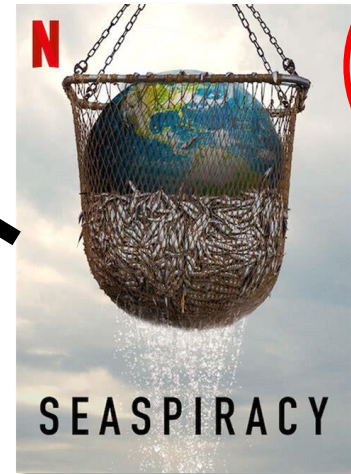
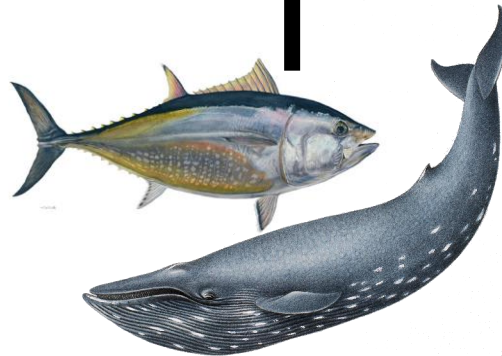
VERSUS



DANSKERNES FISKERE

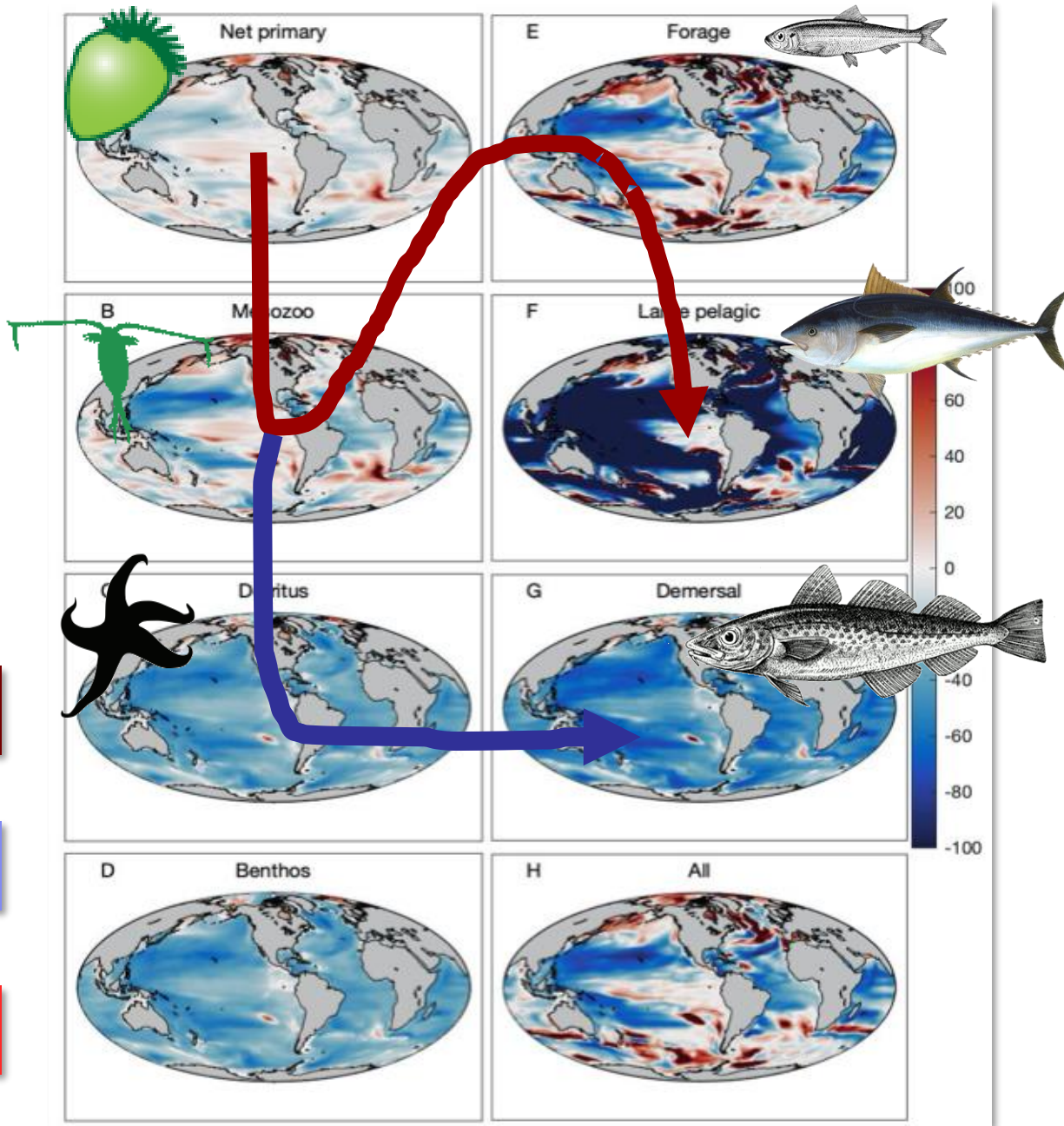
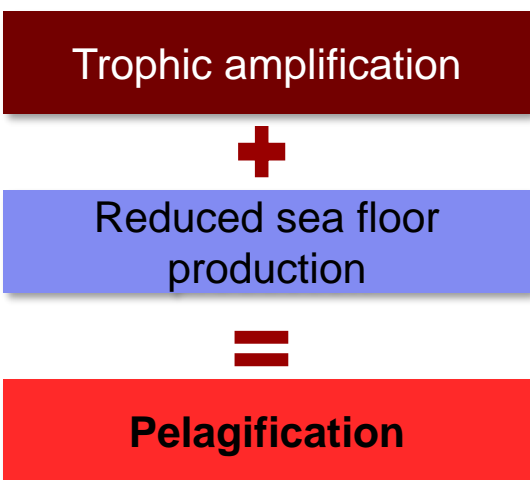
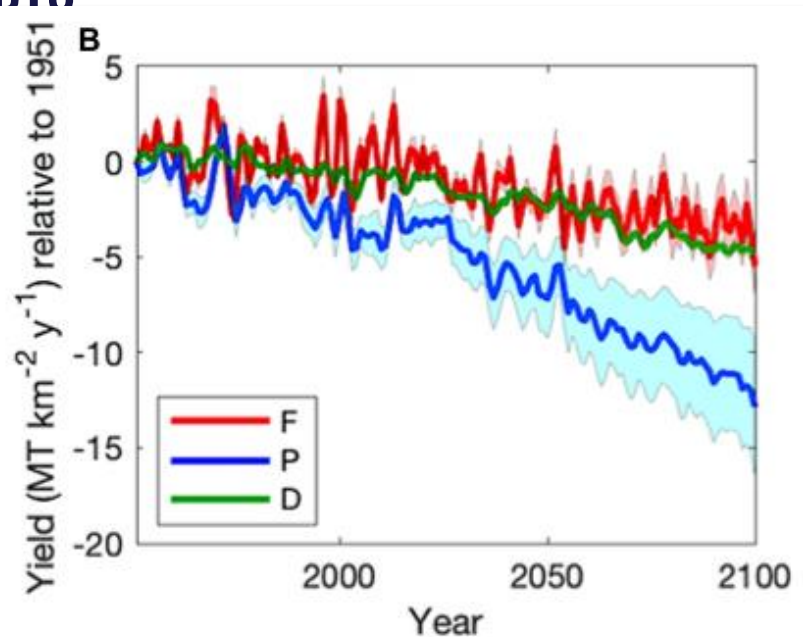
– kursen mod en fælles fremtid

“Danish fishery must become one of the world’s most sustainable fisheries – economically, socially, and environmentally”



Projected production 2051-2100 under high emissions scenario (RCP 8.5)

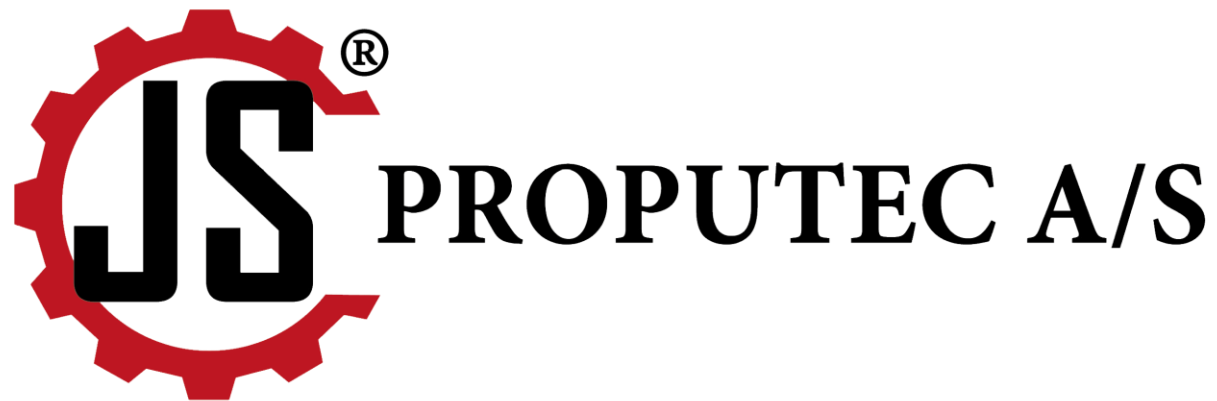
DTU



JUNE 1 - 3
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Coffee Break

Sponsored by JS
Proputec



JUNE 1 - 3
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Claus
Reedtz
Sparrevohn

Chief Scientific Advisor, Danish
Pelagic Producers Organization

**How Can Industry Contribute to Improve
Scientific Advice and Fisheries
Management?**





DPPO
Danmarks Pelagiske
Producentorganisation



HOW CAN INDUSTRY CONTRIBUTE TO IMPROVE SCIENTIFIC ADVICE AND FISHERIES MANAGEMENT?

Claus R. Sparrevohn,
DPPO, Denmark

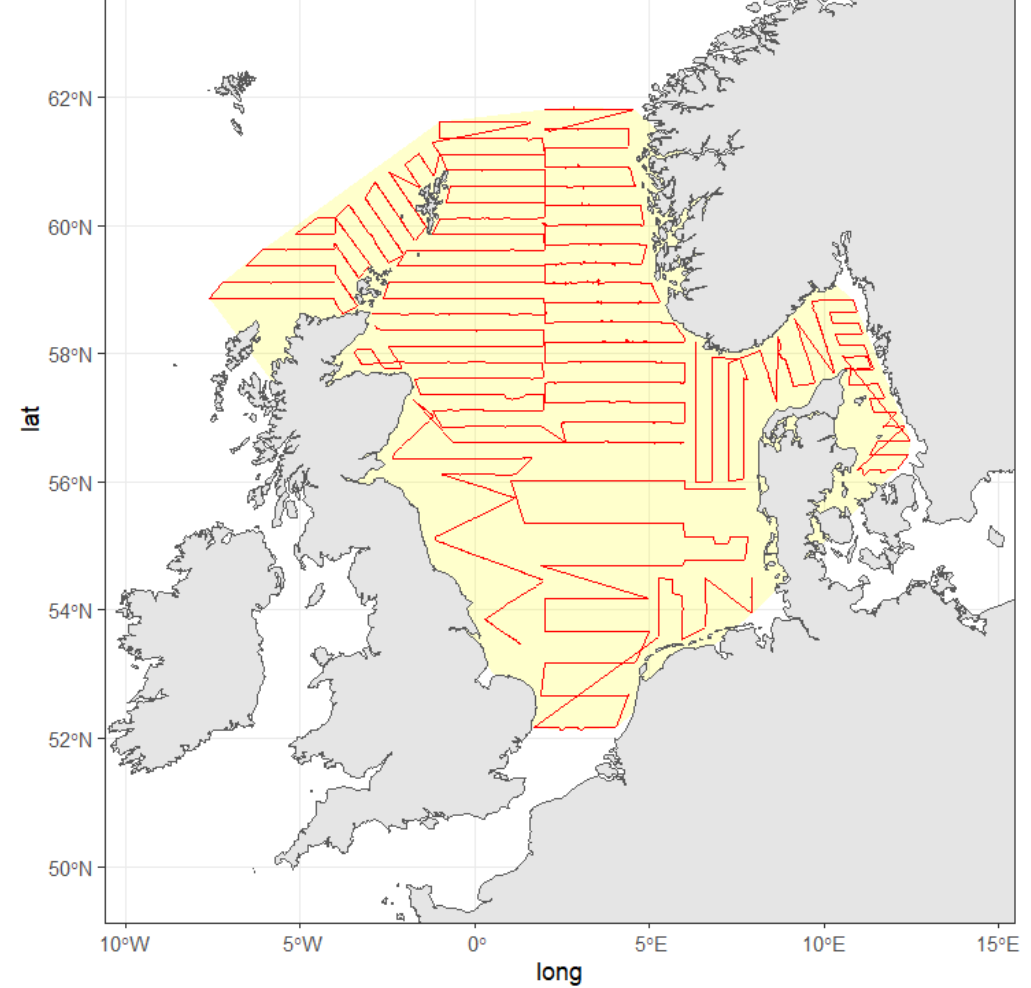
- 1. Improving data:** engaging in data collection, self-sampling and re-estimating historical catch data and “fishermen” knowledge,
- 2. Rules of engagement:** conflicts, roles, pitfalls



Agenda

- For exemple HERAS survey

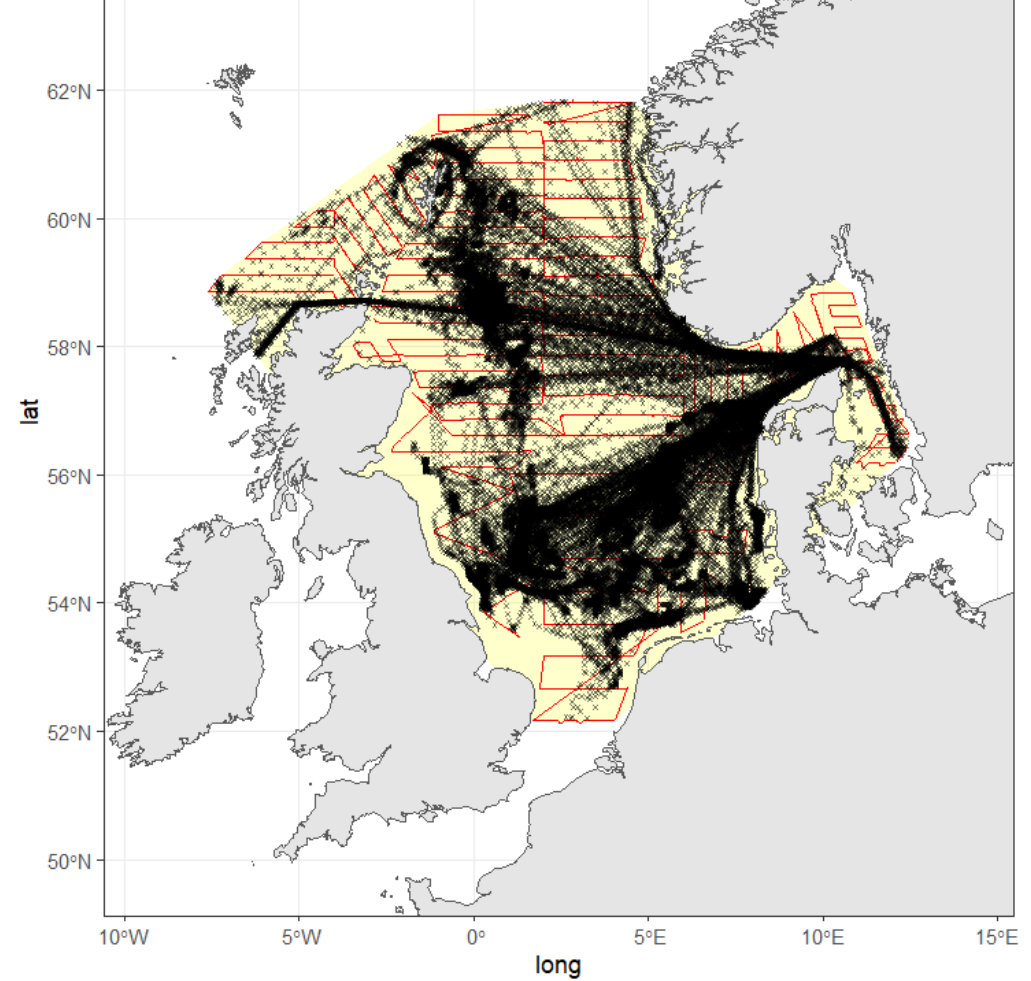
- Biomass measurement of pelagics in NS
- 6 countries involved
- done in June-July
- Crica **10,000 nmi** of acoustic transect



Selfsampling

- Industri trawlers

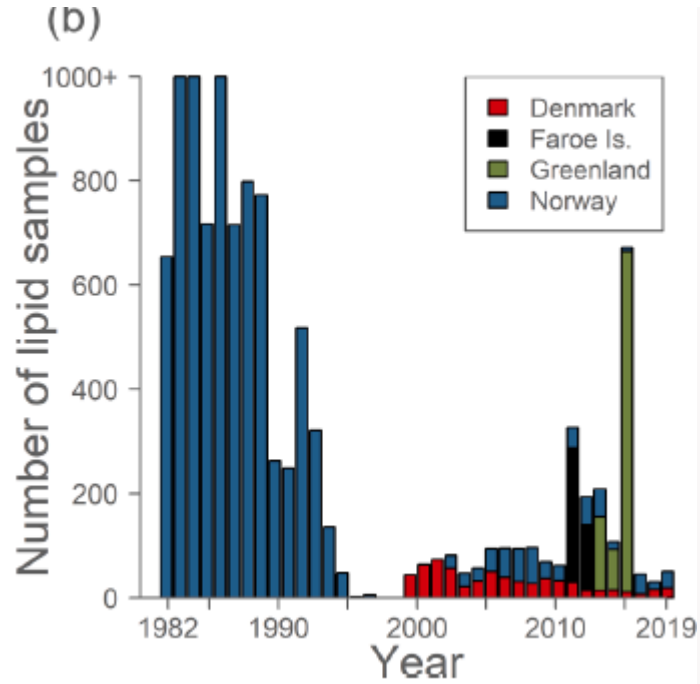
- Crica **290,000 nmi** of acoustic transect



Selfsampling

Bioenergetics of egg production in Northeast Atlantic mackerel changes the perception of fecundity type and annual trends in spawning stock biomass

Teunis Jansen^{a,b,*}, Aril Slotte^c, Thassya Christina dos Santos Schmidt^c, Claus Reedtz Sparrevohn^d, Jan Arge Jacobsen^e, Olav Sigurd Kjesbu^e



ICES WGWIDE REPORT 2014

ICES ADVISORY COMMITTEE

ICES CM 2014/ACOM:15

REF. ACOM

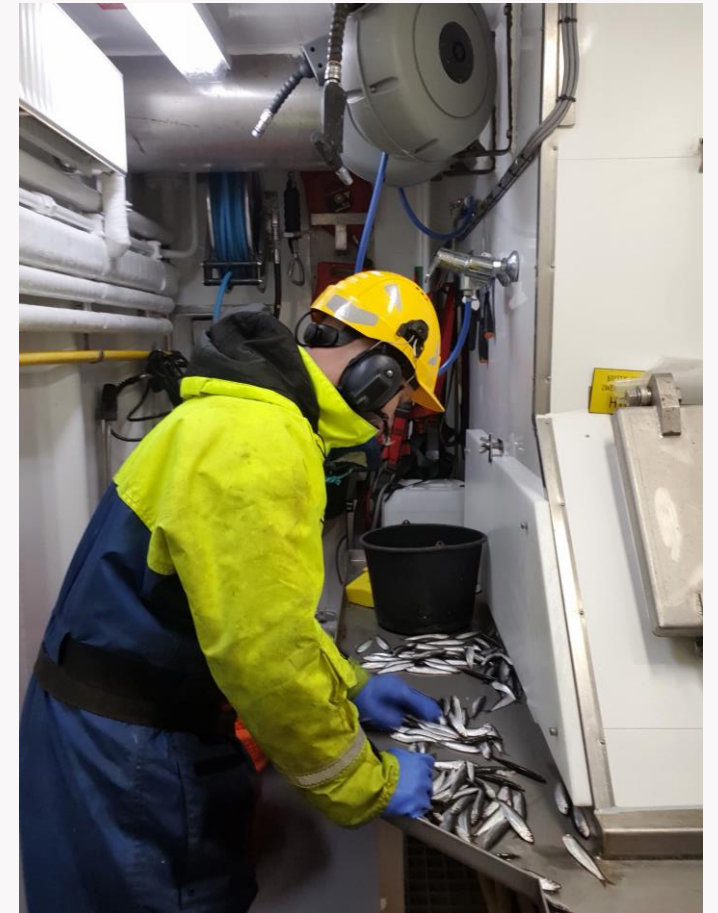
Report of the Report of the Working Group on Widely Distributed Stocks (WGWIDE)

Table 1. Estimated ranges of misreporting during the four time periods considered.

Period	Year Range	Misreporting Factor	
		Lower bound	Upper bound
Klondyking	1972 – 1989	1.7	3.6
Japanese market highgrading	1990 – 2000	1.7	2.5
Uncontrolled IUU	2001 – 2005	1.1	1.7
'Golden age'	2006- 2011	1	1.1

Correcting historical data

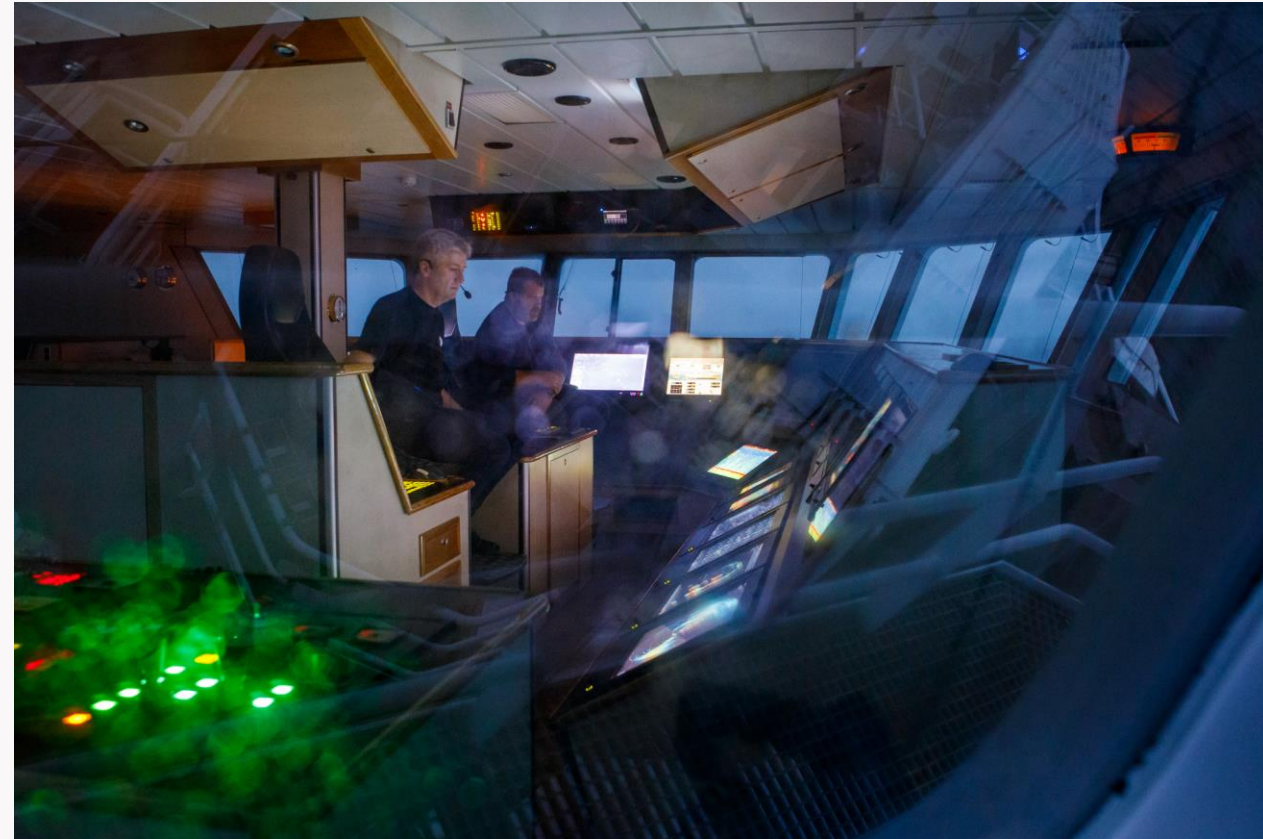
- Catch sampling,
- Length/weight measurements,
- Sensors on vessels,
- Catch rates,
- Gear development,
- Catch composition information.



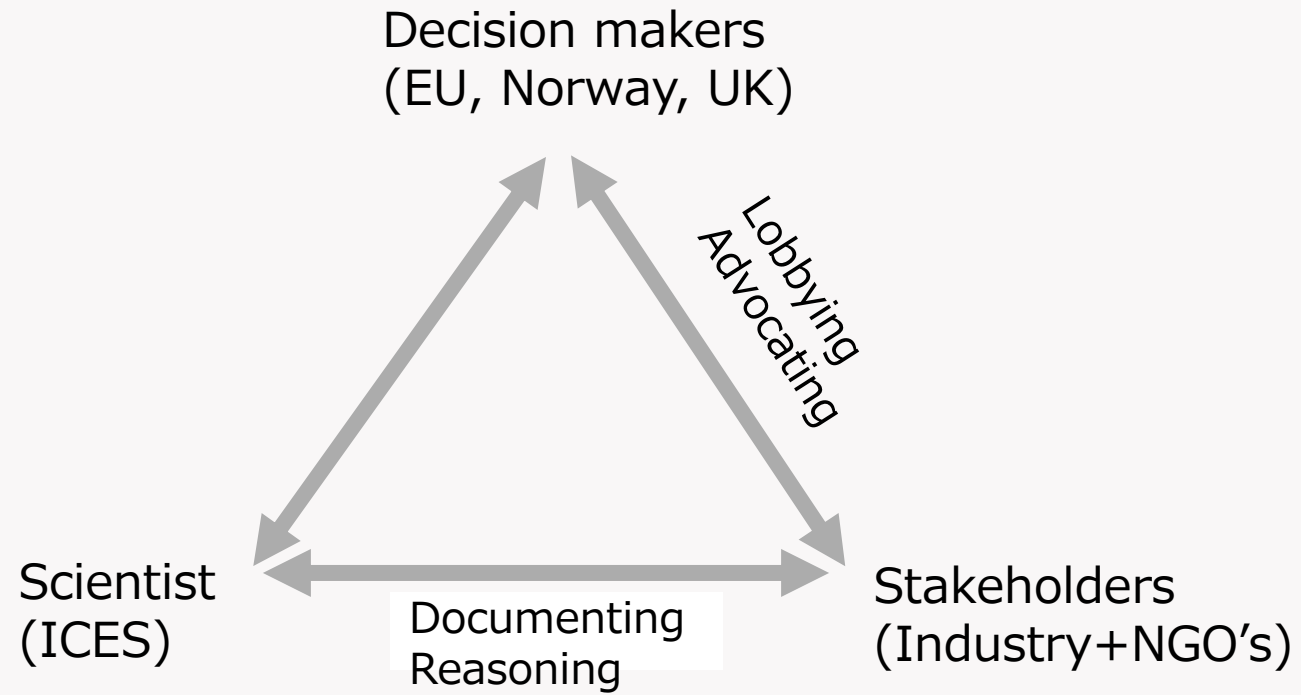
More examples

How do we secure fruitful cooperation between scientists and industry?

- Transparency,
- Unbiased,
- Respect,
- Communication,
- All are stakeholders.



Rules of engagement



Food for thoughts



DPPO
Danmarks Pelagiske
Producentorganisation



JUNE 1 - 3
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Panel Debate

- Anna Rindorf
- Henrik Sparholt
- Jónas R. Viðarsson
- Claus Reedtz Sparrevohn
- Ken Haste Andersen
- Egil Magne Haugstad

How a Science/Industry Partnership
Promotes Sustainability in Fisheries
Management



JUNE 1 - 3
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Anne
Mette
Bæk

Director of EFFOP &
Marine Ingredients Denmark

Fisheries Control Systems – the
Danish Way



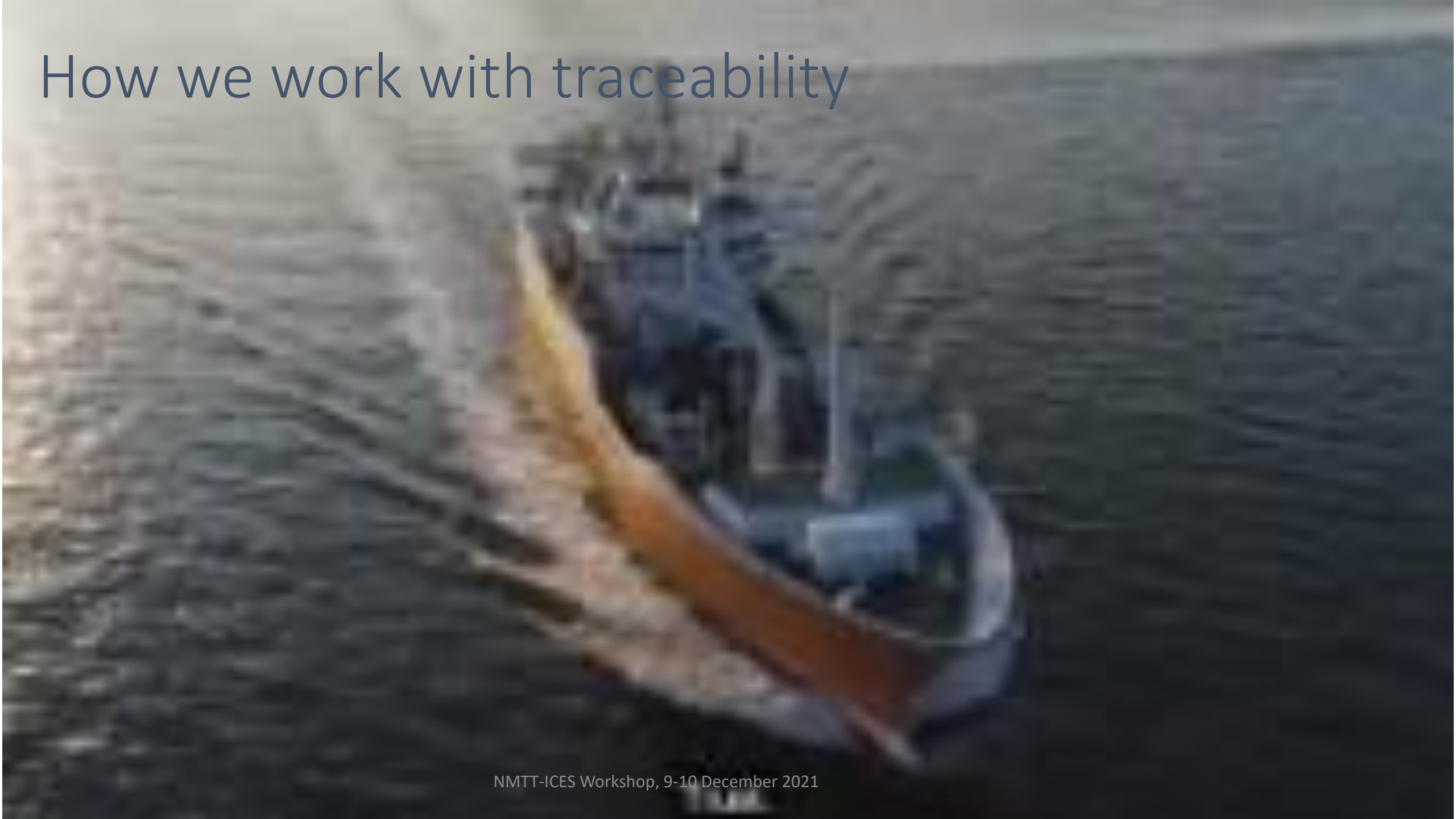
The background of the slide is a photograph of an industrial facility, likely a refinery or chemical plant. It features large, dark-colored pipes and cylindrical tanks, some of which are painted blue. The scene is set against a clear blue sky. A large white circle is superimposed over the center of the image, containing the main title and event information.

Responsible sourcing in the marine ingredients industry

EFFOP
Members conference

Anne Mette Bæk
Skagen June 1st 2022

How we work with traceability



Industry Standard for draining, weighing and sampling of unsorted pelagic landings

Agreed by EFFOP
Members in 2020



The need for and purpose of the standard

Create a level playing field

Remove irregularities in weighing,
sorting and sampling

Promote traceability and increase
transparency

Increase trust with key stakeholders

Prove legality

Verify sustainability

Ensure correct handling of quotas

Increase effectiveness of reporting





The need for and purpose of the standard

The standard is **supplement** to the current national legislations and international agreements and has been developed on the basis of the FAO Code of Conduct for Responsible Fisheries and the post-harvest practices for responsible fish utilization stated herein.

- Landings to the first-time buyer or processor of the fish shall take place in **approved ports** with access to **approved landing and weighing facilities** as well as an **approved operator responsible for the weighing documentation** of the catch
- Water is drained from the fish via **harmonized systems**
- For all unsorted pelagic landings, for fishmeal and oil, all weighing, sampling of species and documentation of the landed catch and bycatch must be made **based on a pre-defined sampling plan** following national rules and regulations

Thank you



EUROPEAN
FISHMEAL AND FISH OIL
PRODUCERS

JUNE 1 - 3
SKAGEN
DENMARK

Lone
Agathon
Jensen

Control Coordinator, Danish
Fisheries Agency - Danish
Ministry of Food, Agriculture
and Fisheries

**Fisheries Control Systems – the
Danish Way**





**Ministry of Food, Agriculture
and Fisheries of Denmark**
Danish Fisheries Agency

Fisheries control systems – the Danish model

Implementation of the Danish control and sampling plans

Timeline leading to the Danish sampling and control plans (1/2)

2014: Commission letter of formal notice to Denmark

Regarding article 5, 14, 23, 33, 64 and 89 to the Control Regulation

2014: Danish reply

On the ground of the reply above, the Commission drops the claims in the pilot letter about article 23, 33 og 64

2019: Commission Additional letter of formal notice to Denmark*

Regarding article 5 (3), 14 (1) and 89 (1) and article 60 and 61

Commission points out that Denmark does not fully comply with article 60 and 61 in the Control regulation regarding:

- the registration, weighing and declaration of fish
- the weighing of fisheries products after landing
- the requirement that all amounts of fish that exceeds 50 kilograms must be registered in the logbook of the vessel with a tolerance of no more than 10 %

2019: Danish reply

** Commissionen's letter of formal notice no. 2014/2137*



Timeline leading to the Danish sampling and control plans (2/2)

2020: Danish Sampling and Control plans are implemented

1 January 2020: Readjustment to the Danish legislation necessary for adopting the plans (national order)

1 January 2020: The plans enter into force

1 April 2020: The plans are fully enforced

2020/ 2021: Updated/ new instructions

Instruction 10.1.4 – Logbook and margin of tolerance

Instruction 10.1.5 – weighing of fish sorted and packed at sea

Instruction 10.1.6 – Sanctioning of infringement of sampling according to the sampling and control plans

Instruction 10.1.11– Application of points

2021: 22-26 November - Visit from the Commission to Denmark to verify the Danish setup and implementation thereof

2022: March - Submission of sampling plan in accordance with article 60.1 and submission of updated sampling plan in accordance with 60.3 and updated control plan.



Implementation of the sampling plans



Ministry of Food, Agriculture
and Fisheries of Denmark
Danish Fisheries Agency

Readjusting the Danish legislation*



Important changes:

§ 2, stk. 2: A box of fish must not deviate with a tolerance more than +/- 5 percent

§ 13: Receivers/buyers of the fish must for all landings either weigh all fish or take out samples in accordance with the respective sampling plan

§ 13, stk. 4: The Danish Fisheries Agency can issue a permission to an auction to use its own sampling plan for the control weighing of the fish

§ 14, stk. 2: The result of the control sampling after landing will always be the subject for the registration in the landing declaration, sales notes etc.

§ 17 & Annex 6: The Danish Fisheries Agency can give permission to vessels to weigh and pack the fish on board, where after it is not necessary to weigh all the fish after landing. Instead control samples can be taken from the catch in accordance with the Danish sampling plan.

*Link to the Danish national order (kontrolbekendtgørelse nr. 290 af 25/03/20) – only in Danish: [LINK](#)

New sampling and control plans*

1) Regarding the weighing of fishery products, that are landed unsorted for industrial purposes



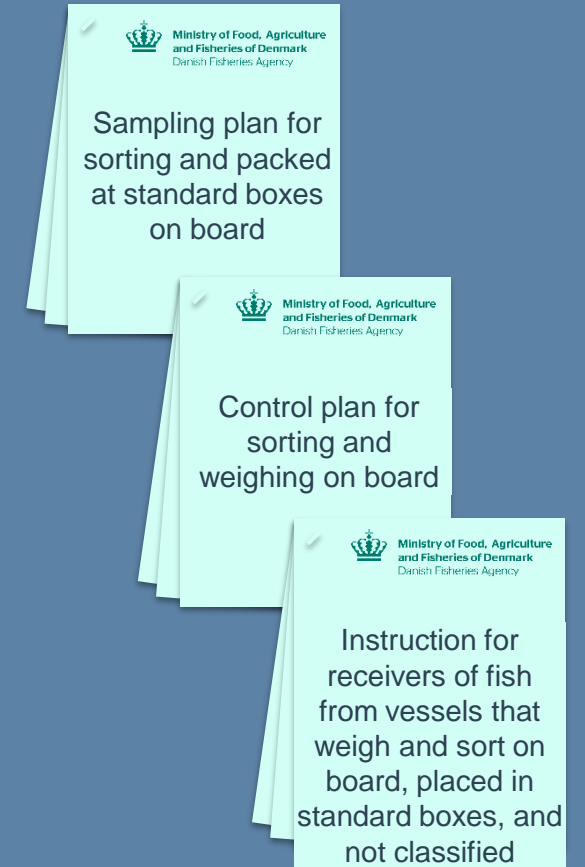
2) Regarding the weighing of pelagic species, that are unsorted at landing



3) Regarding fishery products, that are sorted and weighed on board before landing and first sale



4) Regarding fishery product, that are sorted and weighed on board, but from vessels, not holding an authorization to sort and pack at sea..



*The plans are published on the webpage of the Danish Fisheries Agency (only in Danish) – [LINK](#)

Sampling and control plans

1) Regarding the weighing of fishery products, that are landed unsorted for industrial purposes



- Industrial landings are unsorted because it is practically impossible to sort on board or at landing
- In principle, every species must be weighed separately at landing; however, with the sampling plan it is instead possible to take out samples and base the species composition on the samples
- The first buyer of the fish is responsible for taking out samples (an independent third party can also be designated to take out the samples on the buyers behalf)

Main species	Catch area	Numbers of samples on landings with 25 tons and below	Numbers of samples at landings between 25.1 tons and 200 tons	Numbers of samples at landings with more than 200 tons
Sand-eel (SAN)	North Sea and 3A	3	3 + 1 per commenced 50 tons	6 plus 1 per commenced 250 tons
Sprat (SPR)	3A	5	5 + 1 per commenced 25 tons max 10	21
Sprat (SPR)	North Sea	5	5 + 1 per commenced 25 tons max 10	24
Sprat (SPR)	3D	5	5 + 1 per commenced 25 tons max 10	15
Herring (HER)	3D		5 + 1 per commenced 25 tons max 10	
Norway pout (NOP)	All areas	5	5 + 1 per commenced 25 tons max 10	24
Blue whiting (BLH)	All areas	3	4	4 + 1 per commenced 250 tons
Boarfish (BOR)	All areas	3	3 + 1 per commenced 50 tons	6 + 1 per commenced 250 tons
*Other species	All areas	0,5 per mille of the catch min. 100 kilograms	0,5 per mille of the catch, min. 100 kilograms	0,5 per mille of the catch

Sampling and control plans

2) Regarding the weighing of pelagic species, that are landed unsorted

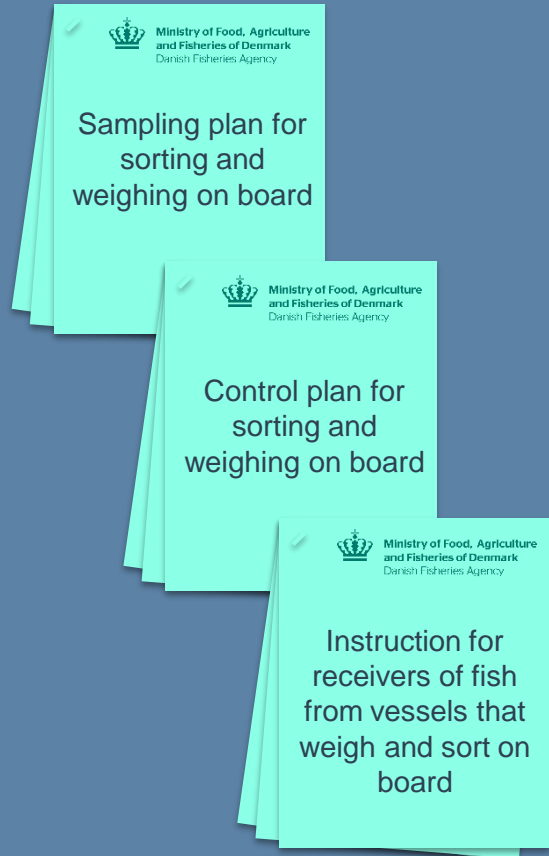


- Pelagic species are stored as unsorted bulk. The catch is landed unsorted, because it is not possible to sort on board before weighing.
- In principle, every species must be weighed separately at landing; however, with the sampling plan it is instead possible to take out samples and base the species composition on the samples
- The first buyer of the fish is responsible for taking out samples (an independent third party can also be designated to take out the samples on the buyers behalf)
- If the vessel store the fish in separated tanks, samples must be taken from each tank

Amount set to sale (in tons)	Minimum weight of the sample (kilograms)
Under 5	8
5 to 15	20
15 to 40	40
40 to 60	60
60 to 80	80
80 to 100	100
100 and above	120 (minimum 0,08 % of every catch with more than 100 tons)

Sampling and control plans

3) Regarding fishery products, that are sorted and weighed on board before landing and first sale

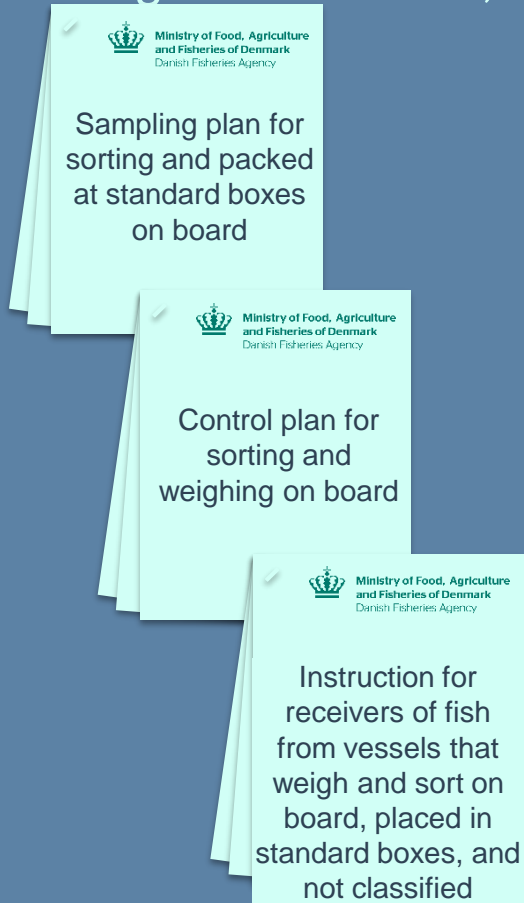


- It is favorable for many vessels to weigh and pack on board. Those vessels have installed scales and special systems to handle the weighing on board at sea.
- The vessels must hold a permission from the Danish Fisheries Agency to be able to weigh and sort onboard (DK authorization 900)
- The weighing must be done on a approved scale on board the vessel
- The fish must be sorted in boxes in accordance with the EU market standards
- A weighing slip should be placed in or at every box which contains information about the weighing result, market standards and traceability
- An auction can get permission to take out samples in accordance with its own sampling plan that is approved by the Danish Fisheries Agency, thus it is not necessary to take out samples in every landing

Number of boxes per species	Number of boxes that – as a minimum – must be taken out as samples
50 kilograms and below	0
1-25	1
26-50	2
51-99	3
100 and above	3 + 1 per 100 box

Sampling and control plans

4) Regarding fishery products, from vessels not authorized to sorted and weighed on board before landing and first sale, and for vessels from other MS without a sampling plan and 3. countries



- Denmark have landings from other MS, not having a sampling plan and from 3. countries, were it is not possible to have a Commissions approved sampling plan. Further does not all DK vessel hold a authorization for weight and packing at sea.
- It is favorable for many vessels to weigh in standard boxes at sea. The vessels must not hold a permission from the Danish Fisheries Agency to be able to weigh and sort onboard
- The fish may be sorted in boxes in accordance with the EU market standards, if not done at sea, this have to be done before first sale.
- A weighing slip should be placed in or at every box which contains information about the weighing result, market standards and traceability.
- If sorted in accordance with EU market standard the auction can use its own sampling plan that is approved by the Danish Fisheries Agency, thus it is not necessary to take out samples in every landing, if sorted in accordance with EU market standard

Number of boxes per species	Number of boxes that – as a minimum – must be taken out as samples
50 kilograms and below	0
1-25	1
26-50	2
51-99	3
100 and above	3 + 2 per 100 box

Implementation - timeline

- January 2020 - Implementation and enforcement of the plans – 12 weeks pass to adjust to the new rules
- January 2020 - A new universe on the Agency's website regarding the plans was launched – targeting fishermen, buyers and transporters of fisheries products
- April 2020 - transportation of fishery products out of DK without prior weighing no longer allowed – several cases from NL
- May 2020 - The Danish sampling and control plans were approved by the Commission
- May 2020 approval of national control program in relation to physical and administrative control and audit of 1. buyers of fisheries products – the program was adjusted in Jan 2021
- April 2020 - Program for auctions in relation to weighing was first approved until October 2020, and later amended for next approval until April 2021
- April 2021 - Program for auctions in relation to weighing was approved for the period 01.04.2021 – 31.12 2021 (no application for 2022 has been received yet)
- Monthly follow up on audit of 1. buyers (Monthly Control Meeting) – large task for the buyers to implement

Implementation – control and audit

There are different way to verify the implementation of the control and sampling plans

- Physical audit of weighing and sampling conducted by the receiver/ buyer
- Administrative audit conducted at the premises of the receiver/ buyer
- Administrative cross check on data, logbook, landing declaration and sales notes

For all three types of verifications, the Danish Fisheries Agency has developed guidelines for the fisheries inspectors.

On top of the different audits are fishery inspection on landing carried out in ports by the inspectors

Implementation – control and audit

There are different way to verify the implementation of the control and sampling plans of landings for industrial purpose.



- Physical audit of weighing and sampling conducted by the receiver/ buyer
 - ✓ Verification of that the samples are take at a semi automatic or full automatic sampling system at the pump.
 - ✓ Verification of that as a minimum the correct number of samples are taken, ad that they are representative for the catch landed, actually number of samples there have to be takes have to be decided in accordance with the main species as recorded at the logbook.
 - ✓ Monitor the identification of each species at the sample and that each species are weighed.



Implementation – control and audit

There are different way to verify the implementation of the control and sampling plans

- Administrative audit conducted at the premises of the receiver/ buyer.
 - Before the audit a number of landings to the receiver/buyer are selected randomly. The received/buyer are not informed about the vessels selected randomly, but the time and date for the administrative audit are agreed, this in order for the receiver/buyer to have the staff present at the audit to facilitate the fishery inspectors.
 - For the landings selected are the documentation for the sampling and the weighing cross checked with the information report to the Danish Fisheries Agency.
 - The weighing record have to contain information about:
 - Date for the weighing
 - Vessel external number and name
 - Amount of each species at the sample
 - Weighing result of each sample for each species at the sample
 - The total amount landed
 - The receiver/buyers name and adress



SKAW INSPECTION
THE SWORN WEIGHER, MEASURER & SAMPLER OF SKAGEN
Tlf: +45 98 44 28 11 - Fax: +45 98 44 21 49 - info@skaw-inspection.dk - www.skaw-inspection.dk
Fabrikvej - DK-9990 Skagen - Denmark

KOPI Inspektionsrapport nr. 61890
Side 1 af 2

Rekvireret af : FF Skagen, Havnevagtvej 5, 9990 Skagen, Att.: John Brun Christensen
Skib/båd : ~~GS-123456789~~

VEJNING - ARTSFORDELING - TEMPERATURMÅLING - TVN

I henhold til skriftlig ordreindgang, bekræfter vi hermed at have udført vejning, artsfordeling, temperaturmåling samt TVN-måling af det nævnte fartøj.

Artsfordeling

Total vejet mængde :	467.643,00 Kg		
Sammensætning af arter :			
1. Sild HER	10451,00 kg	/	2,23 %
2. Hundestejle SKB	43,00 kg	/	0,01 %
3. Usorterbart USO	1434,00 kg	/	0,31 %
Brisling SPR (Hovedart)	455715,00 kg	/	97,45 %

National control program in relation to physical and administrative audit of 1. hand buyers of unsorted landings for industrial purpose and for human consumption.

The target for administrative and physical audits is fixed for a year, for 2021 is the target below.

1. hand buyers, who only receives landings seasonal administrative audits are carried out 4 times pr. year, while 1. hand buyers who receives landings all year administrative audits are carried out 6 times pr. year.

While the target for physical audit of unsorted landings for industrial purpose are set as 7 % of the landing and target physical audit of unsorted landings for human consumption are set as 4 % of the landings. The target for audit is monitored by a SAS product "Visual Analytic".

Havn	Audit type
Esbjerg	Fysisk audit - Industri
Grenå	Fysisk audit - Industri
Hanstholm	Fysisk audit - Industri
Hirtshals	Fysisk audit - Industri
Hundested	Fysisk audit - Industri
Hvide sande	Fysisk audit - Industri
Nexø	Fysisk audit - Industri
Skagen	Fysisk audit - Industri
Strandby (nordjylland)	Fysisk audit - Industri
Thyborøn	Fysisk audit - Industri

Navn	Opkøber nr.	Audit type
Grenaa Lossekompagni Aps	0905	Administrativ audit - Industri
Triplenine Thyborøn A/S	0999	Administrativ audit - Industri
A/S O.V. Jørgensen. Hundested Fiskeexport	1532	Administrativ audit - Industri
Ff Skagen A/S	1941	Administrativ audit - Industri
H.F. Transport Og Fiskehandel A/S	1975	Administrativ audit - Industri

Implementation – Fisheries Agency and in relation to the industry/ stakeholders

Fisheries Agency

- Working group established at the agency with staff from the office in Copenhagen as well as fisheries inspectors – regular meetings every month
- Dialogue with the IT-department in relation to cross-check rules (VALID rules) and other data analyses with regards to compliance of Art. 33 and 109
- Dialogue with DTU Aqua on the scientific advice – special focus on the plan for industrial landings. Change of sampling for industrial purpose (no. of samples in the industrial plan February 2021)
- Formulation and approval of a ‘Control Plan’ for the agency’s follow up on 1. buyers sampling (weighing and sorting etc.) – benchmark for audit-program

Dialogue with the industry/ stakeholders

- Establishment of various fora for exchange of information – regular meetings every 3-4 months since 2020
- Regular bilateral meetings with the various Fishermen Associations – focus on the sanctioning regime and Instruction no. 10.1.4

Implementation – dialogue with the Commission and other Member States

The Commission

- Several enquires on interpretation of rules
- Amended plan for industrial purposes

Sweden

- Swedish landings in Danish ports – interpretation of Art. 60(1) (correct quota management)
- Common Control Program – Sweden in the end decided to postpone dialogue until summer 2022, now further postponed

The Netherlands

- Dialogue about the new Danish plans and transit of fish without prior weighing
- Several infringement cases regarding Dutch landings (primarily Spring 2020)

Poland

- Shift of landings from Bornholm to Poland and Sweden
- Recording of non-quota species e.g. sandeel and flounders



Implementation – dialogue with the Commission and other Member States

Ireland

- Request for information on the Danish plans 2021. Ireland have now implemented sampling plans

Belgium

- Discussion of common control program – Commission denied approving a common control program for the time being due to the situation in Belgium

Regional level

- On request from Denmark weighing provision is now a point on the agenda for meetings in both Baltfish CEG and Scheveningen CEG
- Denmark has circulated two questionnaires to all Member States in Baltfish.
 - The first one was to map which approved sampling and control plans each Member State have
 - The second one is to map out control and enforcement measures (will be discussed on a meeting on 2 December 2021)
- The two questionnaires were given to Scheveningen CEG and EFCA, and will be discussed on the next meeting.

Thank you for your attention

Questions?

JUNE 1 - 3
SKAGEN
DENMARK

**Peter Kongerslev &
Cato Christensen**

Senior Advisor, FF Skagen
Director, SKAWInspection

Technical Weighing Solutions for Responsible Practices





EUROPEAN
FISHMEAL AND FISH OIL
PRODUCERS

Conference:

Responsible Production The European Way

Responsible actions and how to verify them



**Technical weighing solutions for responsible
practices**

Peter Kongerslev,
Senior Advisor **FF Skagen**
& Scandic Pelagic

June 2, 2022

Introduction



- When it comes to reliability and credibility, the fishing industry for many years have had a very bad reputation. Politicians and other authorities have often announced new laws and steps, that should prevent the possibility for fishing and landings of unreported pelagic catches, in other words steps that should guarantee sustainable fishing and landing.
- To improve our reliability and credibility, and not least to secure sustainable landings, we by FF-Skagen in 2014 made a new policy and started to find out how to build a watertight system to make a trustworthy weighing and registration of our landings, this we did in cooperation with a local independent certified 3-rd part survey expert: “Skawinspection”.

Introduction



- However, with the local Survey company “Skawinspection”, we had the challenge that the owner of the company, also was the brother of the Fish supply Director by FF-Skagen.
- We therefore had to be even more alert in building up a reliable and trustworthy handling systems and procedures. And at the same time ensuring that the costs didn’t ran in the wild.
- In the following process, we found, that the use of R_{emote} E_{lectronic} M_{onitoring} would be a good and useful tool.
- And for the “Skawinspection” it from the beginning was made fully clear, that if their survey wasn’t reliable and trustworthy, they could not have the job.
- Therefore, all their descriptions are a part of their certifications.

Introduction



- In 2014 the way the Danish fishery control authorities handled their registration of bycatches in the industry landings was disapproved from the EU-Commission.
- In 2018 it in Brussels was decided that the “*Community control system for ensuring compliance with the rules of the common fisheries policy*” in short just called the **Control Regulation** should be renewed/improved.
- Therefore, among other a Working Group was established to make recommendations on control measurers for some pelagic fisheries. (which final report is the basic in the *EFFOP Industry standard for draining and weighing*)
- In 2018 the Danish fishery control authorities haven't yet delivered an approvable control system for the registration of bycatches in the industry landings for the EU-Commission, therefore...

Introduction



- Therefore in 2019 the Danish fishery control authorities decided that with the effect of January 2020 all future registration of bycatches should be the responsibility of the fish buyer, and a new sampling plan was put into force.
- In 2019 we by FF-Skagen and 999/MID decided that these future registrations of bycatches also should be made by an independent certified 3-part surveyor.
- Simultaneously we started to incorporate this new “regime” into all work descriptions.
- In 2022 the renewed Danish control system (finally) is approved.
- So, in the following we can say:
- **How do we do by FF-Skagen group?.....**

How do we do by FF-Skagen Group



- 1. To have an arm's length:
 - a. ...to the weighing and species control, and
 - b. ...to make sure legislations are followed, and
 - c. ...to make sure all standards are followed,

we have hired a registered, certified, independent 3-rd part Surveyor as an Inspector to handle all registrations, procedures of the weighing, the weighing itself, and the species control/determination of our landings.

How do we do by FF-Skagen Group



- 2. The company we are using is the local Danish company: “Skawinspection”.
- However, there are other survey companies e.g.:
- Sworn Inspection
- DAN EYE
- ECS EURO CARGO SERVICES
- SGS
- Intertek
- Saybolt
- NMCS NORWEGIAN MARINE & CARGO SURVEY

How do we do by FF-Skagen Group



- 3. When the Skawinspektion started doing their surveys by us, they had a good reputation as a trustworthy surveyor, but no experience with weighing and species determination of industrial landings. Therefore, they had developed specific work descriptions of the job they are doing. e.g.:



Procedure for "remote weighing" and segregation of different species, when discharging fresh unsorted pelagic bulk catches for indirect human consumption, into trailers in Hanstholm.

Table of Contents:

1. Procedure before start-up of weighing process.
2. Procedure during ongoing weighing process.
 - 2.1. Location of discharging installation.
3. Procedure for finalizing the weighing process.
4. Self-monitoring of the weighbridge.
5. Segregation of species (Determination of bycatch) of unsorted catches
6. Various enclosures

1. Procedure before start-up of weighing process

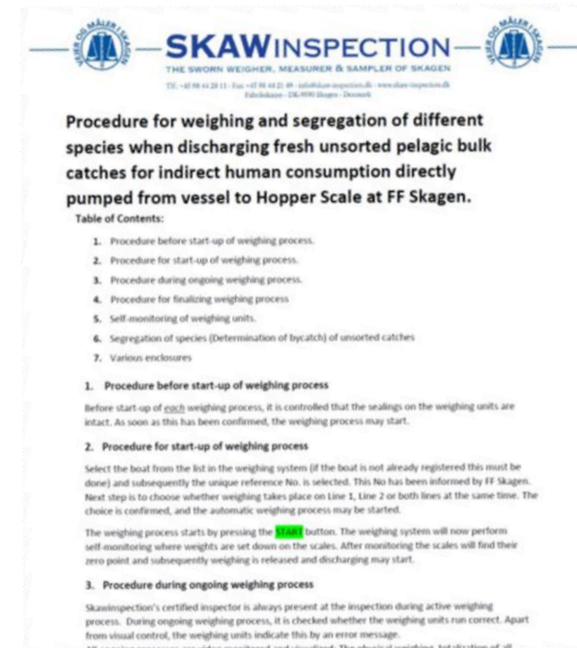
Before starting the weighing process, a visual inspection of the weighbridge itself is performed. This inspection is performed with the installed cameras and is performed to determine any conditions that could compromise the actual and accurate weighing of the weighbridge. An inspection of the weighbridges main instrument (weight indicator) is also carried out with a dedicated camera. The main instrument is connected directly to the weighbridge and must before it may be used, always indicate "0 kg.". In the same way, the "repeater" in the office where the weighbridge inspection is carried out must also show "0 kg.".

Gives the above causes of doubt, staff will be contacted "on location", this to correct the errors that may have occurred. If there is no solution to certain problem, the remote weighing procedure cannot be carried out. The person in charge at the customer and the coordinator at SKAWINSPEKTION are contacted for the further course.

If the weighbridge has not been used for a third-party inspection in the last month, the inspector must obtain the last registered check weighing to ascertain the "ability" of the weighbridge. The last valid verification or calibration certificate can on request always be obtained by contacting SKAWINSPEKTION. If there are no deviations, the equipment / weighbridge is ready for use.

2. Procedure during ongoing weighing process

Skawinspektion's inspector is during active weighing process always present in given "remote office", and the weighing itself is only carried out by Skawinspektion's certified inspectors.



How do we do by FF-Skagen Group

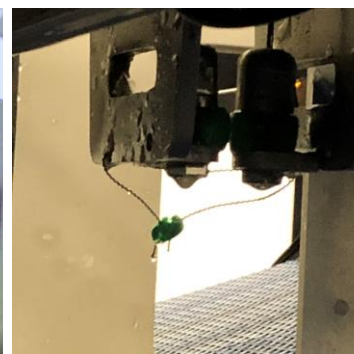


- 4. The scales we are using all are a type, that not allows any untraceable deduction in the registered volume.
- In our opinion this type of scales should be the only scales that can be named as: “an Approved scale”!
- (It took a while before our scale suppliers (Scanvægt, Jydsk Vægtfabrik and Marel) understood what type of scale we were looking for.)
- In addition, all scales are sealable.

How do we do by FF-Skagen Group



- 5. Our sealable scales are, as a part of the technical weighing solutions, of course all sealed and before start of each discharging, the inspector checks that all seals are unbroken.



- If not, the discharging cannot begin.

How do we do by FF-Skagen Group



- 6. As another part of the technical solutions, REM (monitoring cameras) are used as a tool to verify and streamline the efficiency of the Inspectors job.

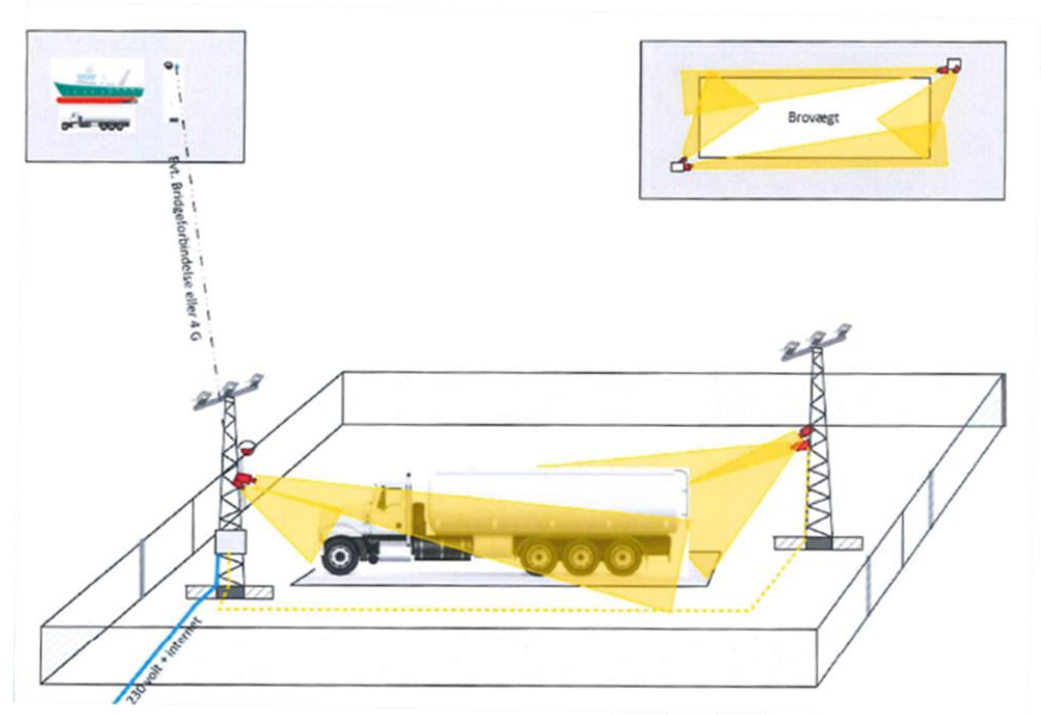
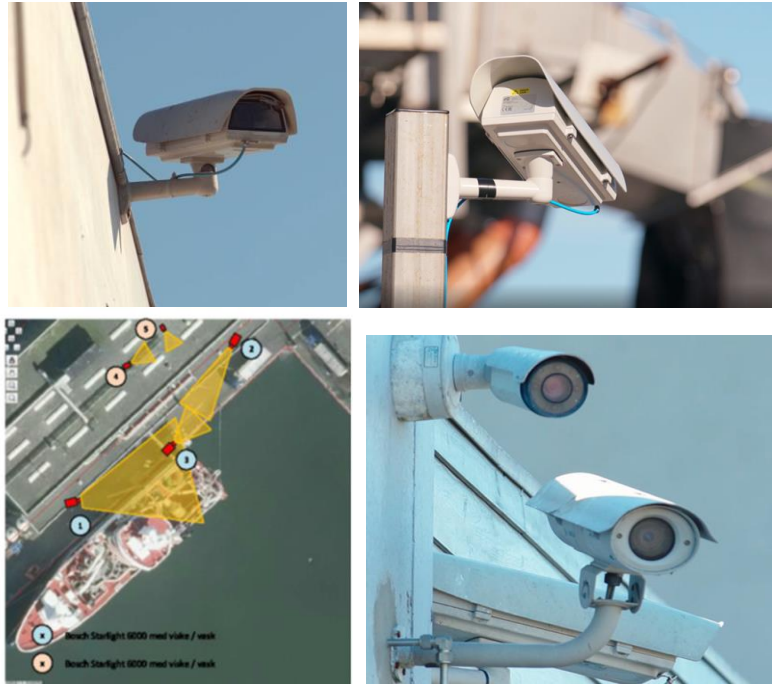
- e.g., the inspector has in his internal work description written:

....To provide any irregularities and in general to be ahead of the situation a complete set of cameras are installed on berth 43 (See below). This makes it possible to see when – and which truck drives under the discharging installation, and to see if fish is discharged into the trailer. Furthermore, it is possible to see which ship is placed at the berth, and whether it is connected to the discharging installation....

How do we do by FF-Skagen Group



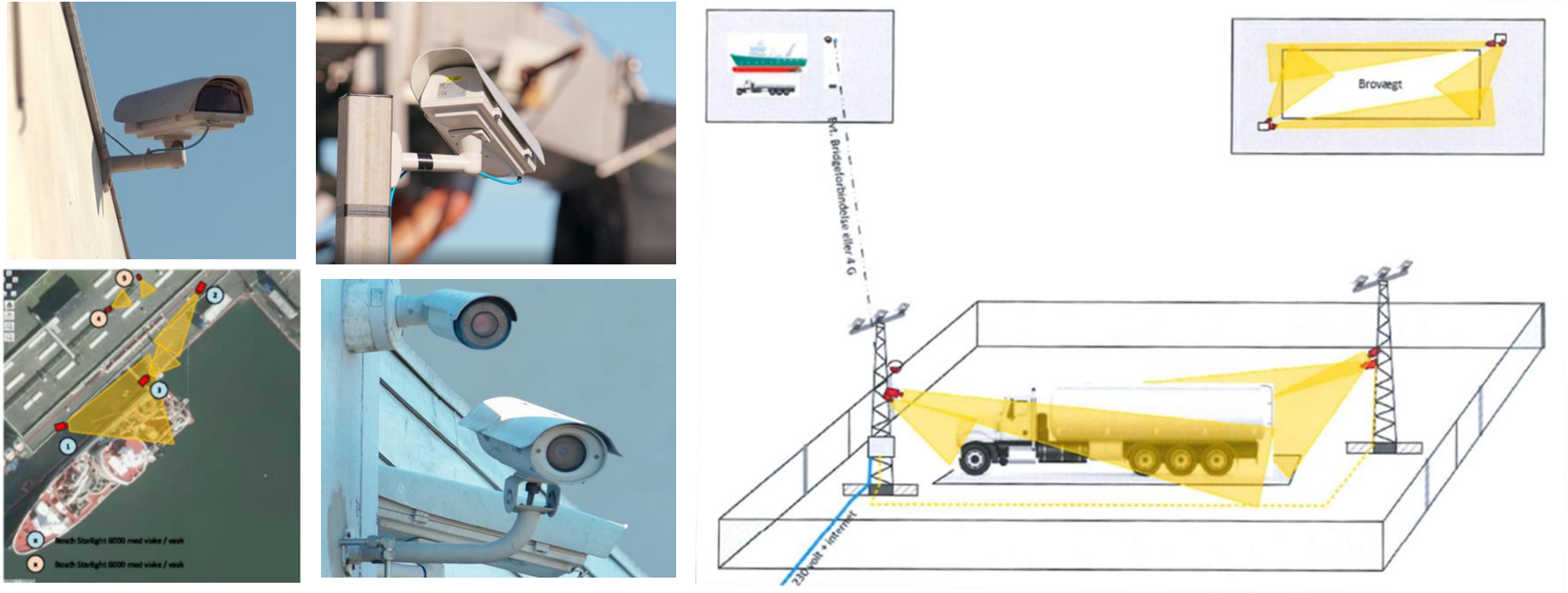
- 6. The monitoring cameras are located at strategical important places. Locations are agreed with the Danish fishery control authorities.



How do we do by FF-Skagen Group



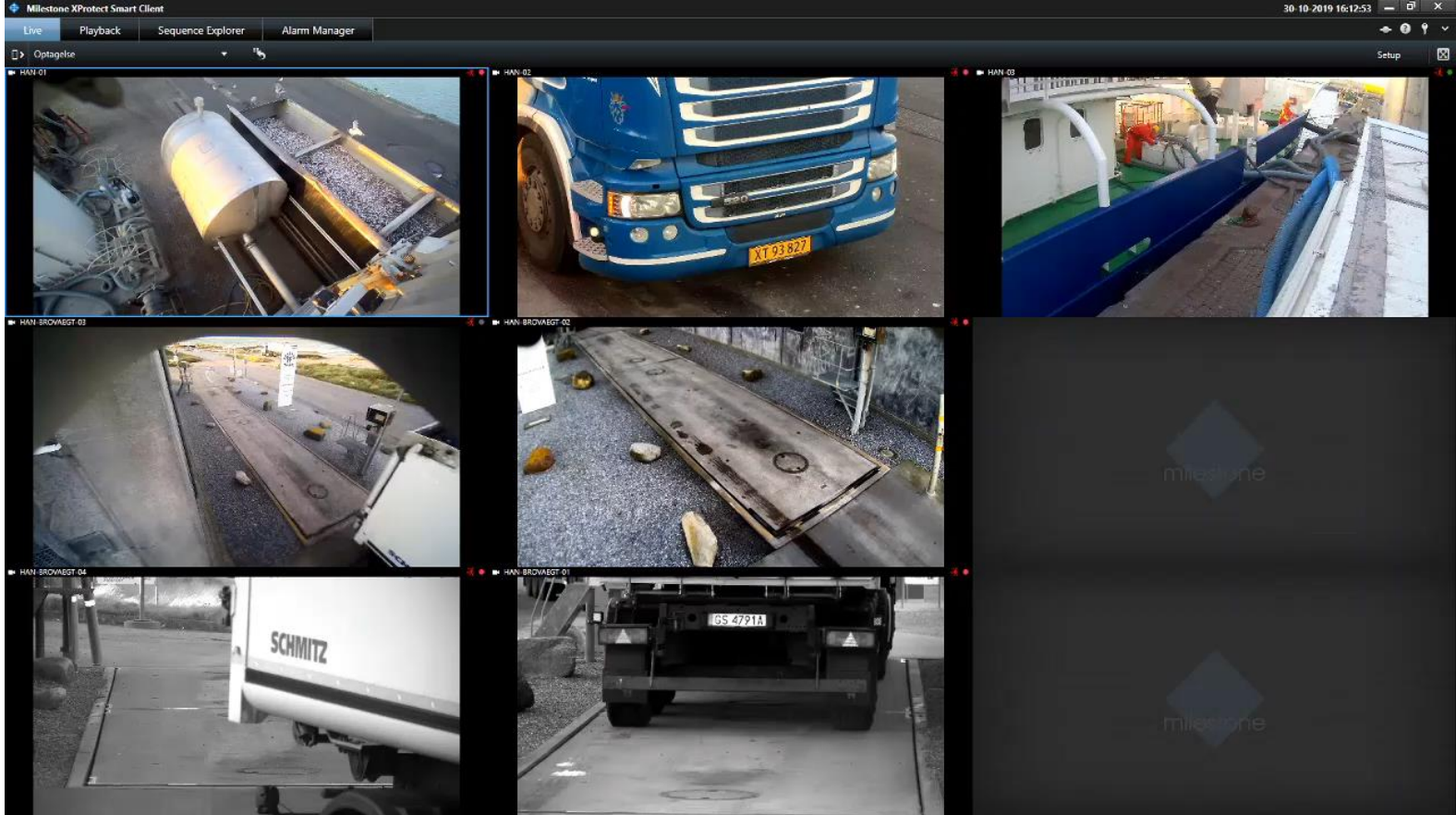
- 7. Using this REM technique at its full, also allows us to receive landings in other ports than where we are situated.



How do we do by FF-Skagen Group



➤ 7. All cameras shows live pictures, here recorded in Hanstholm...



How do we do by FF-Skagen Group



- 8. and the local fishery control office has access to all live material. [Vejestationer \(lytzenit.dk\)](http://lytzenit.dk)



How do we do by FF-Skagen Group



- 9. On top the recorded videos can be used as documentation for having done a correct job.



How do we do by FF-Skagen Group



- 10. At our daughter company Scandic Pelagic, we have implemented same/similar procedures to secure full register of the landings of Herring for Human Consumption production.



Technical weighing solutions for responsible practices

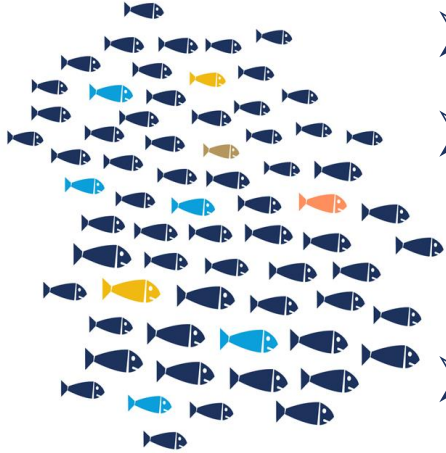


How do we do by FF-Skagen Group



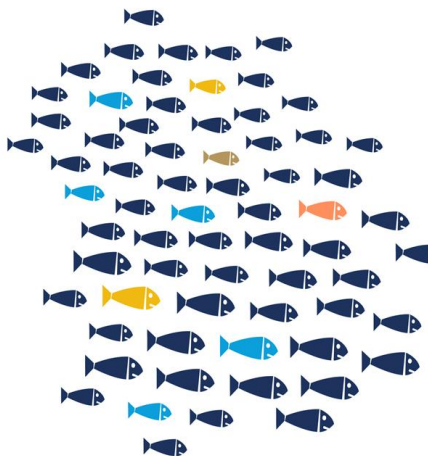
- 11. Scale technical:
- When a scale is switched on, a so called “alibi” number automatically is created.
- When the scale is stopped and started again, a new alibi number automatically is created.
- An alibi number and its recorded weighed volume, cannot be deleted, and if so, a number is missing in the line of numbers.
- In the background a total figure adds up the weighed volume, and this figure increments until one million tons, hereafter it starts up again from zero. This total “background”-volume “fits” with all alibi numbers added up.

How do we do by FF-Skagen Group



- 12. Sampling plan/samples:
- The Danish Fisheries Agency has made a mathematic sampling plans, which is based on statistical material collected over more than 10 years.
- This sampling plan is conducted by the DTU Aqua, which is the Danish National Institute of Aquatic Resources and is an institute at the Technical University of Denmark (DTU).
- This sampling plan is (at least for the time being) the most thorough sampling plan for pelagic landings ever developed. It's divided into two, one for pelagic human consumption, and one for pelagic indirect human consumption.
- Here is how it looks:

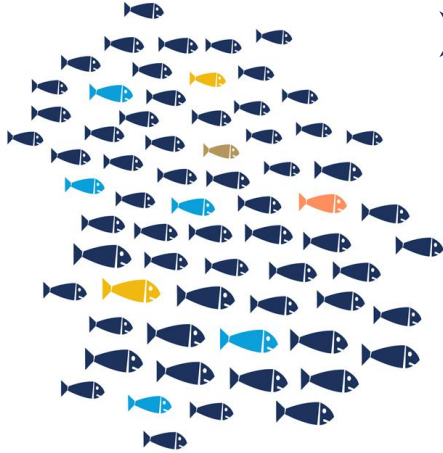
How do we do by FF-Skagen Group



➤ 12. Sampling plan/samples:: indirect human consumption.

Species	Waters/ Sea	Number of 10 Kg. samples at landings of 25 tonnes or less	Number of 10 Kg. samples at landings between 25-200 tons	Number of 10 Kg. samples for landings over 200 tonnes
Sandeel (SAN)	North Sea/ Skagerrak/Katt egat	3	3 plus 1 pr. commenced 50 tons	6 plus 1 pr commenced 250 tons
Sprat (SPR)	3A	5	5 plus 1 pr. commenced 25 tons, max 10 though	21
Sprat (SPR)	North Sea	5	5 plus 1 pr. commenced 25 tons, max 10 though	24
Sprat (SPR)	3D	5	5 plus 1 pr. commenced 25 tons, max 10 though	15
Herring (HER)	3D	5	5 plus 1 pr. commenced 25 tons, max 10 though	15
Norway Pout (NOP)	All	5	5 plus 1 pr. commenced 25 tons, max 10 though	24
Blue whiting (BLH)	All	3	4	4 plus 1 pr commenced 250 tons
Boarfish (BOR)	All	3	3 plus 1 pr. commenced 50 tons	6 plus 1 pr commenced 250 tons
Other Species*	All	0,5 Permille of the catch, minimum 100kg though	0,5 Permille of the catch	0,5 Permille of the catch

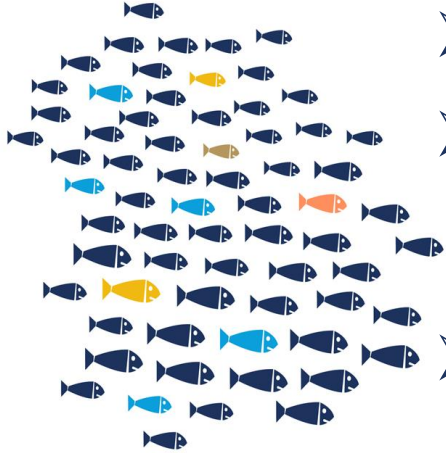
How do we do by FF-Skagen Group



➤ 12. Sampling plan/samples: human consumption.

Volume expected landed (tons)	Minimum total weight of random samples (kg)
Under 5	8
5 to 15 excl.	20
15 to 40 excl.	40
40 to 60 excl.	60
60 to 80 excl.	80
80 to 100 excl.	100
100 tons and over	120 kg however at least minimum 0,08 % of every quantity higher than 100 tons.

How do we do by FF-Skagen Group



- 12. Sampling plan/samples:
- The Danish Fisheries Authorities Agency sampling plans requires also that it is obliged that:
 - A:.....All the sample collections taken must be representative, this means:
 - B:.....That you must secure, that all samples taken out is properly taken out e.g., from the full withs of a conveyor belt.
 - C:.....The sample collection must be approved by the Danish Fisheries Authorities Agency.

How do we do by FF-Skagen Group



- 13. Costs:
- Investment: Cameras: Our camera and software supplier (Lytzen) informed in 2021 that price for e.g., 3 heated cameras and all the required software (Milestone) all in all costs around € 6.000,-
- Investment: Scales: very difficult to say. Is depended on the needed capacity but expect from 100-200.000 €.
- Surveyor: Costs average over the past years at FF for the weighing: € 0,80, and for the species control € 2,00 /ton raw material.
- Costs average over the past years at Scandic Pelagic for the weighing and for the species control combined: € 2,95 /ton raw material

How do we do by FF-Skagen Group



- 13. Costs: Who must pay these costs?
- Surveys: FF Skagen pays for weighing of the industrial fish, and the fishermen are billed for the species determination.
- Surveys: Scandic Pelagic (human consumption) the fishermen are billed all Survey costs, that is the costs for the weighing as well as for the species determination.
- Equipment: FF-Group has all costs.
- What next.....?

How do we do by FF-Skagen Group



- **14. Can we afford not to be a part of the securing sustainable fishing. We think not.**
- When we started securing full registration by us, not all fishermen were happy.
- Now the DPPO (Danish Pelagic Producer Organization) besides their codex in addition has announced, that they by the end of 2022 will have installed CCTV (Closed Circuit Tele Vision) and associated sensors on all Danish pelagic vessels organized in the DPPO. And all data and information from the fishing operations are made directly available to the Danish fisheries authorities.
- Web: [The danish pelagic fishing fleet in DPPO's membership introduces 100% documented fisheries – DPPO](#)

How do we do by FF-Skagen Group



- **14. Can we afford not to be a part of the securing sustainable fishing. We think not.**
- EFFOP back in Faroe Island 3 years ago decided to develop the “***EFFOP’S Industry standard***”. So far so good.
- However, in our point of view a natural next step, must be a ***version 2.0*** of this standard, including all the thorough descriptions, sampling plans, REM and Scale requirements described in this presentation.
- On top this coming version 2.0 as a new Standard should include pelagic landings for human consumption.
- A general standard for all Pelagic's like that, will be welcomed.

How do we do by FF-Skagen Group



- **14. Can we afford not to be a part of the securing sustainable fishing. We think not.**
- But why a version 2.0 ?
- Because as written in the beginning of the version 1.0:
- **Credibility, traceability, accountability and sustainability are central to the fish processing industries.**
- In other words:
- **Our future depends on decisions made today.**

How do we do by FF-Skagen Group



➤ Questions.....?

How do we do by FF-Skagen Group



When I was a boy, my momma would send me
down to the corner store with \$1.00.
And I'd come back with:
5 potatoes, 2 loaves of bread,
3 bottles of milk, a hunk of cheese,
a box of tea and 6 eggs.
You can't do that now...
...too many fuckin' security cameras.

How do we do by FF-Skagen Group



➤ Thank you for your time !

How do we do by FF-Skagen Group



Best regards
Peter Kongerslev
Senior Advisor

peko@scandicpelagic.com



- WE CREATE VALUE OF MARINE RESOURCES



How do we do by FF-Skagen Group



How do we do by FF-Skagen Group



- [Sådan sikrer vi gennemsigtighed og lige vilkår – Marine Ingredients Denmark \(maring.org\)](http://maring.org)

Third party surveillance – transparency builds confidence

Are you- and your company ready to
commit yourselves to new demands?

Name: Cato B. Christensen
Title: Owner/CEO
Profession: Cargo Surveyor



IMPLICATIONS of Third Party surveillance

- What is a third party?
- Benefits from transparency: Credibility, trust, no disagreements
- Your obligations: Think differently, accept standardized procedures

FAO (UN) also secures transparency by the service of a third party



The fishing industry to a great extent is using third-party monitoring

Certification and independency **DOCUMENTET!**

- Strong company governance and finances (ISO/IEC 17020)
- Guidelines for observing personal relationships (ISO 37001)



Third-party surveillance

"THE SKAGEN WAY"



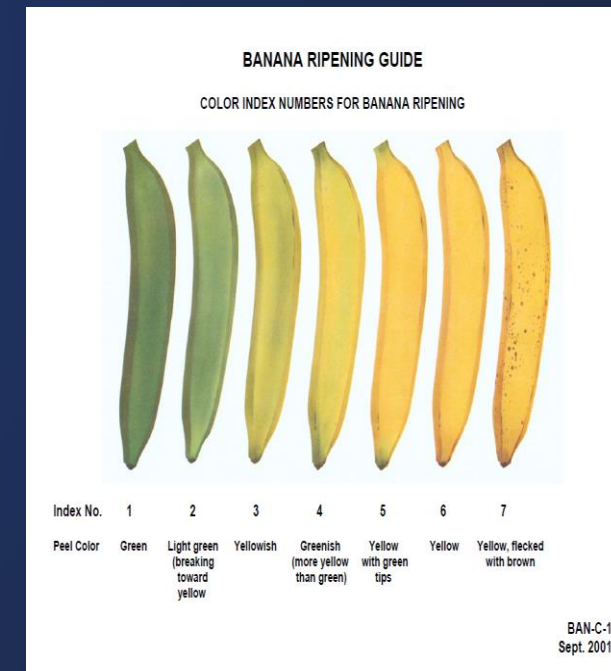
All pelagic landings are monitored down to the smallest detail
All quantities landed are weighed on approved calibrated scales
Species are sorted according to national regulations
All results are shared with involved parties including authorities
Data from Danish vessels are shared with scientists

Danish actors FF Skagen and Triple Nine are creating
transparency – not just talking about it

That makes me proud as an independent surveyor and as a
citizen

As an additional guarantee of impartiality, inspections are carried out in all kind of industries

- Inspection of fresh fruit
- Draft surveys in ships
- Bunker surveys, heavy fuel, diesel
- Sampling of grains and feeds
- Cleaning inspections





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- Description of working procedure with digital cameras. Surveillance



> Weighing and measuring > Sampling > Tally > Inspection and check > Draft and bunker survey > Other services



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Einar Eg
Nelsen

Professor, National Institute of
Aquatic Resources, Section for
Marine Living Resources

Is DNA-testing the Future of Species
Control?



DTU



Is DNA-testing the future of species control?

Einar Eg Nielsen, Paulina Urban, Dorte Bekkevold, Jos Kielgast, Magnus Jakobsen

Mixed industrial catches

- Large mixed quantities (>200 tonnes)
- Generally few species
- Uneven distribution of species in catch (hauls/tanks)
- No fixed EU standards (level playing field)
- **Current control by manual counting and weighing (buckets)**
- Problems with bycatch (e.g. herring)
- Problems with documenting catch
- Minimum reporting 50 kilos

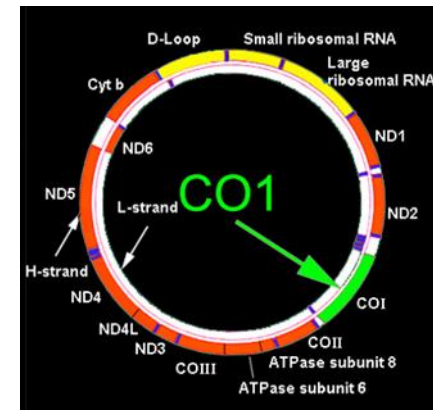


DNA-Mix project, Danish Fisheries Agency, industry and fishermen. Funded by **European Maritime and Fisheries Fund**



DNA based species-identification –“Barcoding”

- “Barcoding of life” database www.boldsystems.org
- One gene COI (cytochrome c oxidase subunit I)
- 650 bases ACTG.....
- Separates 98% of studied fish species
- 21.073 species (25.05.2022)
- Simple as it relies on categorical differences
- Single species samples (filets, fins) easily identified without taxonomic expertise



GGTAACATCCCGAAAGTC

GGTAACATCACGAAAGTC



Species 1



Species 2

Can DNA testing be used for mixed catches?

- **Challenges:**

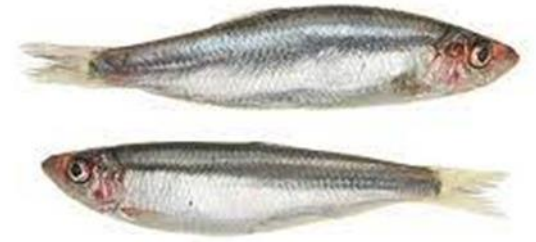
- How to sample large inhomogenous mixtures?
- Do some species give more DNA \neq weight?
- Is the precision high enough?

- **Potential solutions:**

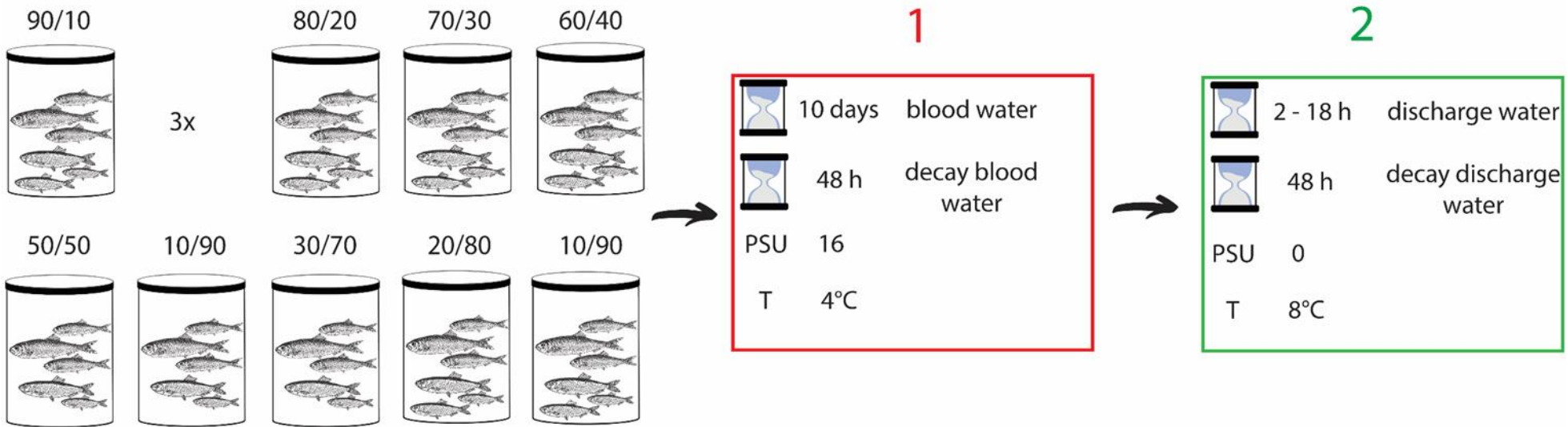
- Sample production water on vessel or in factory = more homogenous DNA composition than the fish
- Calibrate for DNA/weight, with respect to different species
- Test the robustness of inferences with "mock" mixture samples (species proportions and size etc.)



Case 1 Sprat and herring mixed catches



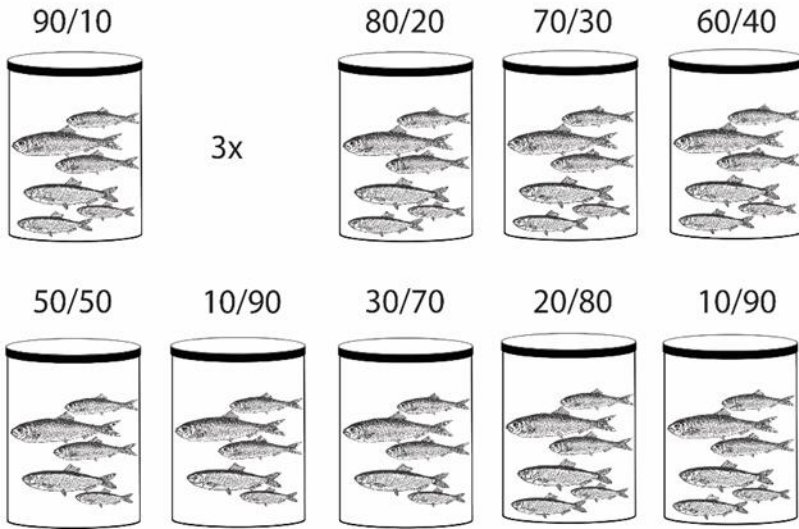
- Experiment:



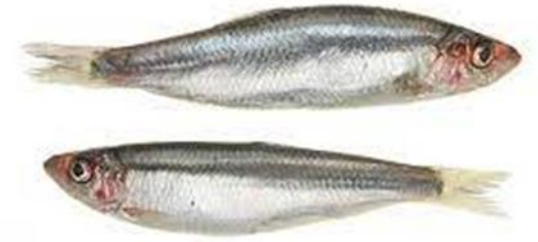
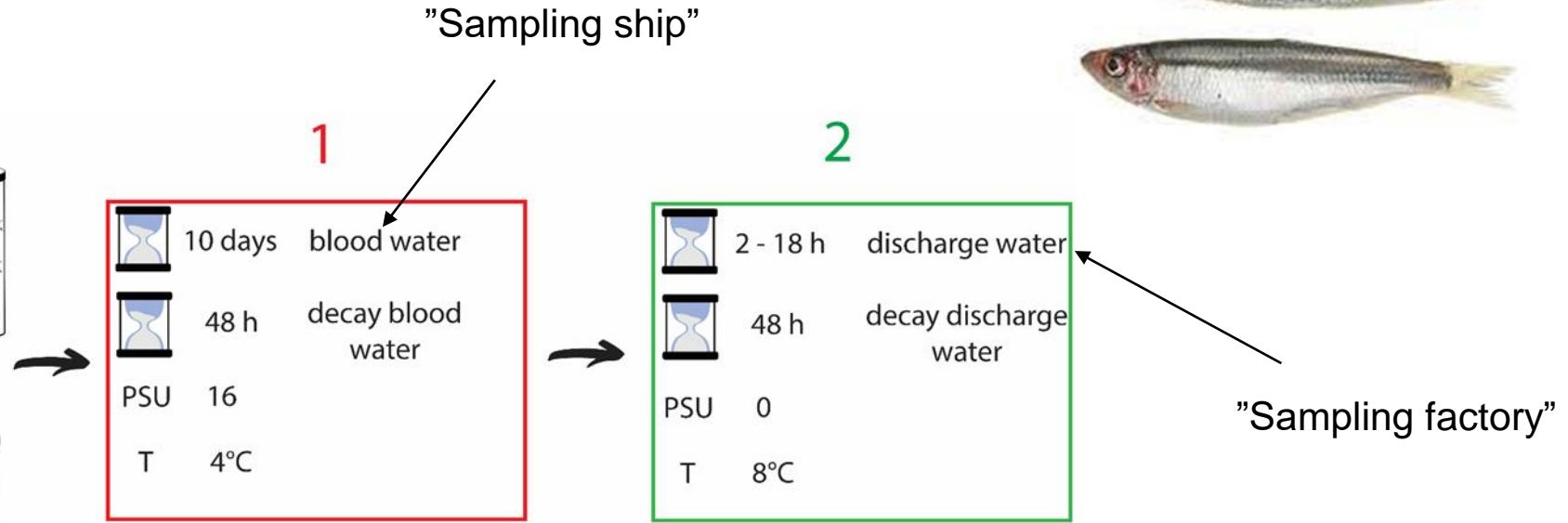
5 kilos in each bucket

Case 1 Sprat and herring

- Experiment:

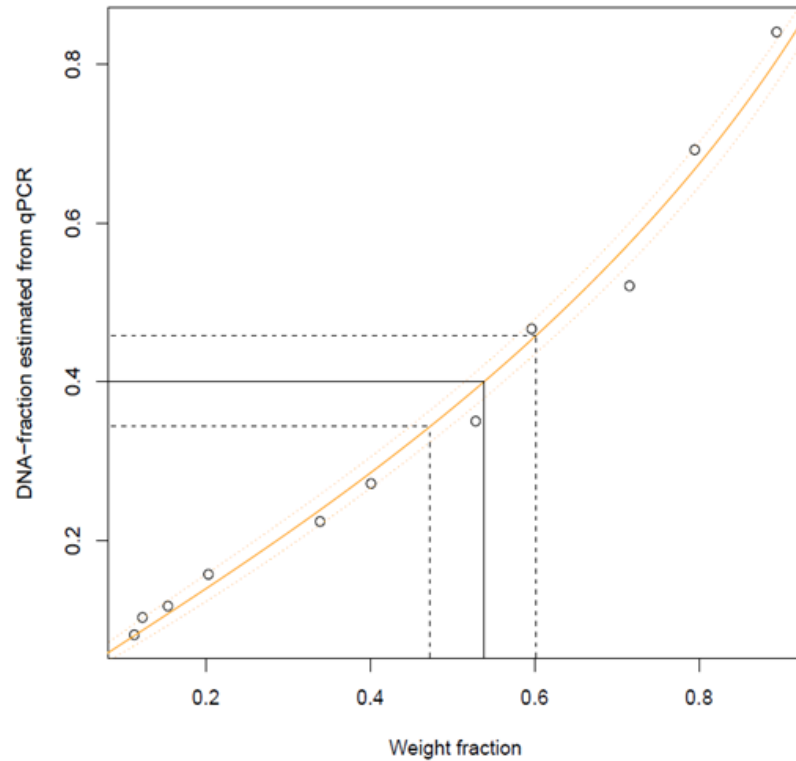


5 kilos in each bucket



Relationship between weight and DNA fractions (herring)

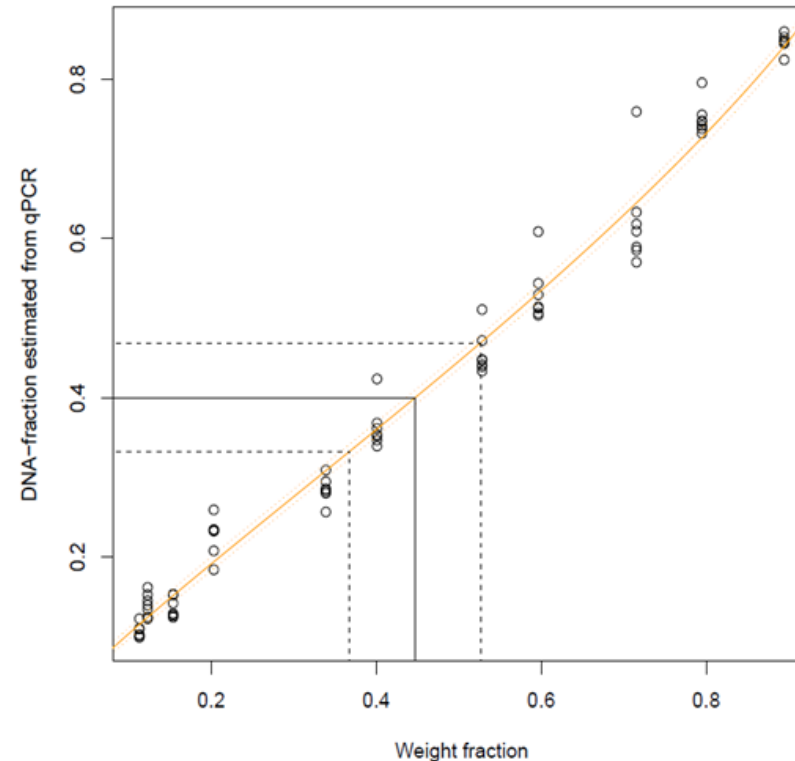
qPCR-measurements of blood water



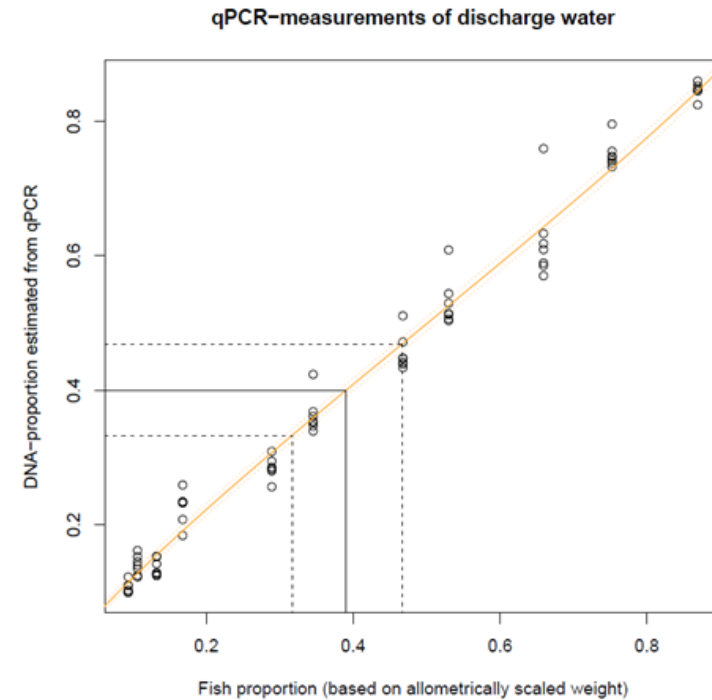
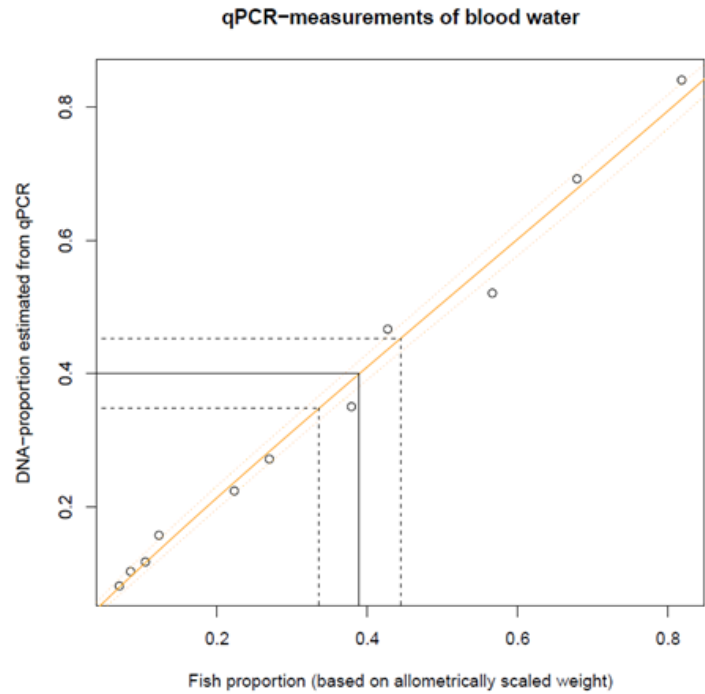
DNA-fraction measured (μ_i) = 0.4 (95% CI)

Weight fraction estimated = 0.53 ± 0.07

qPCR-measurements of discharge water

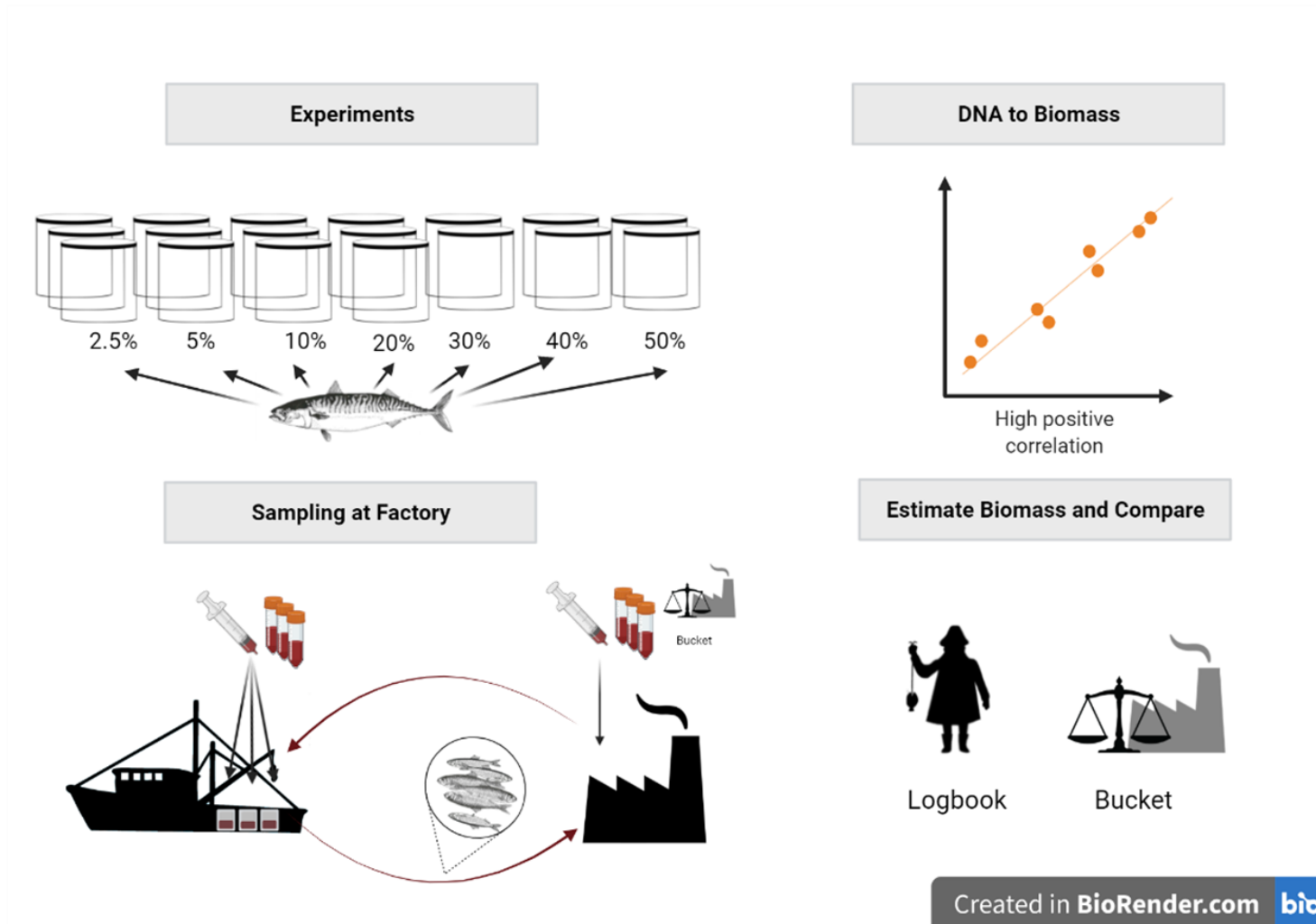


Relationship between weight and DNA fractions corrected for relative size of fish (herring larger = less DNA per weight)



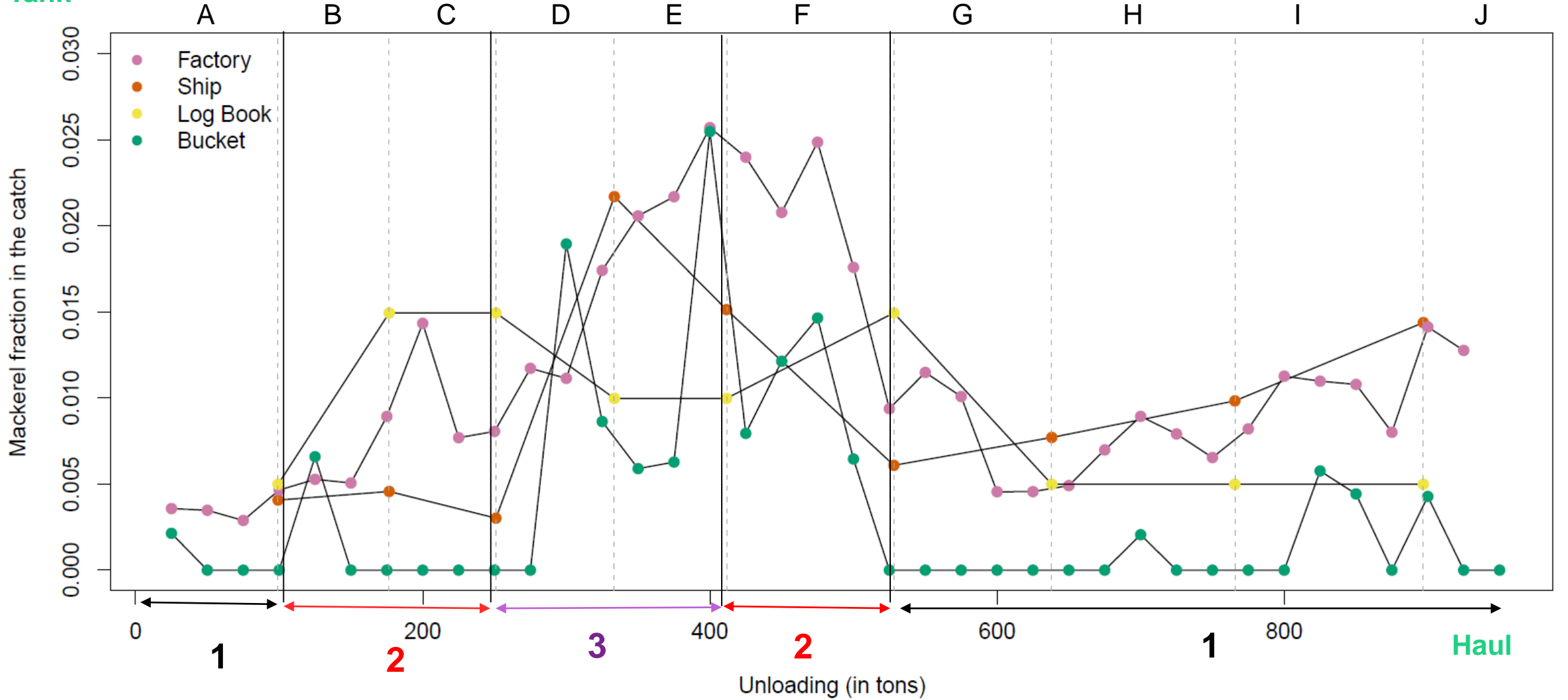
DNA-fraction measured (μ) = 0.4 (95% CI)
 Corrected weight fraction = 0.4 ± 0.05

Case 2 Bycatch of mackerel in herring fishery

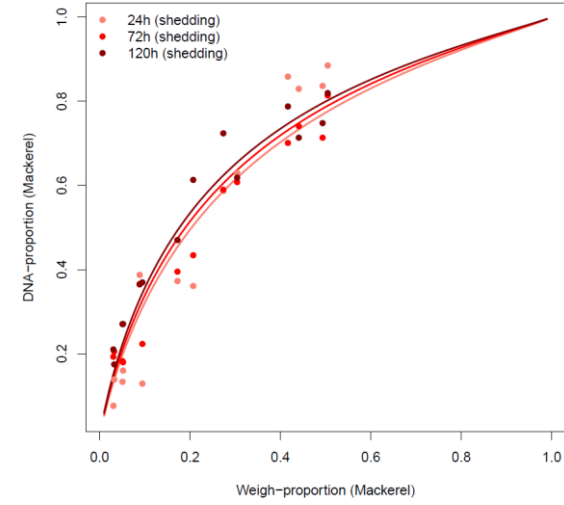
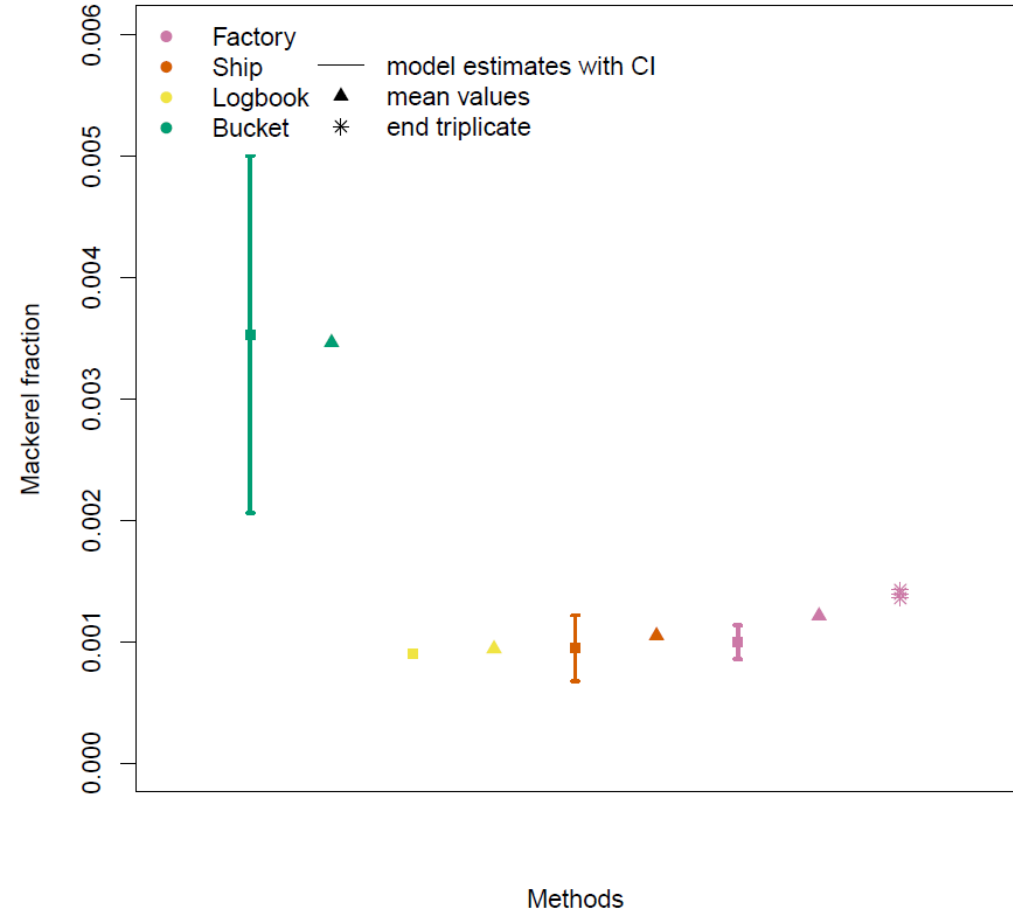


Landing – the unloading process

Tank



Mackerel fraction estimated with different methods



Conclusions and what's next

- DNA based species control from production water has high sensitivity and precision = large potential for practical implementation
 - Factors like species and relative fish size has to be (and can) be accounted for in relation to DNA proportion
 - The process of unloading the fish and reuse of discharge water in the factory is complex and has to be known for DNA testing
 - Sampling water from ship tanks before landing may be the best solution
-
- More industrial scale trials with known weight proportions have to be conducted
 - Robustness to factors like maturity, sea-area and time of year should be investigated
 - Practical implementation trials can be conducted now using visual and DNA based methods in parallel
 - The frequency for updating the relationship between DNA and weight should be assessed
 - DNA methods for more complex mixtures are under development



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Coffee Break

Sponsored by Unit
Pump

UNIT-PUMP



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Alexandre
Cornet

Ocean Policy Officer, WWF
EPO

**Why is Seafood Traceability Important
in an Era of Climate Change?**



Seafood Traceability:

Aligning RFMO catch documentation schemes
to combat IUU fishing

December 2021



EU IUU FISHING COALITION



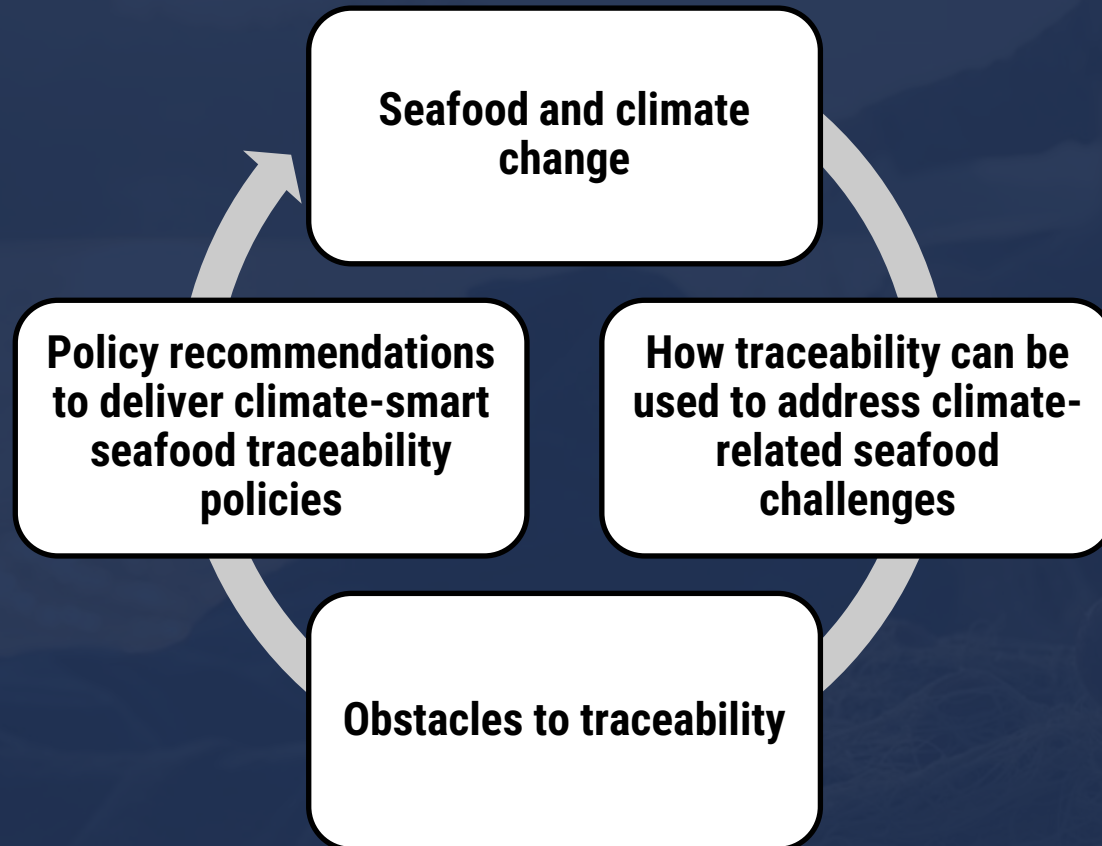
Why seafood traceability is important in an era of Climate change?

Alexandre Cornet

Ocean Policy Officer, WWF European Policy Office

June 2022

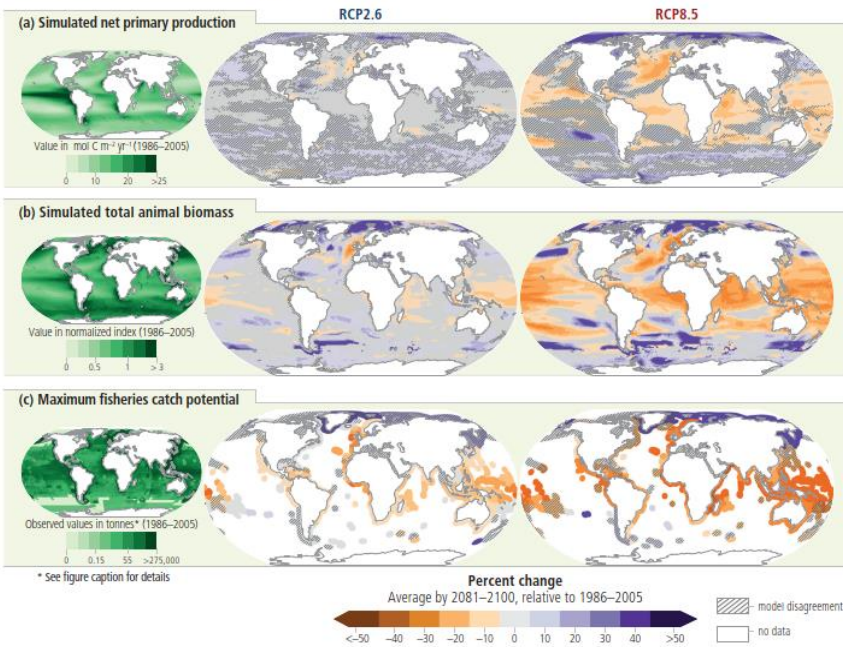
Contents



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Seafood and climate change: what science tells us (IPCC)

Projected changes, impacts and risks for ocean ecosystems as a result of climate change



Projected risks for marine ecosystems...

Decrease in :

- Global biomass of marine animal communities
- Production of marine animal communities

Shifts in species :

- Composition
- Spatial distribution
- Abundance

... Cascading effects ...

By 2100, a decrease of fisheries maximum catch potential of up to 25% relative to 1986–2005 under high emissions scenario

Climate change-induced increased exposure to pathogens, organic pollutants, mercury... of marine plants and animals

... On humans ...

Affecting income, livelihoods, and food security of marine resource-dependent communities

Challenging fisheries governance (sharing and regulating the use of fishing resources)

Leading to risks for seafood safety particularly for communities with high consumption of seafood and for economic sectors such as fisheries, aquaculture

Seafood and climate: From science to policy objectives

Set up and implement science-based, forward looking and responsive fisheries management strategies to rebuild stocks and ensure the resilience of marine ecosystems and resources

Reduce carbon emissions

Projected risks for marine ecosystems...	... Cascading effects On humans ...
<p>Decrease in :</p> <ul style="list-style-type: none"> • Global biomass of marine animal communities • Production of marine animal communities <p>Shifts in species :</p> <ul style="list-style-type: none"> • Composition • Spatial distribution • Abundance 	<p>By 2100, a decrease of fisheries maximum catch potential of up to 25% relative to 1986–2005 under high emissions scenario</p> <p>Climate change-induced increased exposure to pathogens, organic pollutants, mercury... of marine plants and animals</p>	<p>Affecting income, livelihoods, and food security of marine resource-dependent communities</p> <p>Challenging fisheries governance (sharing and regulating the use of fishing resources)</p> <p>Leading to risks for seafood safety particularly for communities with high consumption of seafood and for economic sectors such as fisheries, aquaculture</p>

Safeguard the livelihoods of fisheries dependent communities (food security, incomes, ...)
 playing field and a fair access to fisheries resources in the face of increasing competition for resources and challenges to global governance
 Ensure coordination and complementarity between national and transboundary regional policies

Mitigation
 Adaptation

Address seafood safety risks

A fisherman in a boat at sunset, handling fishing nets. The sun is low on the horizon, creating a golden glow over the water. The fisherman is wearing a grey jacket and yellow pants. In the foreground, there is a large pile of tangled fishing nets with a red buoy. The background shows a calm sea and distant hills.

How can seafood traceability contribute to addressing climate change related fisheries and seafood challenges ?

© Darko Mihalic / WWF Mediterranean / FishMPABlue

Traceability's role in the face of climate change

Environmental objectives	Traceability's role
Set up and implement responsive, science-based, and forward looking fisheries management strategies to rebuild stocks and ensure the resilience of marine ecosystems and resources	<p>Provides some of the necessary data to sustainable fisheries management strategies</p> <p>Helps combat illegal, unreported and unregulated (IUU) fishing, which derails fisheries management strategies and devastate marine ecosystems</p>
Reduce carbon emissions	Allows to evaluate the full life cycle carbon footprint of seafood products

Traceability's role in the face of climate change

Governance and socio-economic objectives	Traceability's role
Safeguard the livelihoods of fisheries dependent communities (food security, employment...)	Provides the necessary data for sustainable fisheries : food security and incomes Helps combat IUU fishing: food security
Guarantee a level playing field for fisheries operators in the face of increasing competition for resources and challenges to global fisheries governance	Helps combat IUU fishing: fairness of marine resources uses and fairness of market competition
Address seafood safety risks	Allows to follow the movement of a food through specified stage(s) of production, processing and distribution Ensures sanitary quality during fishing operations, onboard processing and the subsequent stages of packaging, transport and storage before reaching the end consumer
Ensure coordination and complementarity between national and transboundary regional policies	Allows exchange of data between fisheries bodies and entities for integrated policies and measures

A bit of prospective: Traceability and ocean science

- Remember! Need to ensure responsive, science-based, and forward looking fisheries and ocean policies
- To better understand how climate change affects the Ocean and how to improve marine resources management, ongoing development of scientific tools and digital models :
 - In Europe, Mercator Ocean, which provides an ocean simulation system (ocean digital twin) supporting the conservation and the sustainable use of the oceans, seas and marine resources
- Seafood traceability is one of the most effective ways to generate data on ocean uses and the interactions between humans and marine ecosystems
- Better traceability and the associated data from the seafood industry could feed into a participatory and inclusive ocean science, which could then be effectively leveraged to better inform fisheries management strategies

A photograph of a fisherman in a boat at sunset. The fisherman is wearing a grey jacket and yellow pants, and is focused on handling fishing nets. The sun is low on the horizon, creating a bright reflection on the water. In the foreground, a large pile of fishing nets is visible, with a red buoy attached to one of the ropes. The background shows a calm sea and distant hills under a hazy sky.

So, what are the obstacles that still hinder traceability's effectiveness?

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Key traceability shortcomings

Ahead of arrival on the EU market

- Current EU system of import controls characterized by **paper-based**, often **incompatible** Member State schemes **without centralized data collection or dissemination**
- Member States are permitted to develop their own risk assessment, lot inspection and rejection procedures in cases of non-conformity with EU regulations for imported seafood > **significant discrepancies leading to distortion of import trade flows** towards those Member States with seemingly the weakest rules or capacities
- **Failure to implement obligations or enforce often effective and dissuasive sanctions** with regard to fisheries control
- Imported products that have been **further or re-processed** present even **greater challenges**

Key traceability shortcomings

Within the EU market

- **Limited cooperation and potential incompatibilities between traceability systems in fisheries control and public health** may be impacting the efficiency and effectiveness of both systems
- Terminology used in fisheries and food legislation may have **different meanings and/or definitions** between countries
- **Lack of effective control** in some Member States: with free movement of goods within the EU market, weakening of the whole EU fisheries control system

Key traceability shortcomings

AT RFMOs level

- **Proliferation of CDS schemes:** complexity, administrative burden, economic cost
- **Discrepancies** leading to risks for inter-operability and possible gaps
- May lead to **missing important key data elements**
- **Limited geographic scope** while species can extend beyond RFMOs' areas

Table 4 | CDS key data element requirements

Recommended or applied in practice Optional or needs to be improved Not recommended or required

	Key Data Elements (KDEs)	Stakeholder recommendations for CDS			Current RFMO multilateral CDS practices				Current unilateral CDS practices		Current regional CDS practices
		EU IUU fishing Coalition	FAO Voluntary Guidelines	GDST 1.0 Standard	ICCAT	CCSBT	CCAMLR	IOTC ⁱ	European Union	United States of America	Association of Southeast Asian Nations
WHO	Vessel name	Green	See article 1(b)	Green	Green	Green	Green	Green	Green	Green	Green
	UVI (IMO number)	Green	See article 1(b)	Green	Red	Red	Yellow	Red	Yellow	Yellow	Only required for carrier vessels, not for fishing vessels
	Vessel flag	Green	See article 1(b)	Green	Green	Green	Green	Green	Green	Green	Red
	International Radio Call Sign (IRCS)	Green	See article 1(b)	Yellow	Red	Red	Green	Red	Green	Red	Red
	Information of exporter/re-exporter	Green	See article 1(f)	Red	Yellow	Green	Green	Green	Green	Green	Red
	Identity of import company	Green	See article 1(g)	Red	Green	Green	Green	Green	Green	Green	Red
WHAT	Product type (use of FAO Alpha code)	Green	See article 1(d)	Green	Green	Green	Red	Green	Green	Green	Red
	Species name embedded in the FAO/ASFIS 3-Alpha Code	Green	See article 1(b)	Green	Green	Green	Green	Green	Green	Green	Green
	Estimated live weight (kg)	Green	Red	Not specified between live or processed	Red	Red	Red	Yellow	Green	Red	Red
	Processed weight (kg)	Green	See article 1(d)	Green	Yellow	Yellow	Green	Red	Green	Green	Green
	Declaration and authorisation of transshipment at sea	Green	See article 1(c)	Green	Green	Yellow	Green	Red	Green	Yellow	Green
WHEN	Event date (Harvesting operation)	Green	See article 1(b) ⁱⁱ	Green	Green	Green	Green	Green	Green	Green	Green
WHERE	Catch area	Green	See article 1(b)	Green	Red	Red	Green	Red	Red	Green	Green
	Authorisation to fish	Green	See article 1(e) ⁱⁱⁱ	Green	Red	Red	Green	Green	Yellow	Red	Red
	Port of landing	Green	See article 1(b)	Green	Red	Red	Green	Red	Green	Green	Red
	Processing location	Green	Red	Red	Red	Red	Red	Green	Green	Red	Red
HOW	Fishing methods	Green	Red	Green	Green	Green	Red	Green	Green	Red	Red

A fisherman in a boat at sunset, handling fishing nets with a red buoy in the foreground. The scene is captured in a cinematic style with warm, golden light reflecting off the water. The fisherman is wearing a grey jacket and yellow pants, and is focused on his work. The foreground shows a large pile of tangled fishing nets with a prominent red buoy. The background features a calm sea and distant land under a soft, hazy sky.

What can be done to support traceability and ensure climate-smart seafood policies?

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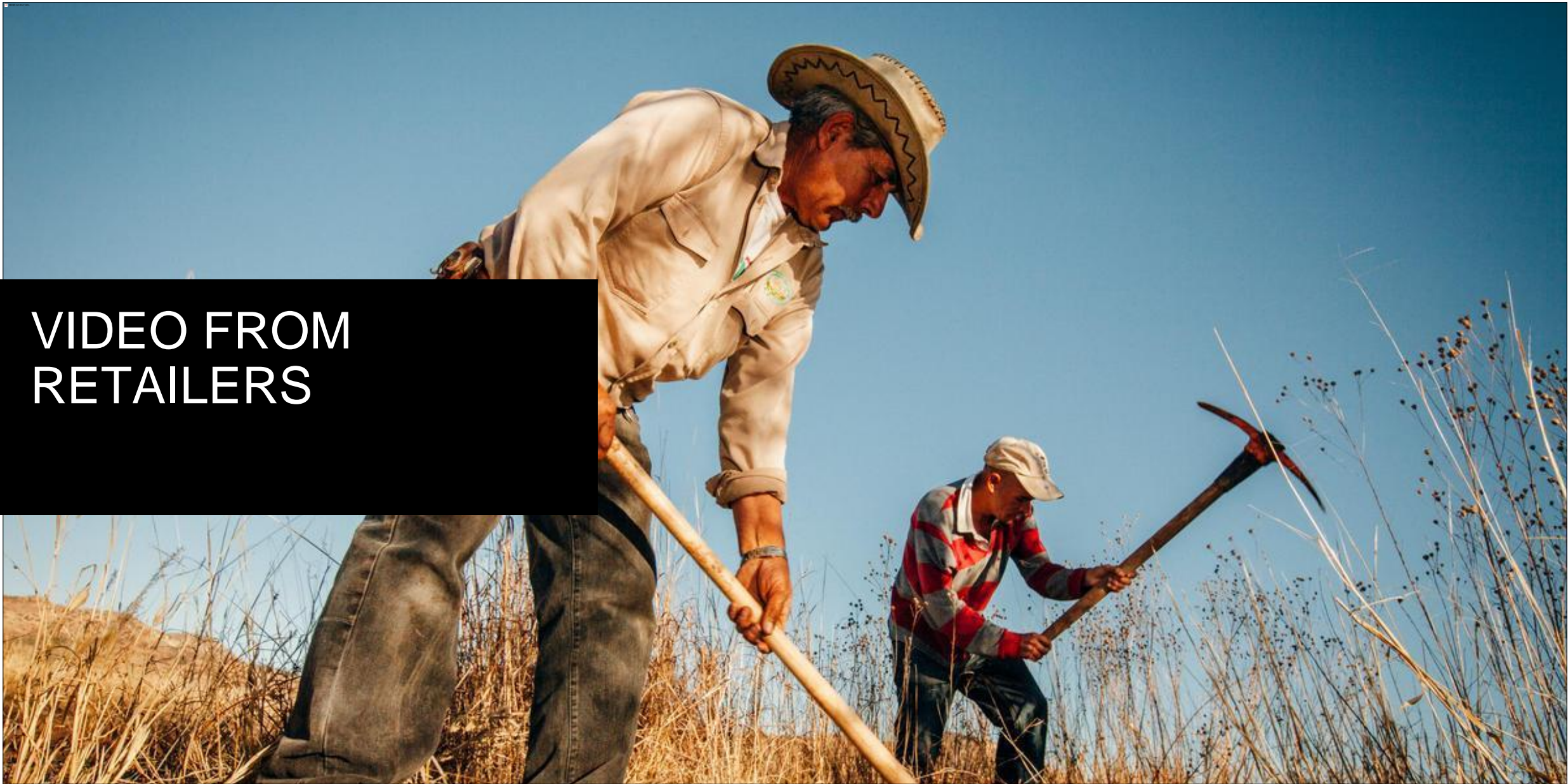
Improvement of seafood data collection scope

- **In RFMOs:**
 - Expand CDS coverage to additional species and geographical areas in RFMOs while ensuring alignment
 - Integrate KDEs requirements
 - Create systems that are interoperable
 - Begin to develop a generically-aligned model of CDS
 - Adopt measures to pre-emptively address the consequences of CC on the stocks (ex: IOTC)
- **At EU level :** use the revision of the fisheries control system to expand the information required by the EU IUU Catch Certificate, especially: IMO number, fishing gear, increased data on catch area and date

Improvement of seafood data systems and uses

- **Digitisation**
 - E-CDS in RFMOs
 - Digital EU IUU Catch Certificate alongside use the EU-wide centralised electronic database for catch certificates accompanying imported seafood (CATCH)
- **Data transparency**
 - Particularly for processed, mixed and transported products
 - For retailers, ensure that suppliers provide all information behind their seafood products, including, at a minimum, the type of gear used to catch the fish, the area in which it was caught and the scientific name of the species
 - Demand from consumers for transparency and food providence to make better-informed purchasing decisions

VIDEO FROM
RETAILERS



Thank you!

Alexandre Cornet, Ocean Policy Officer, WWF EPO

acornet@wwf.eu

Seafood Traceability:

Aligning RFMO catch documentation schemes
to combat IUU fishing

December 2021



EU IUU FISHING COALITION



OCEANA

The Nature Conservancy

PEW



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**Camiel
Derichs**

Regional Director in Europe,
Marine Stewardship Council

**The Role of MSC Now and in the
Future**





Measuring and demonstrating sustainability of fisheries past-present-future

Camiel Derichs, Program Development Director (MSC)

1. What are the perspectives of MSC going forward?
2. How will the standard relate to environmental footprints of fisheries?
3. Are trimmings/byproducts sustainable by default and how should they be certified?

SEAFOOD

179mt

global fish production

28%

of wild-capture landings is small pelagics

2.4 billion

People depend on seafood as nr1 protein

54%

from wild-capture fisheries

19%

of wild capture production is 'reduced'

Ca. 60 mil

Directly depend on fishing/Aq for work/income

- Overfishing, IUU and ecosystem impacts.
- Climate change
- Surge in demand for fish

**The need for sustainable fishing
has never been greater.**



Low confidence from civil society in the seafood industry



Fishing the Feed

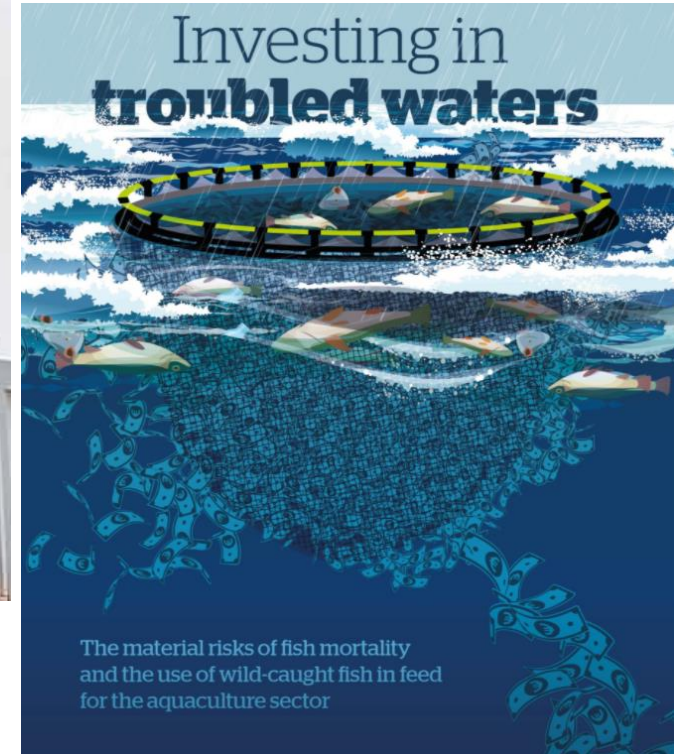
Farmed seafood is seen as a solution to the chronic overfishing of our oceans. But under the surface lies one of the most unsustainable industrial practices on the planet.

FIND OUT MORE

Changing Markets Foundation
campaign 2019-present



Greenpeace actions 2020

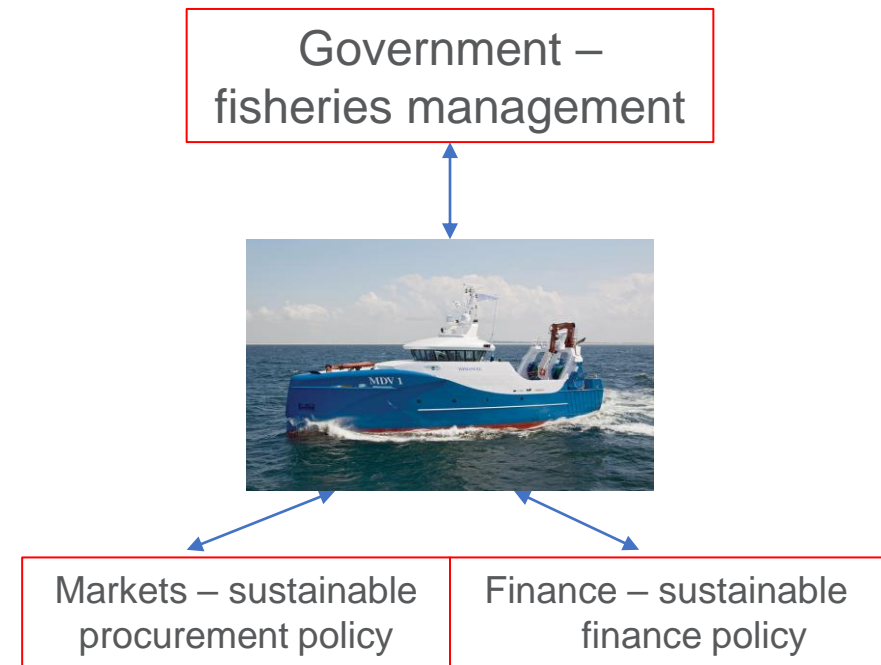


Planet tracker report 2021

TO THE IS HOPE!



- Fish stocks and marine ecosystems are renewable resources, *often resilient and can recover if well managed!*
- Critical is that resource managers (governments) do their job.
-and that those fishing and processing seafood get the right incentives; role for market actors and financial actors.
- Fundamental role for credible standards as a tool to document sustainable ESG performance.

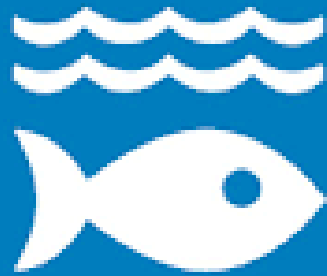


MSC RECOGNISED TO OFFER A KEY TOOL TO GOVERNMENTS AND COMPANIES TO DEMONSTRATE COMPLIANCE WITH THE SDG TARGETS OF SDG 14

12 RESPONSIBLE
CONSUMPTION
AND PRODUCTION



14 LIFE
BELOW WATER



- No Illegal, Unreported and Unregulated (IUU)
- No Overfishing
- No destructive fisheries practices
- Good management
- Traceable to origin

MSC Fisheries Standard

World leading standard, defining sustainability for wild-capture fisheries

MSC Chain of Custody Standard

Leading international standard for seafood assurance

ASC/MSC Seaweed Standard

Standard for environmentally sustainable and socially responsible seaweed/microalgae production

The MSC Fisheries Standard



1

The sustainability of stock

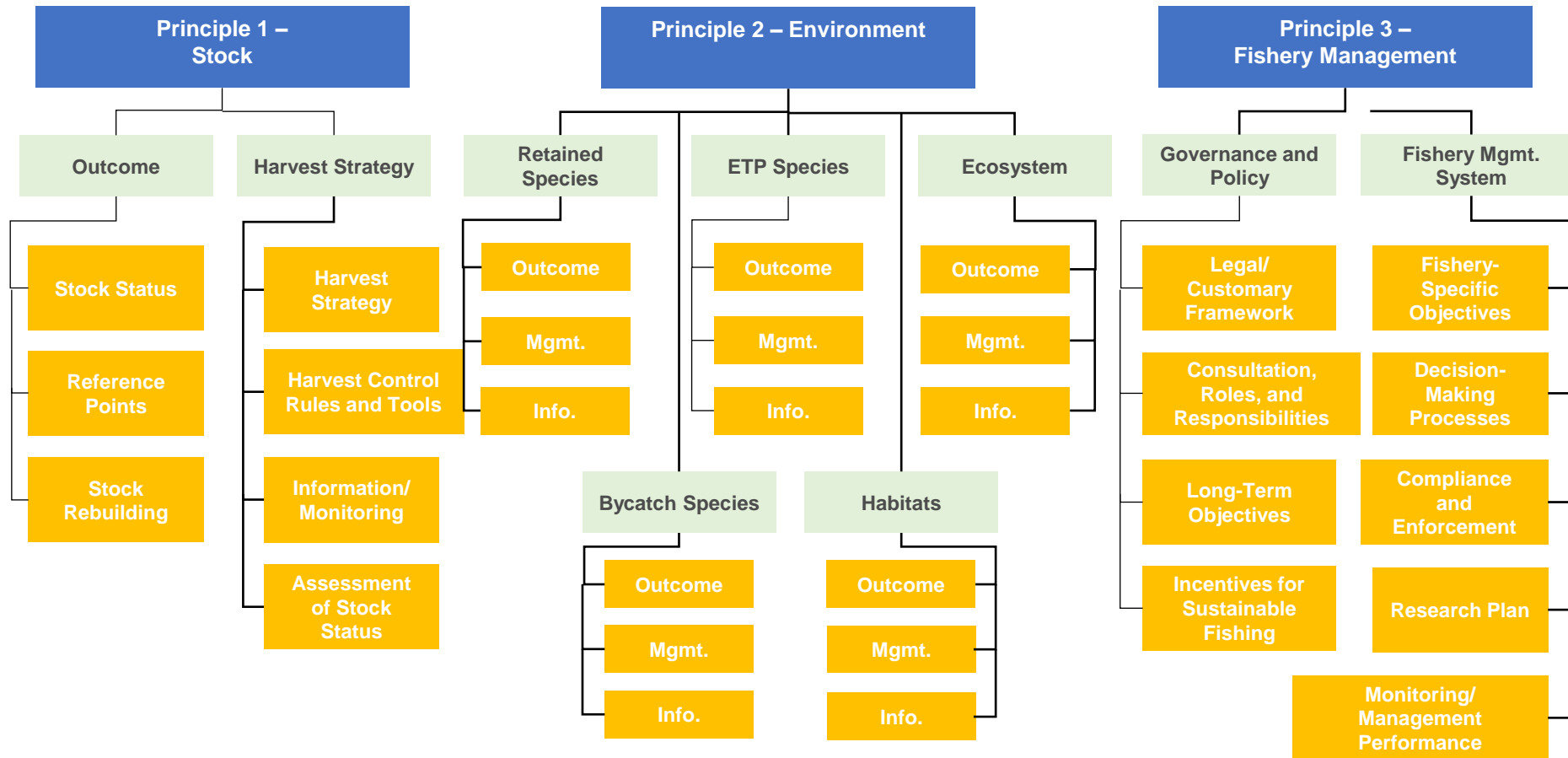
2

Ecosystem impact

3

Effective management





Average ≥80

Each PI ≥60

A TRANSPARENT AND ROBUST ASSURANCE SYSTEM

- 3rd party assurance, separation between standard setting and verification
- The program covers vessels – processors – feed producers – oil refineries – traders – brands and retailers. I.e. From boat to consumer ready tamperproof product



SWOT

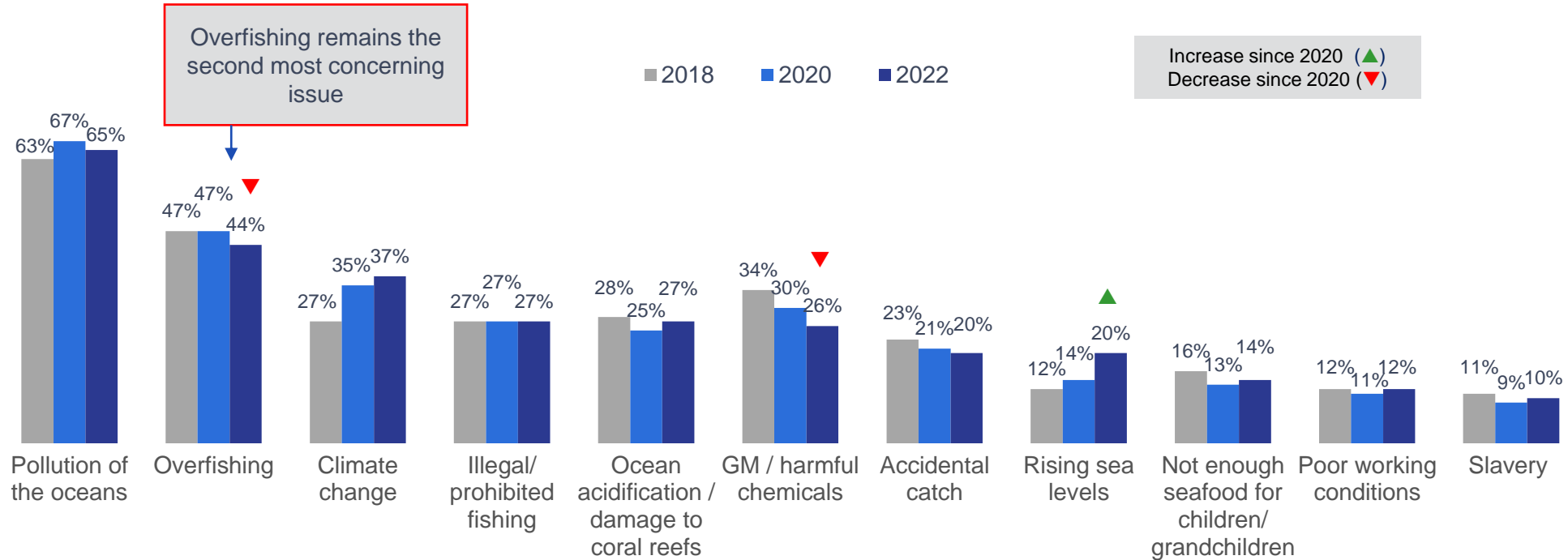
- Ca. 86% of global fisheries not certified, most located in the DW.
- Geopolitical context turned for the worse - challenge
- Ask on MSC growing, scope, regulatory approaches – opportunities
- Need to drive efficiency in ESG auditing is high whilst strengthening assurance model is expected too – opportunities
- Market/Consumer expectations



CONSUMER PERCEPTIONS



#SFF2022



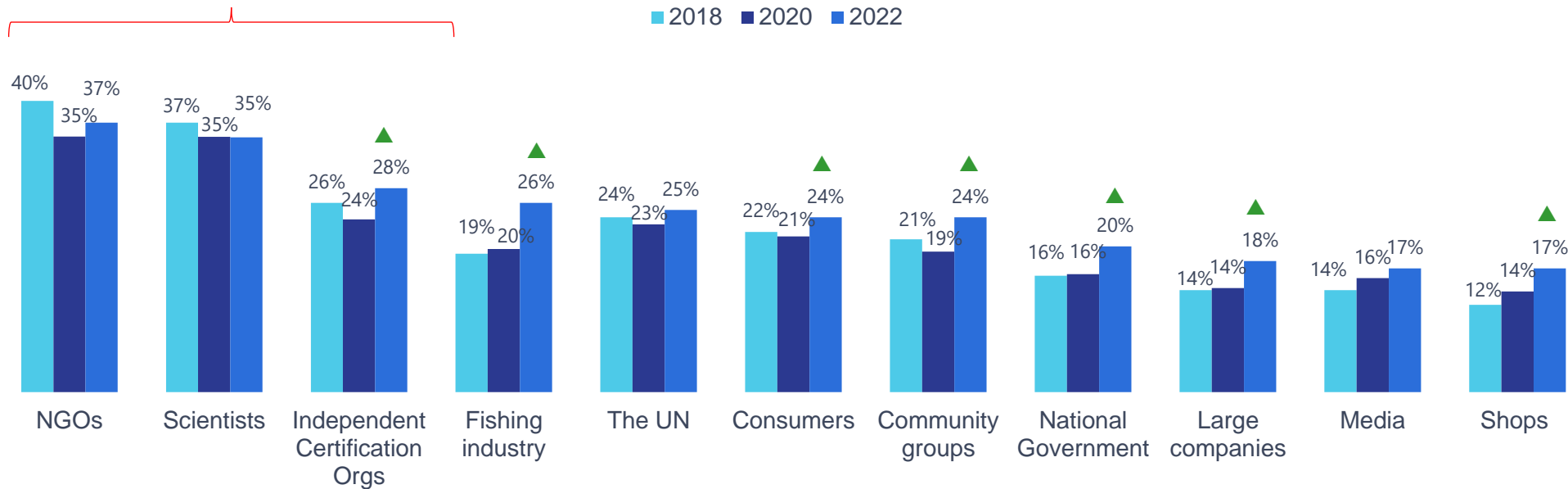
Base: Seafood consumers, global, n=20,127

Q11.2: There are many different potential threats to the world's oceans, the wildlife living there, and the people who work there. Which of these potential issues worries you the most?

Actors perceived to be contributing “very well” to protecting the ocean environment, top 2 (6+7 on a 7-pt scale)

MSC is a science based conservation NGO, offering an independent certification program

Increase since 2020 (▲)
Decrease since 2020 (▼)



Base: Seafood consumers, global, n=20,127

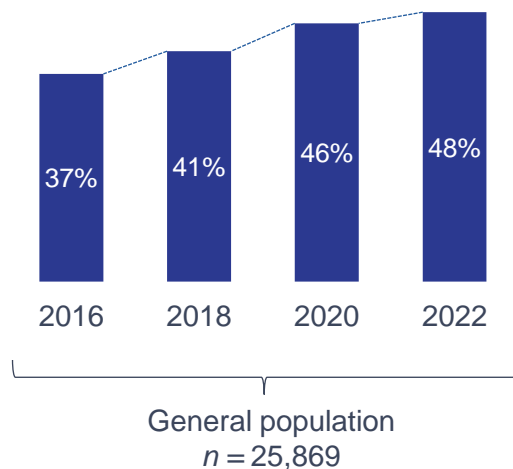
Q3.1: How well do you think the following groups or institutions are contributing to protecting the world’s ocean environment?

POSITIVE T



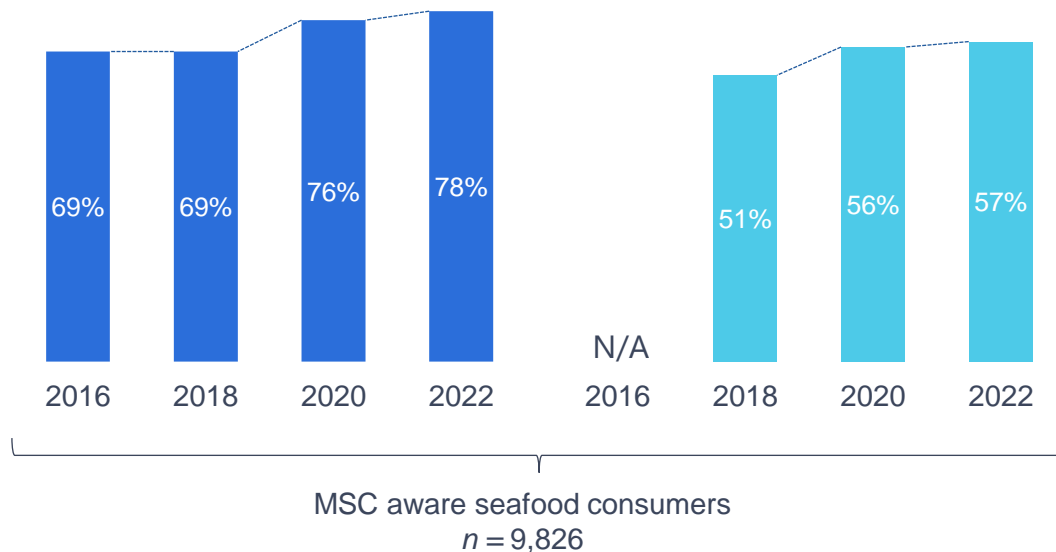
Awareness

“Seen Often” +
“Seen Occasionally”



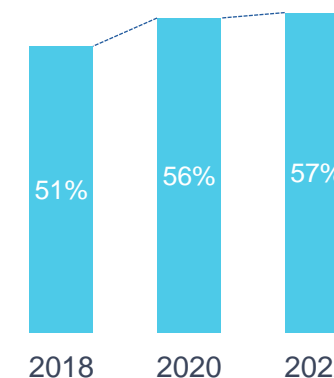
Trust

5+6+7 on 7-pt scale

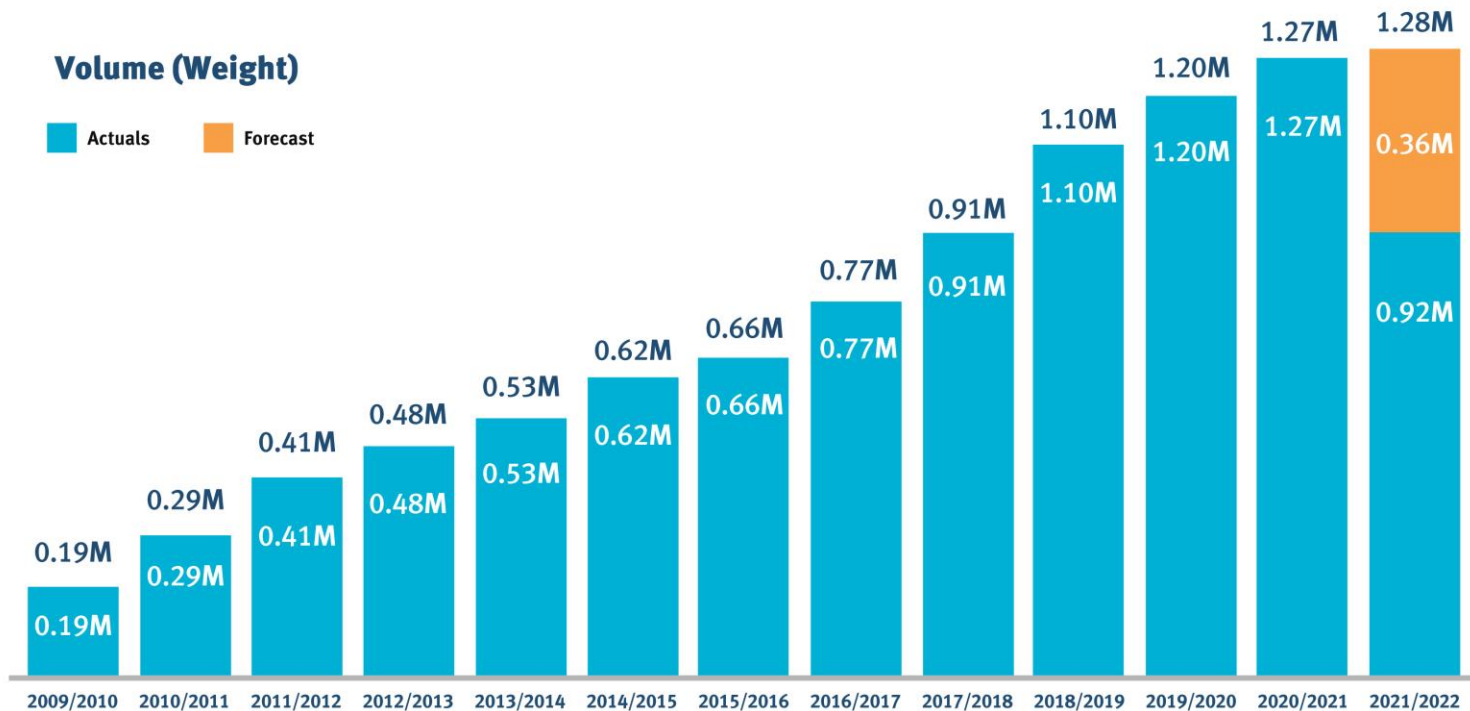


Likelihood to Recommend

“Very likely” +
“Likely”



NUMBER OF PRODUCTS WITH THE MSC LABEL



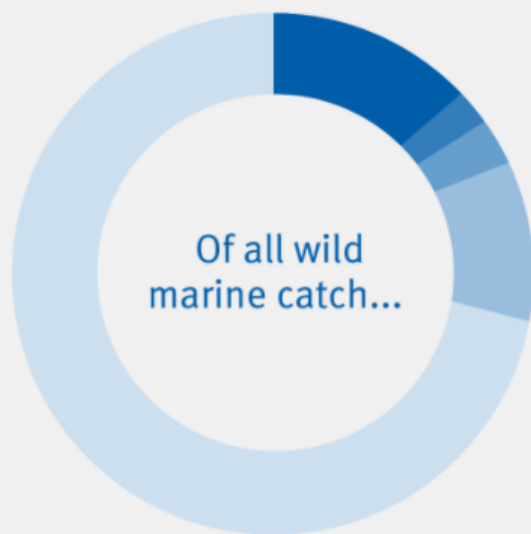
20,000+ products
with the blue MSC label

60+ nations
where consumers can buy MSC
labelled products

1.28M tonnes
2021-2022 volume of sales forecast

In 2021:

MSC certified fisheries



- 14% MSC certified
- 2% In-assessment for MSC certification
- 3% MSC certified but suspended
- 10% Working towards MSC certification

Number of fisheries engaged in the MSC program

2020-21 **516**
2019-20 **498**

+3.5%

Fisheries made >2000 improvements!



THANK YOU

Camiel.Derichs@msc.org

A

HOME



1. What are the perspectives of MSC going forward?
 - Sustainability more important than ever.
 - Credible verification of sustainable ESG performance more important.
 - Expect more regulation, higher standards, and higher expectations on companies.
 - MSC (wild) ASC (AQ) offer credible efficient global solutions to the seafood industry.

2. How will the standard relate to environmental footprints of fisheries?
 - Core components of environmental sustainability in fisheries are clear. Stock levels, minimize impacts on ecosystem, more robust MCS systems and management effectiveness.
 - Additional components grow in relevance: social (in progress), carbon emissions (TBD).

3. Are trimmings/byproducts sustainable by default and how should they be certified?
 - No they are not by default sustainable. Trimmings from an overfished stock are not sustainable. They should not be certified if they are not sustainable.

MSC FRAMEWORK FOR TRANSITIONING TO SUSTAINABILITY



Gap analysis

- MSC pre-assessment
- Standardized sustainability indicators

Planning

- Action plan
- Milestones and timelines
- Benchmarking and tracking tools

Improvement

- Capacity building
- Research and management improvement
- Funding (Global Fisheries Sustainability Fund)

Certification

- MSC assessment
- Risk Based Framework for data-limited fisheries
- Market support and partnerships

Maintenance

- Potential for new markets
- Surveillance
- Continuous improvement

Pathways projects

Verified improvement/responsible fishing

MSC certified sustainable

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Libby
Woodhatch

Executive Chairman, Marin
Trust

Marin Trust – What it Can that Others
Cannot



*MarinTrust - The Certification
Programme for Marine Ingredients*

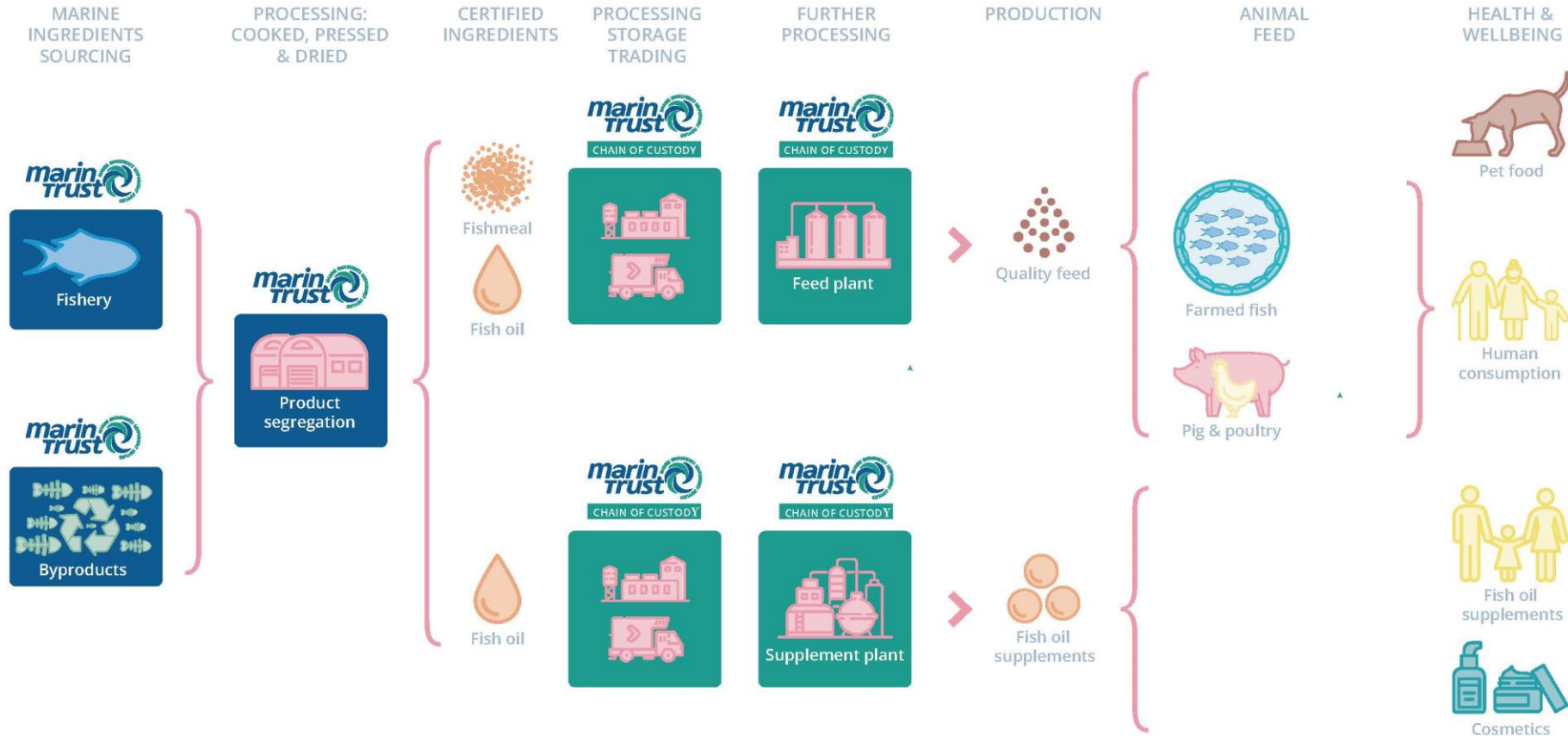


EFFOP, 2 June 2022

Value Chain



INDEPENDENT STANDARDS VALUE CHAIN



TRACEABILITY TO SOURCE; RESPONSIBLY SOURCED & PRODUCED

Brief history of the programme



2009



2015

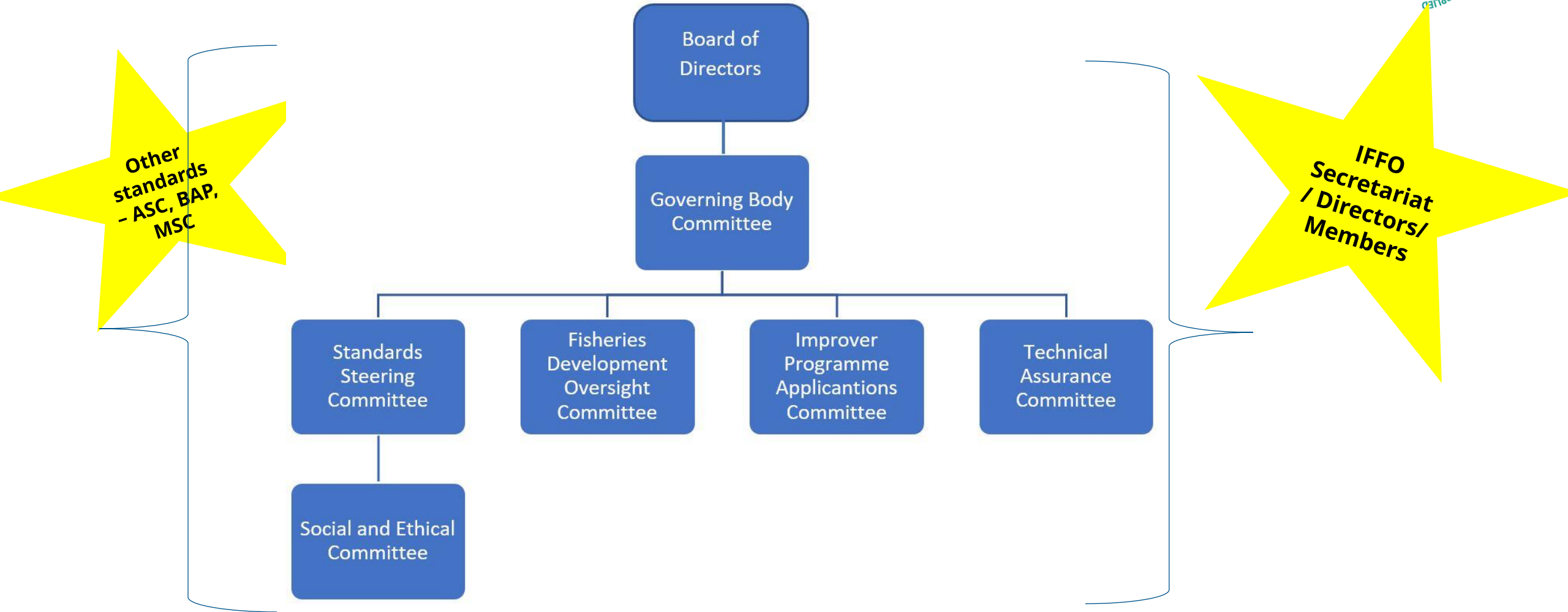


2020

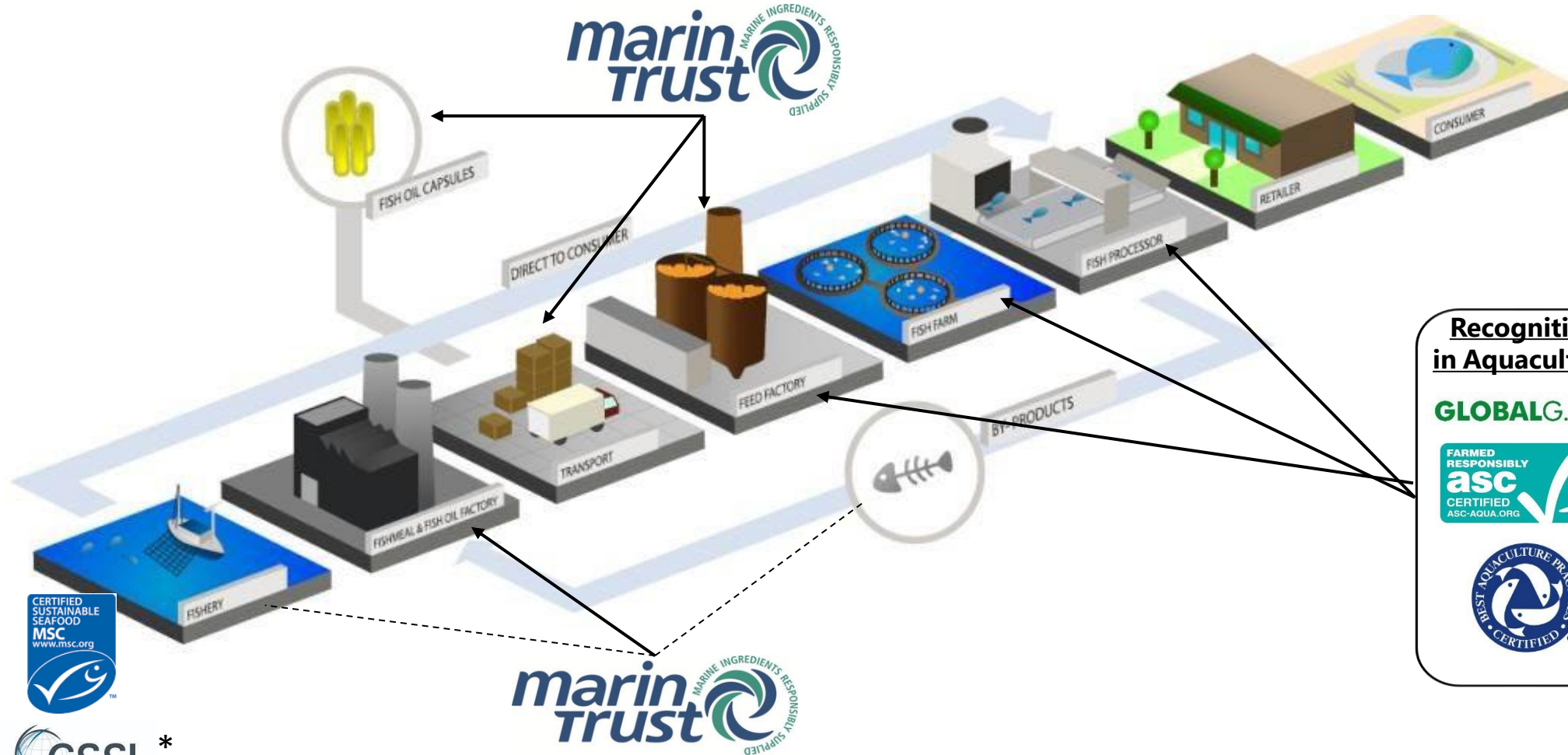


- To protect marine ingredient producers against being accused of bad practices
- To champion best practices of marine ingredient production
- To prove to stakeholders (value chain, NGOs, journalists) that if you are MarinTrust (IFFO RS) certified you are NOT the same as those accused of bad practice

Governance



Complementing one another to provide end-to-end assurance



Recognition in Aquaculture

GLOBAL G.A.P.

FARMED RESPONSIBLY
asc
CERTIFIED
ASC-AQUA.ORG

BEST AQUACULTURE PRACTICES
CERTIFIED



* In progress

Three key pillars for Responsible Supply (it's not *all* about the fisheries and IUU)



Responsible
sourcing

Responsible
production


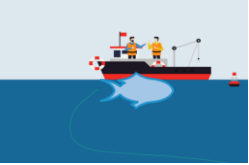











Responsible
Traceability

Recognition of certified material



Value Chain Link	MSC	MarinTrust
Fishery	Main standard	Main standard
MI Producer	MSC CoC	Main standard
Further processing	MSC CoC	MarinTrust CoC
Feed Producer	Feed Standard: ASC Global GAP BAP	Feed Standard ASC Global GAP BAP

Fishery Improvement Projects (FIPs) recognition

BENCHMARK PROGRAMME FOR THE FIP	FISHERY	PROCESSING OF RAW MATERIALS AT THE FISHMEAL / FISH OIL PLANT	FURTHER PROCESSING TRADING	PROCESSING FOR USAGE IN FEEDS
	 <p>Accepted into the MarinTrust Improver Programme</p>	 <p>  RECOGNISED as FIP material following MarinTrust audit Can make the claim to be Improver Programme accepted </p>	 <p>  RECOGNISED as FIP material following MarinTrust audit Can make the claim to be Improver Programme accepted </p>	 <p>  RECOGNISED as Improver Programme material following Chain of Custody audit at the trading stage </p>
 <p>Uses MSC as a benchmark</p> 	<p>Accepted into Fishery Progress</p>	 <p>NOT LISTED as sourced in a FIP</p>	 <p>Requires “due diligence” to ensure traceability</p>	 <p>Requires “due diligence” to ensure traceability</p>

Recognition by other Standards

Best Aquaculture Practices (BAP):

- 50% (towards 75% by 2025) of marine ingredients shall come from **MSC/MarinTrust** or **MarinTrust Improver Programme (IP), SFP, WWF and Fishery Progress**. Ref, Feed Mill standard Issue 3.0, page 20



Global GAP:

- 60% of marine ingredients shall come **from MSC/MarinTrust** and/or **MarinTrust IP, SFP** or **WWF**

GLOBALG.A.P.

Aquaculture Stewardship Council (ASC):

- Levels 1 to 3 (**IP, MarinTrust**)
- Due Diligence Process
- Legal – equivalent
- Social – cover some clauses, other to consider for V3
- Environmental - cover some clauses, other to consider for V3
- Level 4?



Marine Stewardship Council

Current MoU with MSC being updated to increase mutual recognition & identify areas for collaborative working



Why a standard?



- Voluntary certification standards exist in all sectors of the economy
 - The MarinTrust Programme is **specific to marine ingredient producers** and further processing and was established by the marine ingredient sector via IFFO
- Market driven approach, complements regulatory frameworks to provide assurances to supply chains and ultimately the consumer
 - Demonstrates compliance
 - Verifies commitment to responsible sourcing, quality and safety
 - Reduces risk and increases credibility
 - Safeguards reputation
- Recognised in the sourcing policies of feed companies, aquaculture companies, petfood manufacturers, retailers etc
 - Easier route to due diligence, especially as underpinned by assurance mechanisms
- Mutual recognition with other standards
- MarinTrust standards drive continual improvement beyond certification – for example the Improver Programme

Protecting the reputation of MI and the MI sector in Europe and beyond



PERSPEKTIV

Vi spiser den fattige verdens fisk

Opdræt af fisk er ifølge FN en af verdens hurtigst voksende industrier og nødvendigt, hvis vi skal brødføde verdens befolkning i fremtiden. Men verdens fattigste risikerer at sulte, hvis de rige lande i stigende grad skal spise opdrættet laks og ørred, lyder kritikken.

bbc.com

In summary, why MarinTrust?



- It is a standard programme envisioned, conceived and established by the Marine Ingredient sector through IFFO
 - This legacy remains core to MarinTrust today through the governance structure and engagement with certificate holders
- It is the only standard programme that focuses on marine ingredients only – and all aspects from supply, to manufacturing and traceability
- It is recognised by other relevant standards, including the ASC and MSC, filling a gap in the value chain, which means end-to-end assurance
 - But not everything is ASC, we satisfy other standards too
- It is embedded within the sourcing policies of feed producers, pet food producers and some retailers, with growing interest from the nutraceutical industry
- It is the only programme that can bring marine ingredients from recognised FIPs to feed producers, satisfying the demand of aquaculture standards and sourcing policies
- The standard programme can be used as a platform to inform the value chain and other stakeholders about best practice in the marine ingredient sector and enhance its reputation



Thank you.

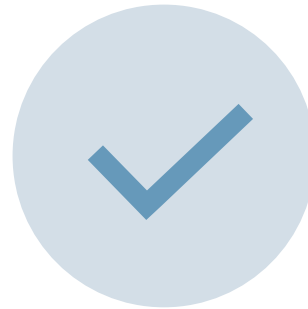
Any questions?



By-product assessment



MARKET PRESSURE FOR
RAW MATERIAL DUE
DILIGENCE



IUU RISK ASSESSMENT
WORK



BY-PRODUCT
WORKSHOPS

Results from workshop and pilots

Certificate holder comments;

Simplification through risk-based approach welcomed

Legality of the facilities supplying the by-products

Mixed by-products



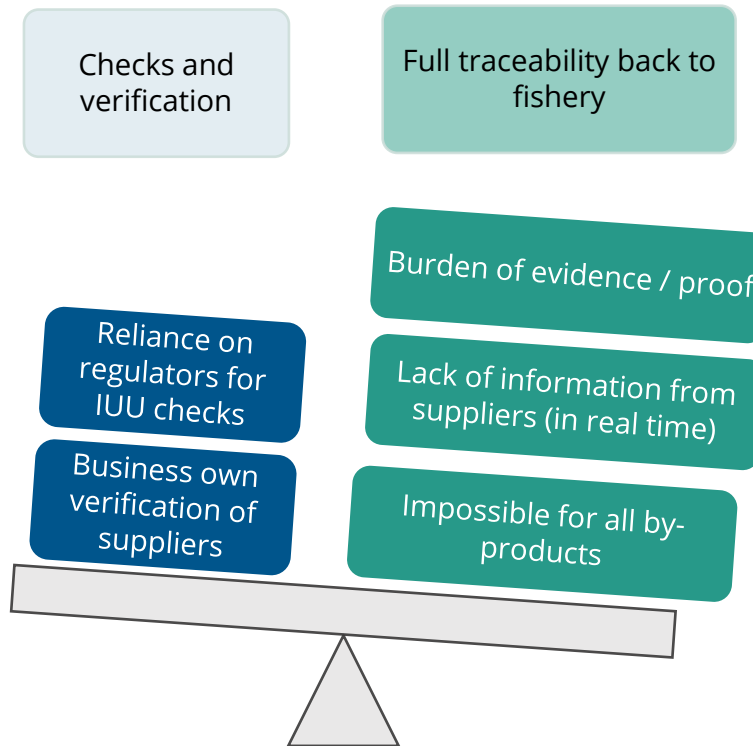
By-product balancing act



Uses same principle as for wholefish and other materials suppliers

The sourcing of fish is managed by the supplier

Marine ingredients producer verifies the supplier



The fish from which by-products are sourced must be verified by the marine ingredients producer



By-product Assessment Development



IFFO RS V1.6		MarinTrust V2.0		MarinTrust V3.0	
A	Management framework and procedure	NA	Not assessed	A	IUU risk assessment
B	Stock assessment procedure and management advice	C	<p>C1.1 Fishery removals considered or negligible</p> <p>C1.2 Biomass above MSY or removals negligible</p>	B	Management measures review
C	Stock status	D	PSA	C	IUCN Red List, PSA

A. IUU Risk Calculator



IUU risk score	Low risk score =1	Medium risk score =2	High risk score =3
4.2.3.1 What is the average overall <u>flag State</u> risk score, derived from the latest IUU Fishing Index?	<1.5	>1.49 and <2.2	>2.19
4.2.4.1 What is the average overall <u>port State</u> risk score derived from the latest IUU Fishing Index?	<1.6	>1.59 and <2.49	>2.5
4.2.5.2 What is the average overall <u>country</u> IUU risk score of all covered supply chain countries derived from the latest IUU Fishing Index?	<2	>1.99 and <2.49	>2.5
Score (circle as appropriate)	2-3-4-5-FAIL		

Alternative list of indicators



	Indicator
1	Fishery governance and stock health – MSC cert or Fish Source profile
2	Flag of fleet – whether flag of convenience (FOC)
3	Coastal state is contracting party or cooperating non-contracting party to all relevant RFMOs
4	Party to the Port State Measures Agreement
5	Carded' under the EU IUU Regulation
6	Identified by the National Oceanic and Atmospheric Administration for IUU fishing
7	Mandatory vessel tracking for commercial seagoing fleet
8	Accepted FAO Compliance Agreement
9	Ratification/accession of UNCLOS Convention
10	Ratification of UN Fish Stocks Agreement
11	Have a national plan of action to prevent, deter and eliminate IUU (NPOA-IUU) fishing

B. Management Measure Review



Propose to replace stock specific reference point check with country level management measure review, based on questions including:

- Is there a TAC? Does the fishery often exceed these limits?
- Spatial/ temporal measures in place
- Traceability system (e.g. food safety)
- National action plan for Endangered Threatened & Protected Species (ETP)
- The precautionary approach is applied in the formulation of management plans.

FDOC proposals to the GBC



- In May the GBC agreed to pilot the proposed risk-based approach to replace the V2 Stock specific approach, with the following assessment structure:
 - A. IUU risk assessment (based on the IUU Risk Register plus one other)
 - B. Management review
 - C. IUCN Red List
 - D. PSA

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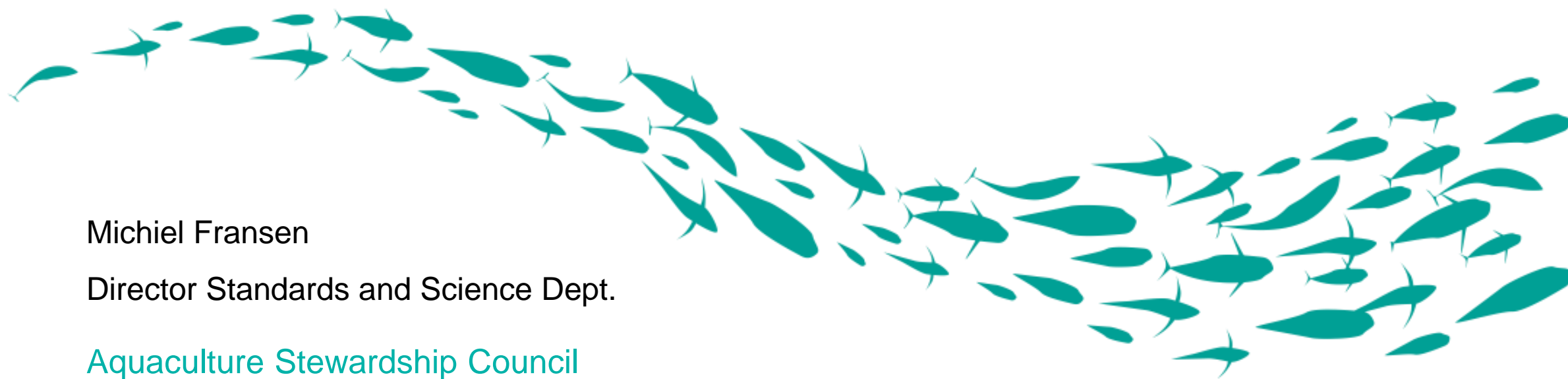
Michiel
Fransen

Head of Standards and
Science, ASC

**The ASC Feed Standard and how it
Impacts Fishmeal Production**



ASC Feed Standard



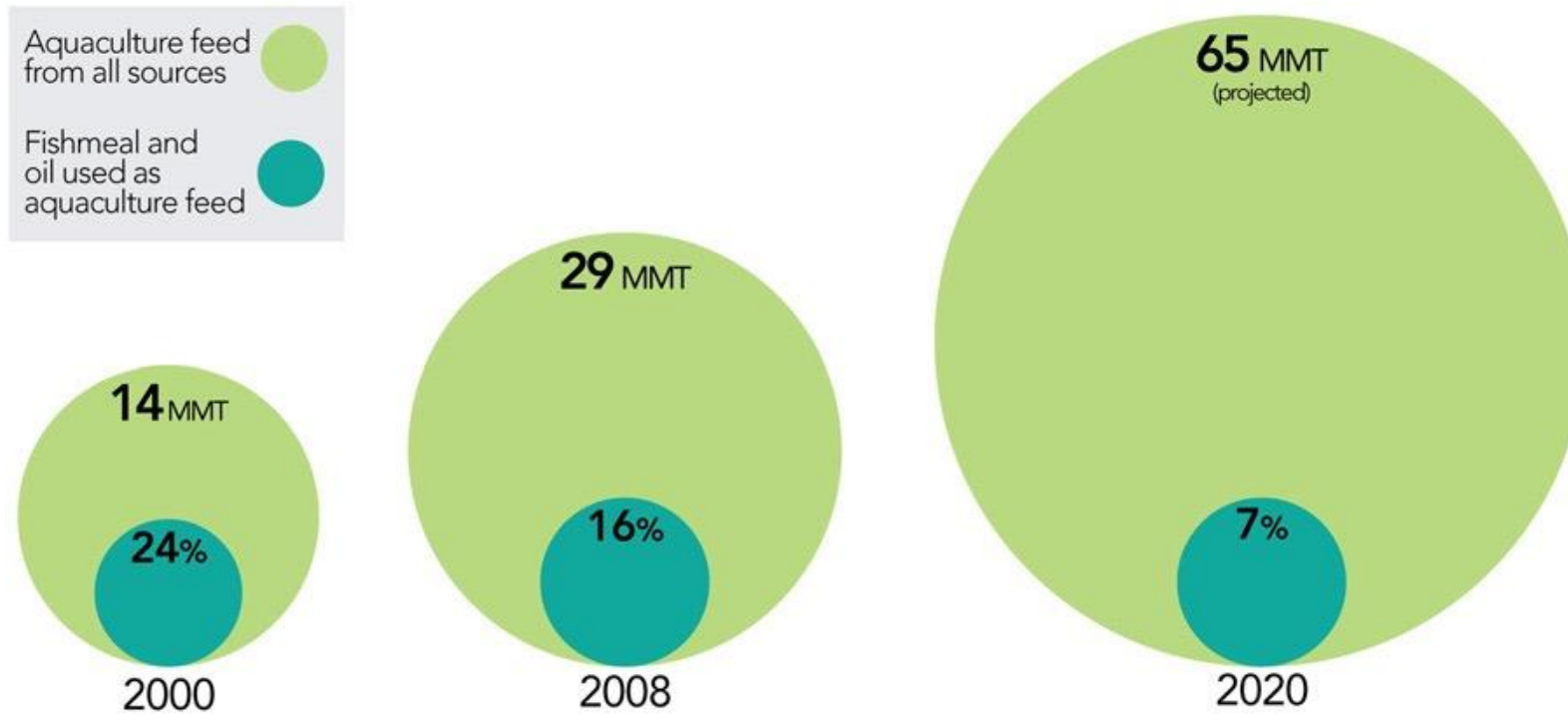
Michiel Fransen

Director Standards and Science Dept.

Aquaculture Stewardship Council

www.asc-aqua.org

Role of Marine Ingredients



- Specs
- Volume
- Price
- Risk/reputation

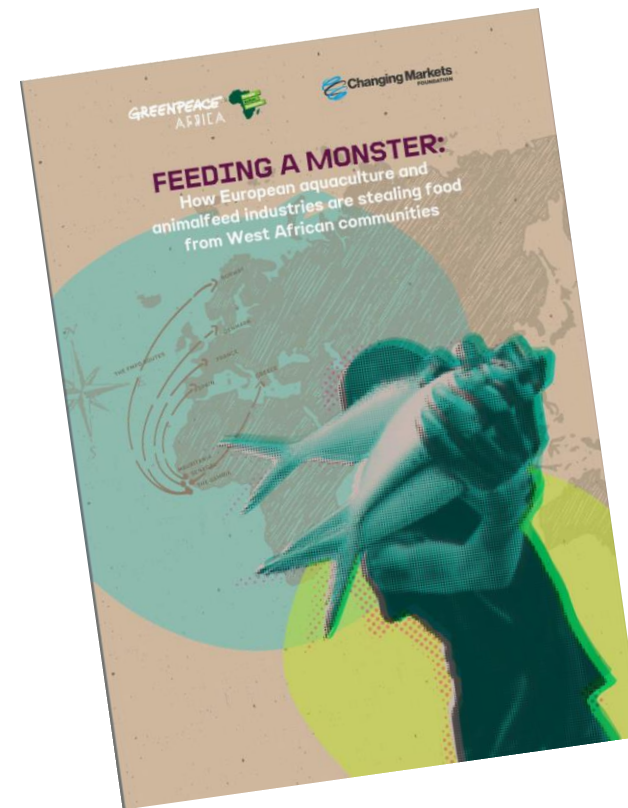
ASC Commitments



Consumer facing brands worry over public reputation!

Reputational risk drivers

- Water
- Health/Welfare
- Feed...



Feed Standard – main mechanisms



- Supply Chain Due Diligence
- Improvement model for both marine and plant ingredients
- Flexibility & efficiency for supply chain (MarinTrust, MSC)

Feed Standard – levelling the playing field



A better story to tell?



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DENMARK

Charlotte
Thy

Coordinator for Nordic
Environmental Footprint
Group

Green Claims and Sustainability
Labeling – Perspectives and Potential





BUREAU
VERITAS

2022 | 2ND JUNE – SKAGEN, DENMARK

GREEN CLAIMS AND SUSTAINABILITY LABELLING – PERSPECTIVES AND POTENTIAL

A GLOBAL LEADER IN TESTING,
INSPECTION & CERTIFICATION SERVICES



CV :

Bureau Veritas

- Senior Product Developer
- Auditor: ISO 14001/EMAS
- Verifier: EPD, ISO 14025/14064-1+2 + EU PEFCR Feed
- Environmental Footprinting Products/Organisations
- Carbon credits (farming/forest)
- Anti-greenwashing (i.e. green claims on food)
- Coordinator Nordic Environmental Footprint Group (NMR)

- Danish Crown: director sustainable farming & production
- Danish Environmental Protection Agency

- Large innovation Projects: DRIP (IFD), Pork 4.0 (GUDP)
- PEFCR TS work package leader for pork
- Memberships: Board GUDP + Environmental Appeal Board

- Contact: charlotte.thy@bureauveritas.com +4530941727

THE NEF GROUP

The Nordic Council of Ministers is the official body for Nordic collaboration – covering Denmark, Sweden, Norway, Finland, Iceland and the autonomous regions Greenland, the Faroe Islands and Aaland Isles

In 2015 the Nordic Environmental Footprint Group, NEF, was founded as a measure under the Circular Economy activities

- **The purpose is coordinating the Nordic countries authority work within the European Product Environmental Footprint Initiative (PEF)**
- **Pose Nordic views in the dialogue with the EU, i.e. by drawing up discussion papers, input on footprint methodologies, facilitate collaboration between Nordic Universities and stakeholders**
- **Disseminate knowledge regarding PEF to Nordic stakeholders. The group include national representatives in the EU work**

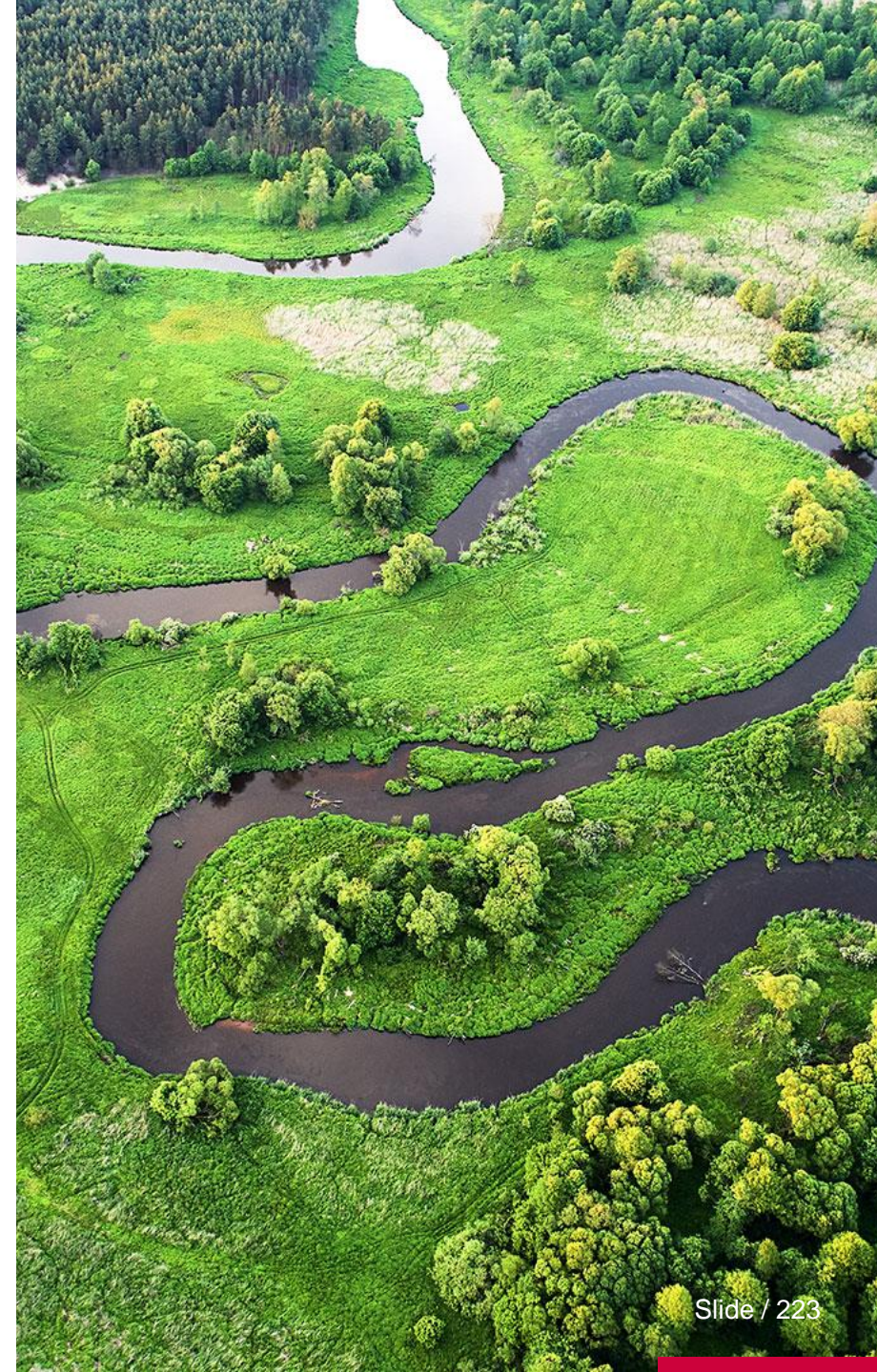
WHAT IS PEF AND OEF

LCA (lifecycle assessments) are used for calculating the environmental impacts from a products (and organisations)

PEFCR are category rules specifying the way to calculate the footprint of a product within the category (i.e. beer, batteries etc)

PEF is the resulting footprint of a product

OEF are a PEF-compliant footprint of an organisations



Timeline 2003-22 for development of PEF and OEF

Mandates

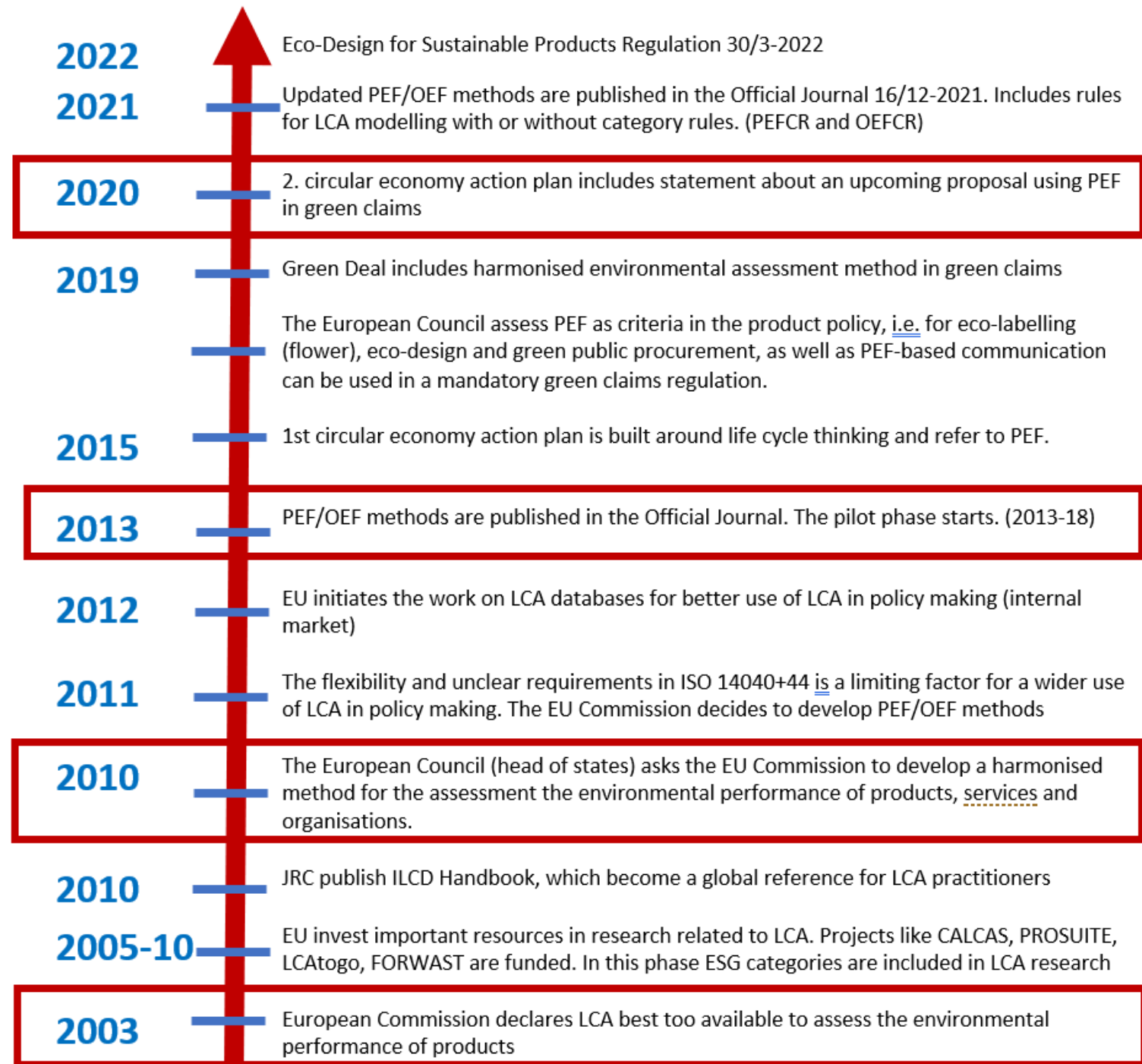
Analysis

Research

Methodology

Pilot testing

Policy development



THE CHALLENGES

The European **single green market** need a harmonised approach to assessment of the environmental impact of products, services and organisations



Proliferation
 Environmental labels
 Reporting schemes
 Certification schemes

Internal Market
 National "tailor-made" legislation

Competitiveness
 Increased of costs due to multiple requirements
 More difficult access to markets
 Unfair competition/misleading claims

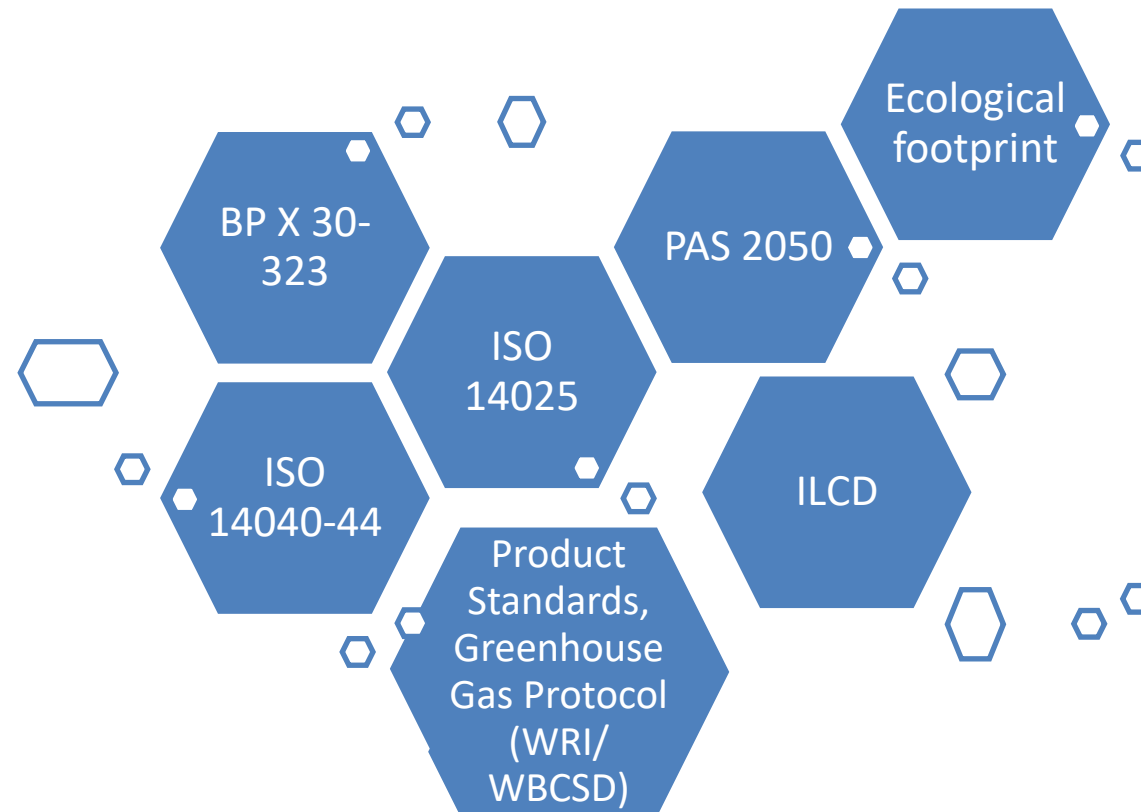
Consumers
 Mistrust in company-driven green marketing

WHY NOT USE EXISTING REGULATION?

Calculated environmental impacts based on LCA can differ hugely depending on

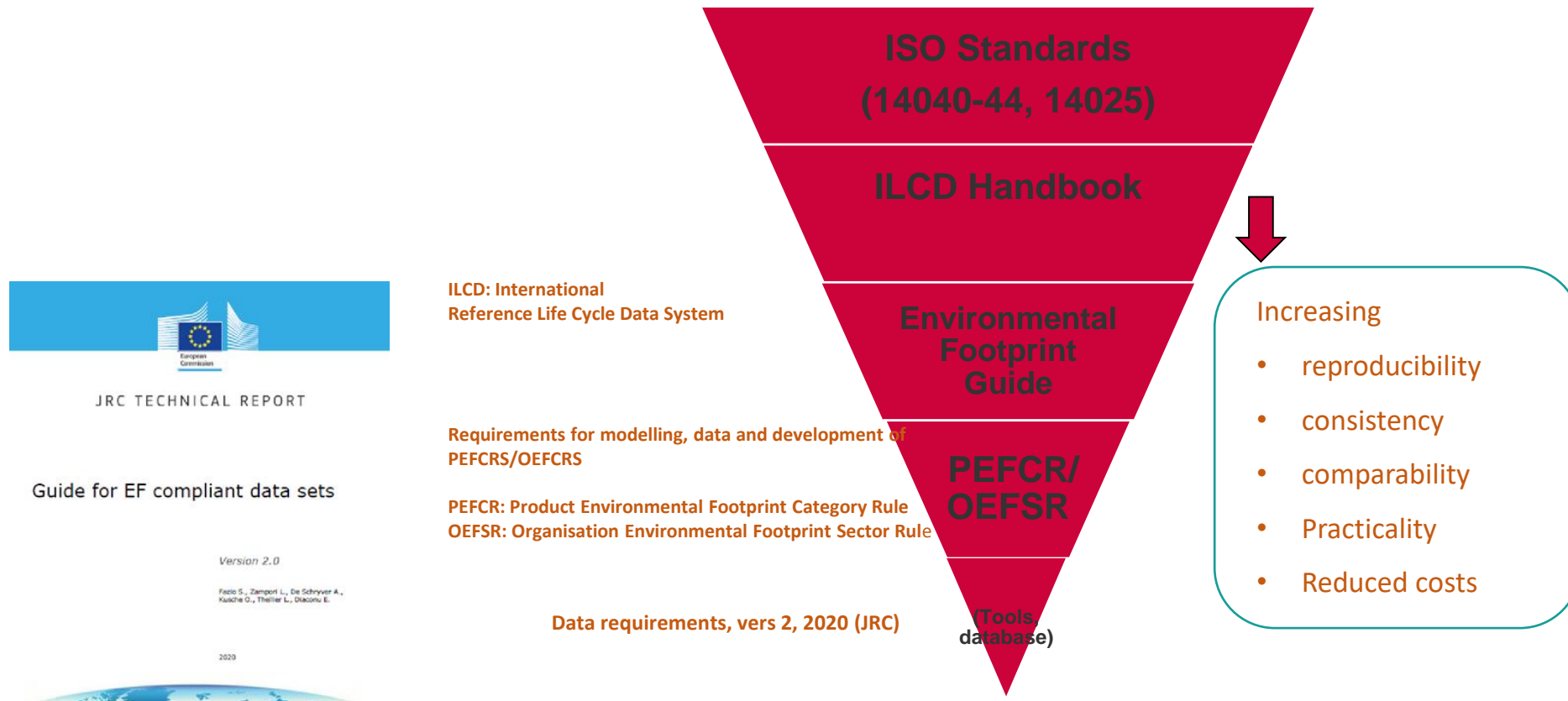
- methodology
- scoping (what is included and excluded)
- modelling
- data

Making comparisons impossible and useless in market regulation and for driving the green transition

















WHAT IS SPECIAL ABOUT THE PEF APPROACH?!

FROM GENERIC ISO STANDARDS TO CATEGORY RULES



PEFCR and OEFCR PILOTS 2014-18


1. wave pilots

-  Batteries and accumulators
-  Decorative paints
-  Hot & cold water pipe systems
-  Liquid household detergents
-  IT equipment
-  Metal sheets
-  Non-leather shoes
-  Photovoltaic electricity generation
- ~~ Stationary~~
-  Intermediate paper products
-  T-shirts
-  Uninterrupted power supplies
-  Retailer sector
-  Copper sector

2. wave pilots

-  Leather
-  Thermal insulation
-  Beer
- ~~ Coffee~~
- ~~ Fish~~
-  Dairy products
-  Feed
- ~~ Meat~~
-  Pet food
-  Olive oil
-  Pasta
-  Wine
-  Packed water

3. wave 2020-

-  Marine Fish
- Cut flowers and potted plants
- Flexible packaging
- Apparel and footwear
- Synthetic turf

— MODELLING AND DATA

The updated EU PEF/OEF recommendation contains 4 annexes stipulating how to model a PEF or OEF if there aren't any category rules

There are also rules for development of new PEFCR's and OEFCR's
EF 3.0 compliant datasets are implemented in numerous commercial LCA- databases

It has become easier (and faster) to model an LCA and can be used for all types of LCA modelling – i.e. in EPD's



COMMISSION RECOMMENDATION

of 16.12.2021

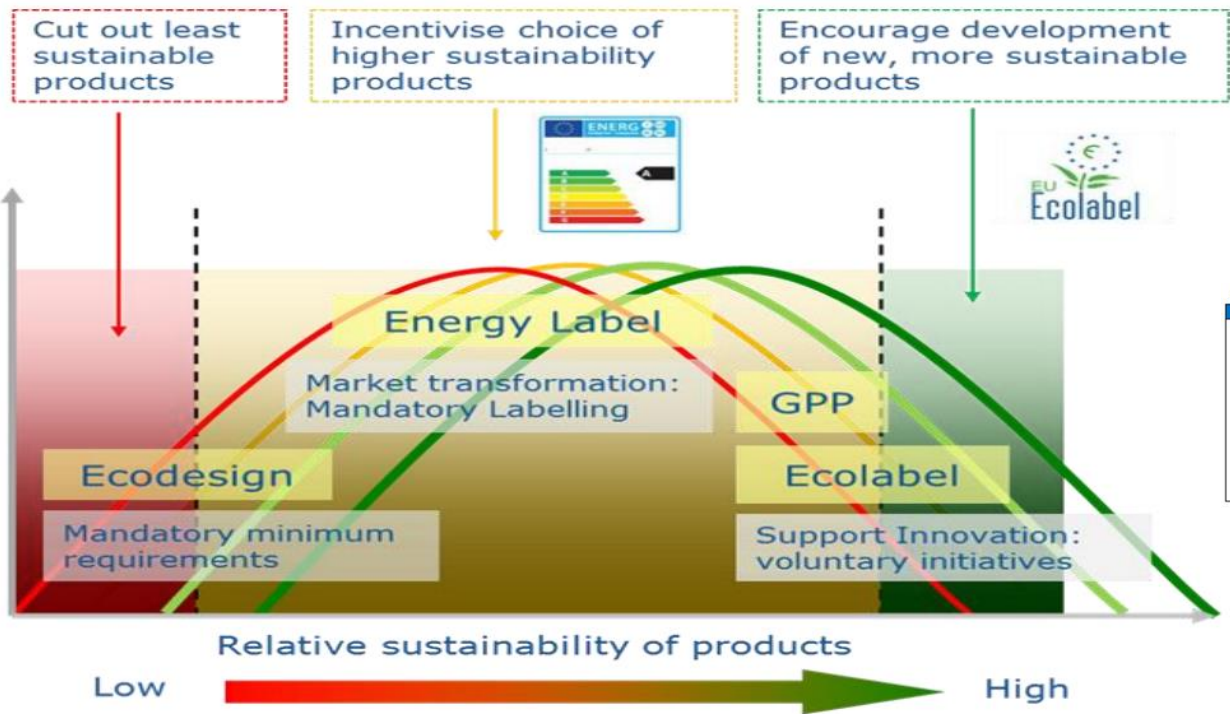
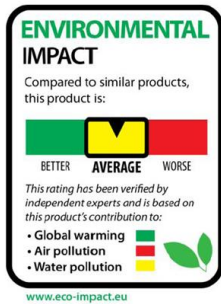
on the use of the Environmental Footprint methods to measure and communicate the life cycle environmental performance of products and organisations

ECO-DESIGN FOR SUSTAINABLE PRODUCTS REGULATION

Eco-Design regulation proposed 30. 03. 2022 approach for ALL other products than food, feed, animals, plants and medicine

PEF is the methodology that will be used to for determining the Environmental Footprint

Product chain perspective – public procurement criteria - digital product passports etc.



Empowerment of consumers central for succes in the green transition

Figure 2.2. PEF label types included in Experiment 1 (format, continued)

Label type 6	Label type 7	Label type 8	Label type 9
<p>ENVIRONMENT</p> <p>TOTAL</p> <p>BETTER AVERAGE WORSE</p> <p>You can control global warming by choosing wisely. Do you know that half of the environmental footprint of most products is made during production? Do you know that half of the environmental footprint of most products is made during production? Do you know that half of the environmental footprint of most products is made during production?</p> <p>Results relative to the average value* based on the EU PEF method (excluding 0.1% of products)</p>	<p>ENVIRONMENT</p> <p>TOTAL</p> <p>BETTER AVERAGE WORSE</p> <p>Do you know that half of the environmental footprint of most products is made during production? Do you know that half of the environmental footprint of most products is made during production? Do you know that half of the environmental footprint of most products is made during production?</p> <p>Results relative to the average value* based on the EU PEF method (excluding 0.1% of products)</p>	<p>ENVIRONMENT</p> <p>TOTAL</p> <p>BETTER AVERAGE WORSE</p> <p>YOUR ENERGY COMES FROM...</p> <p>Renewable: Wind, Solar, Hydropower, Biomass, Geothermal, Ocean, Tides, and other</p> <p>Non-renewable: Coal, Oil, Natural Gas, and other</p> <p>Results relative to the average value* based on the EU PEF method (excluding 0.1% of products)</p>	<p>ENVIRONMENT</p> <p>TOTAL</p> <p>BETTER AVERAGE WORSE</p> <p>Most relevant impacts are...</p> <p>Global warming, Air pollution, Water pollution, Acidification, Eutrophication, Land use change, and other</p> <p>Results relative to the average value* based on the EU PEF method (excluding 0.1% of products)</p>



MARINE PEFCR IN DEVELOPMENT

EDIBLE FISH – FARMED AND WILD

RPs for Unprocessed Marine Fish Products

sphera® maki Consulting GmbH
Life cycle expert services

SGS



Wild catch



Farmed fish

- Both are a “virtual” (i.e. generic, non-existing) product
- Based on data on EU consumption of marine fish and global fisheries

FEED PEFCR

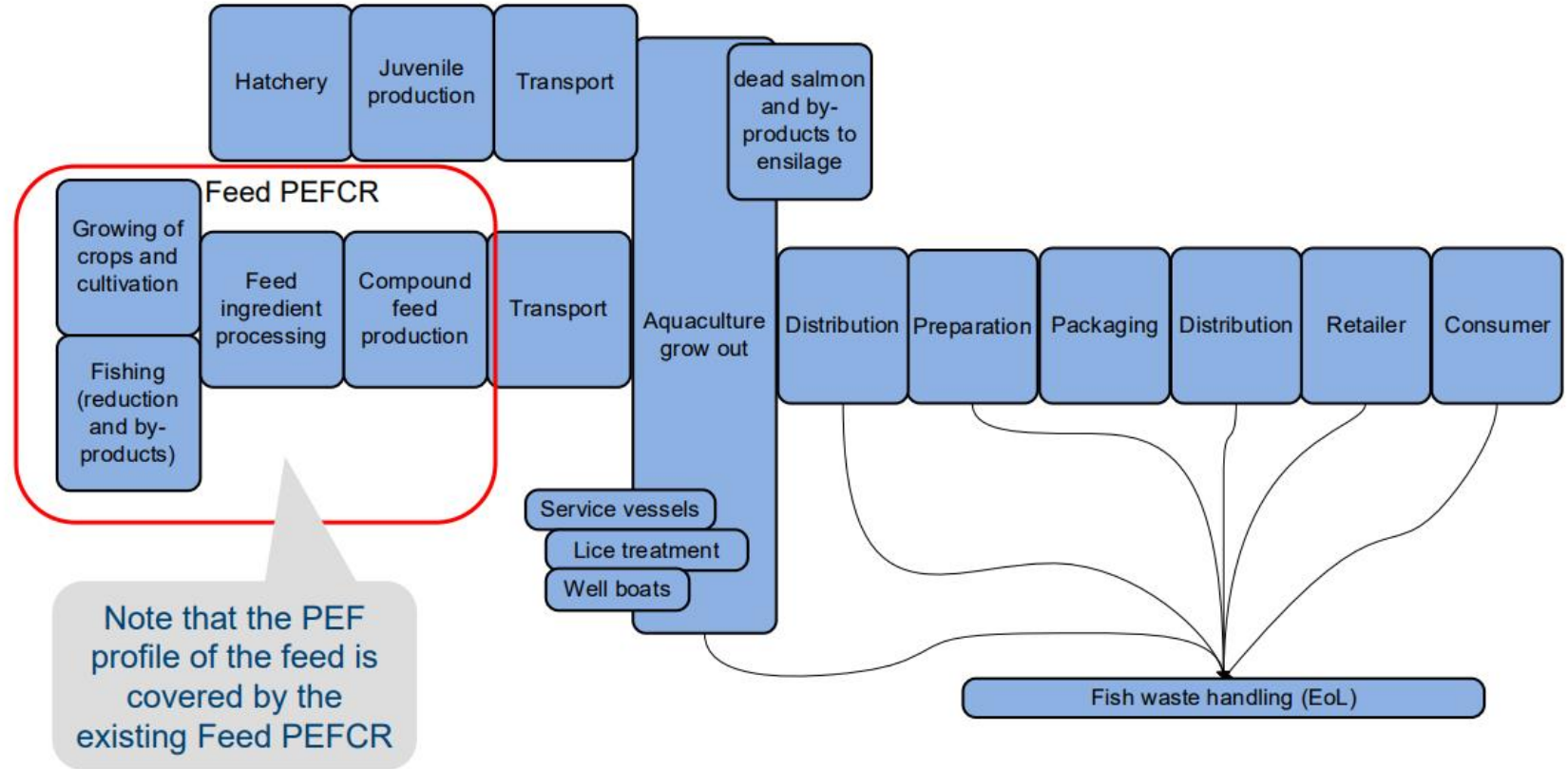
The Feed PEFCR is used for fish feed

It would make sense following the modelling and data in the marine fish PEFCR

And include the steps concerning

1. production of fish meal and fish oil
2. shipping to fish feed producer

System boundary: Unprocessed farmed marine fish products



POLICY DEVELOPMENT – EUROPEAN PERSPECTIVES

Green Claims Initiative

it is expected environmental impacts have to be documented and credible communication is based on lifecycle assessments

Taxonomy regulation

- sustainable financing. Lifecycle perspective as well as do no harm principle

Sustainable Products Regulation

- extended product scope for eco-design directive beyond electrical appliances, i.e. textiles, building materials, electronics and plastics. Lifecycle based minimum requirements have been flagged by EU. Farm to Fork discussions about eco-label for food.

Green Consumption Pledge and Code of Conduct on Responsible Food business and Marketing Practices

Codexes

MORE INFORMATION

**Presentations from NEF
conferences and agrifood
workshops from 2015
onwards can be found at:**

www.nordic-pef.org

JUNE 1 - 3
SKAGEN
DENMARK

Sara
Hornborg

PhD, Scientist at RISE,
Department of Agriculture
and Food

**Fish Meal and Oil – a Life Cycle
Assessment Perspective**



Fish meal and oil – a Life Cycle Assessment perspective

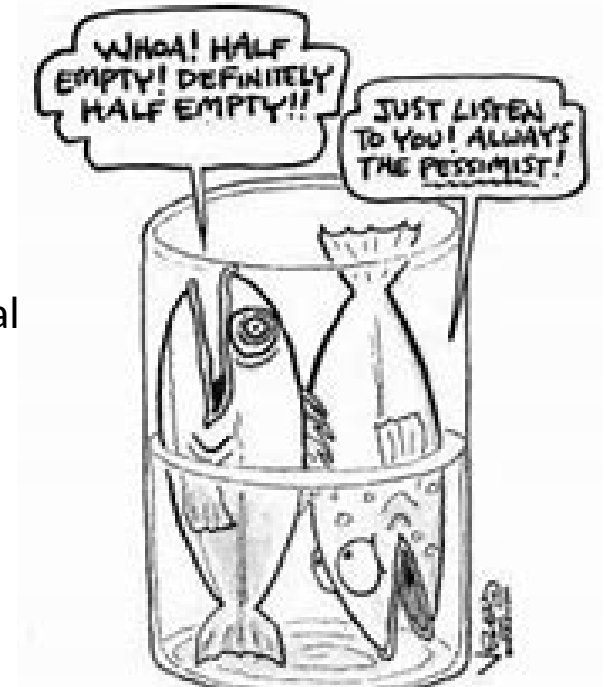
Sara Hornborg, PhD
EFFOP Conference June 2nd, Skagen



RI-
SE

Today's talk

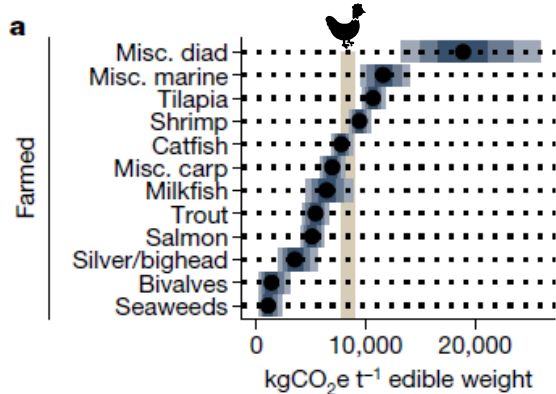
- Greenhouse gas (GHG) emissions of seafoods and drivers behind
- Insights from Life Cycle Assessment (LCA) of Danish fish meal and oil production



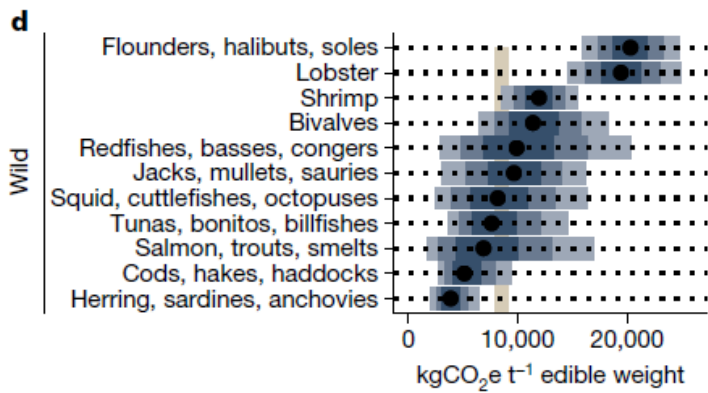
Life Cycle Assessment

- 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

Seafood – GHG emission overview

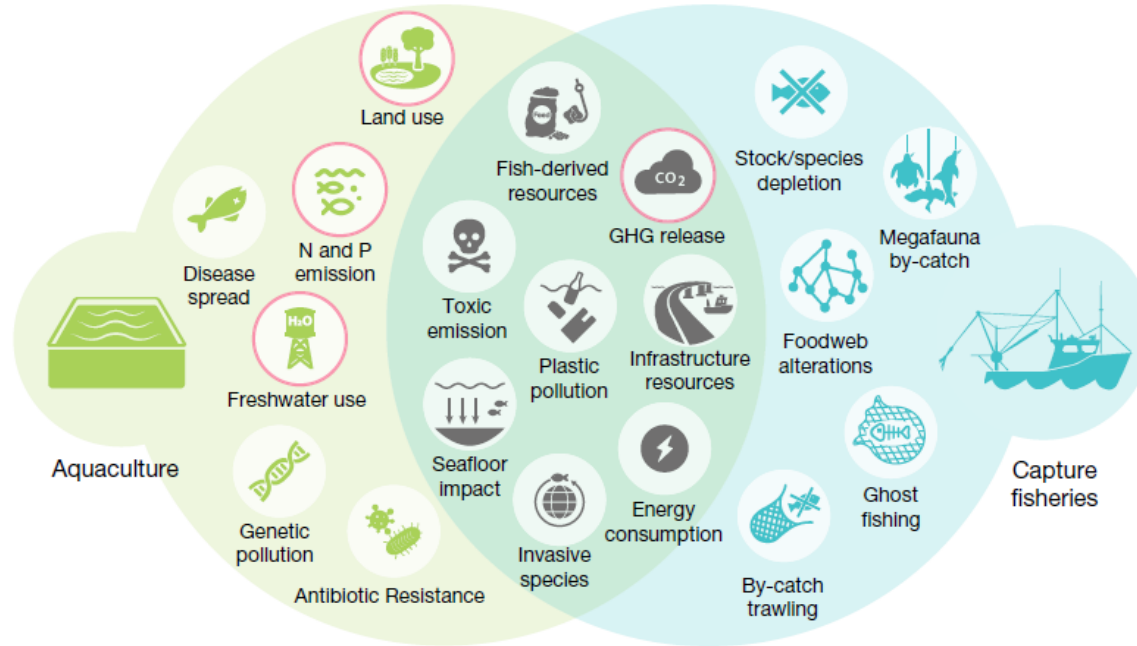


← Driven by feed use



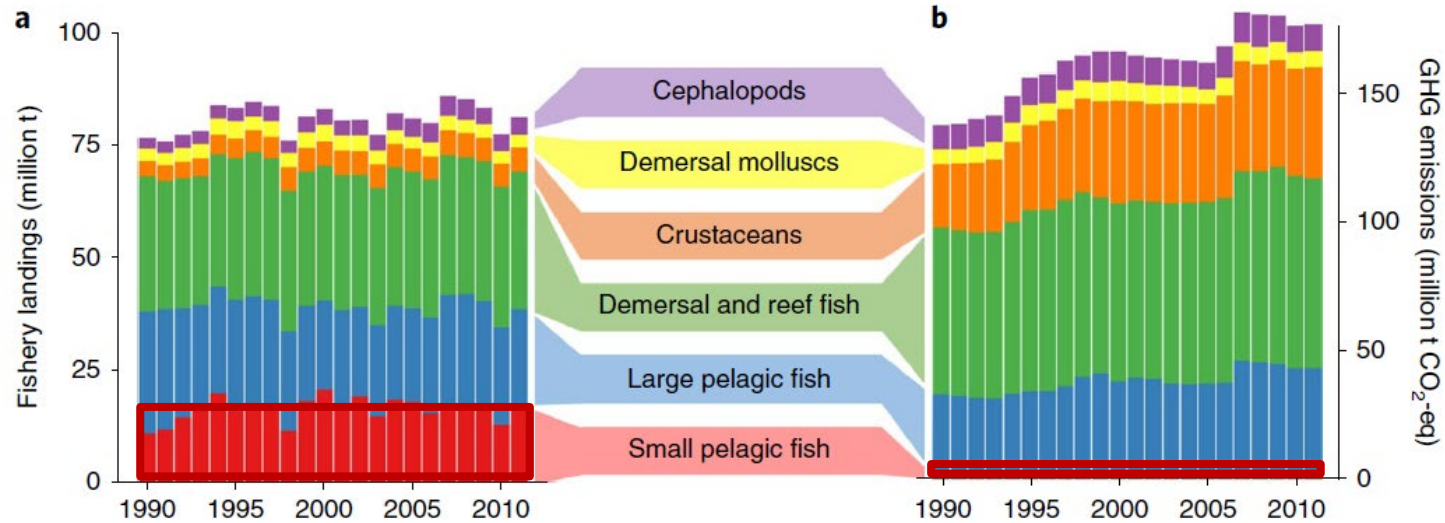
← Driven by fuel use

Seafood – more to consider



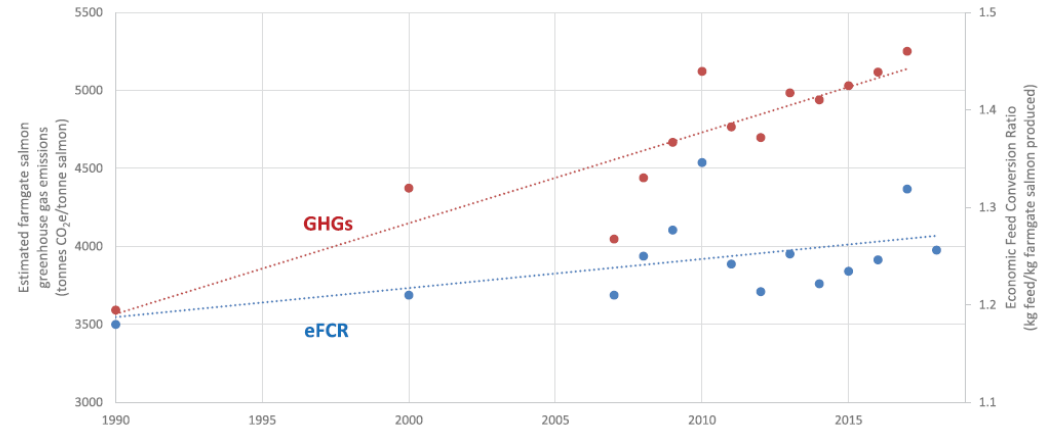
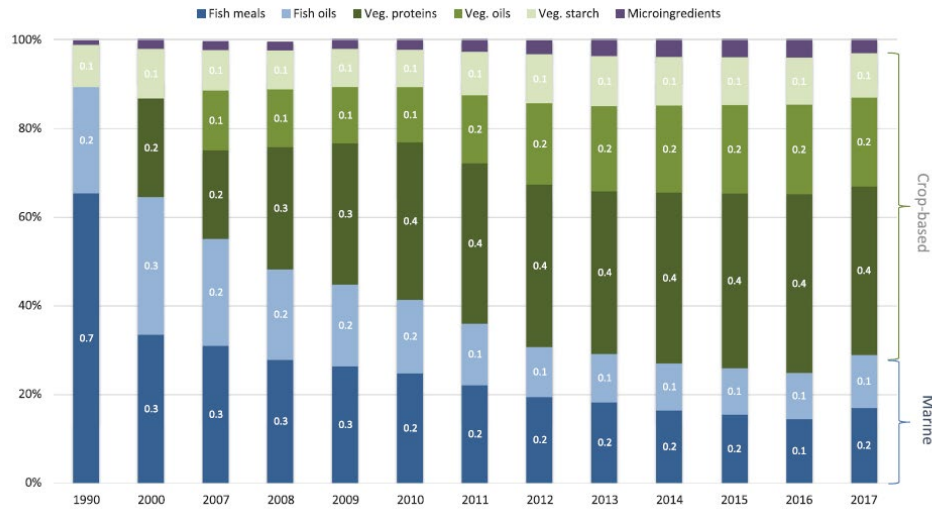
Common and unique pressures

GHG emissions of global capture fisheries - trends



Feed: composition and amount

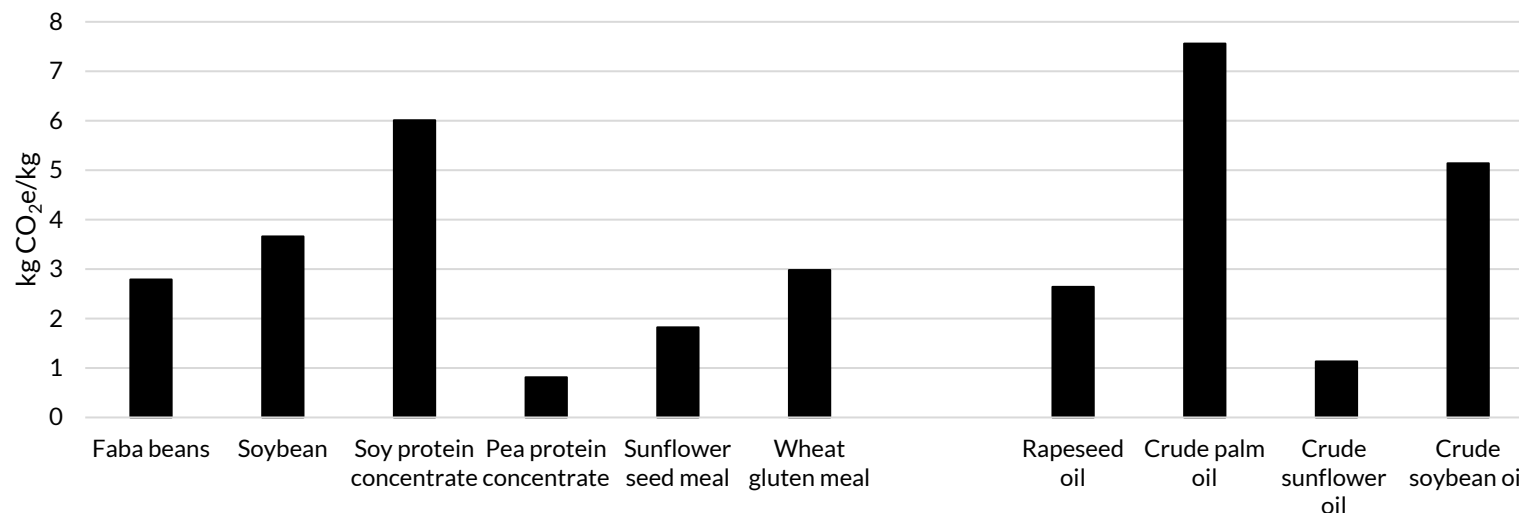
Norwegian salmon farming



LCA of 1 kg Danish fish meal and oil

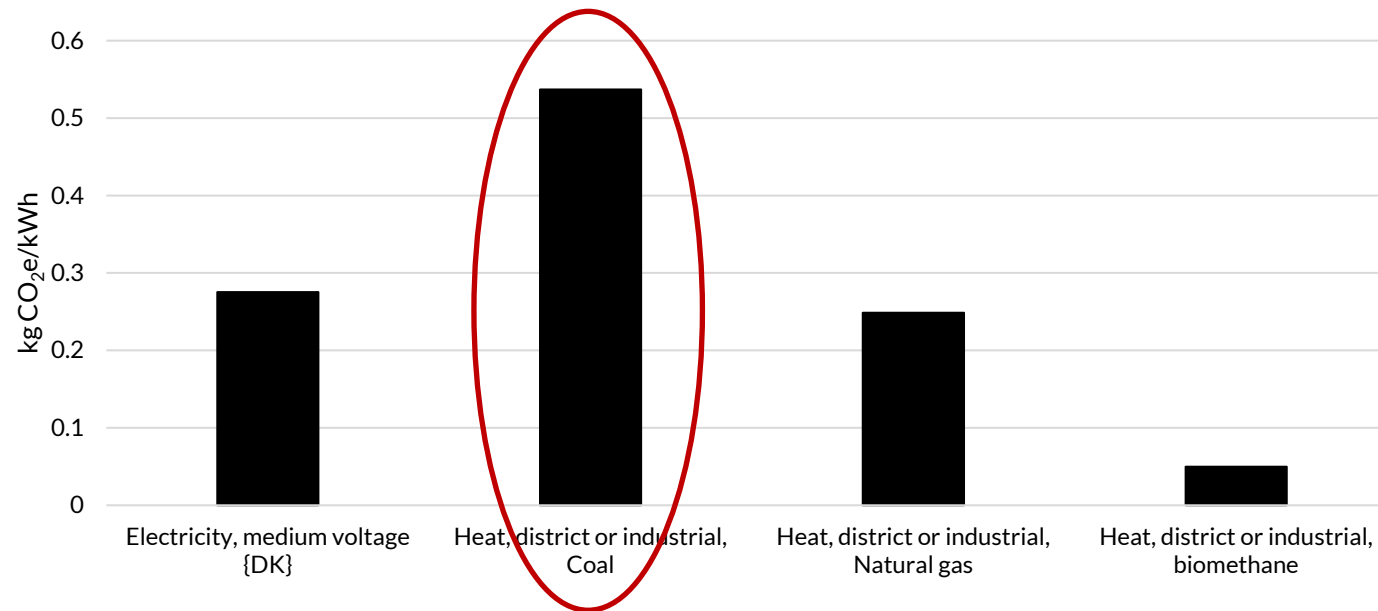
- **Fish raw material input driver of GHG emissions**
 - Pelagic fisheries highly efficient
 - Yield important
- **Processing into fish meal and oil the second largest driver**
 - Dominated by energy use and source
- **Use of trimmings may have a higher contribution to emissions compared to reduction 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



Opportunities and challenges for fish meal and oil

Issue	Opportunities	Challenges
Greenhouse gas (GHG) emissions	<ul style="list-style-type: none"> • Low emissions compared to e.g. soy • Focus on energy efficiency and yield • Switch to green energy on land 	<ul style="list-style-type: none"> • Ability to switch to green energy (TRL, alternative fuels, available infrastructure on land, costs, ...)
Feed-food conflict	<ul style="list-style-type: none"> • 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) 	<ul style="list-style-type: none"> • 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!

Sara Hornborg

Sara.Hornborg@ri.se

+46 10 516 66 96

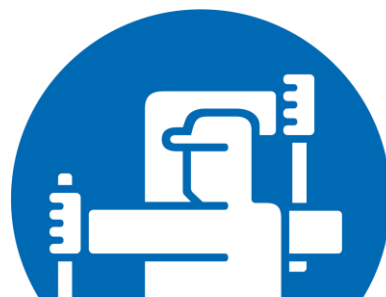
Want to know more about our seafood work at RISE?

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

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DENMARK

Coffee Break

Sponsored by
Héðinn hf.



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1922 — 2022



JUNE 1 - 3
SKAGEN
DENMARK

**High Level Panel
Debate: Megatrends
in Sustainability
and Green Claims**

- Thord Mønsen, Head of Section, The Directorate of Fisheries, Norway
- Søren Gade, Member of European Parliament, Vice-Chair Committee of Fisheries
- Fabrizio Donatella, director for fisheries policy, DG MARE
- Johannes Palsson, CEO of FF Skagen

**Control, Resource Management and the Political
Responsibility for Securing a Sustainable and
Profitable European Industry**



JUNE 1 - 3
SKAGEN
DENMARK

Michael
Lundgaard
Thomsen

CEO, Aalborg Portland

Keynote Speaker: Sustainable Production
in Energy-Intensive Industries





REDUCTION OF CO2 EMISSIONS IN ENERGY INTENSIVE INDUSTRIES IN DENMARK

- FOCUS ON NEW TECHNOLOGIES FOR THE
GREENING OF CEMENT

Michael Lundgaard Thomsen, Aalborg Portland

Agenda:

1. Climate partnership – Danish Government and Energy Intensive Industries

- **Organization and process**
- **Results**

2. Cement – challenge and solutions in CO2 reductions

- **Impossible to abate ?**
- **New technologies**

The background of the top half of the image is a photograph of an industrial setting. It shows a large, dark-colored metal wheel or part of a machine in motion, with a bright, intense light source at the point of contact, creating a dense spray of bright orange and yellow sparks that radiate outwards. The scene is dimly lit, with some blurred lights in the background, suggesting a factory or workshop environment.

Regeringens klimapartnerskaber



Partnerskab for energitung industri

Climate Partnerships

6

Characteristics for energy intensive industry



Production of critical products for building, energy, transportation and food sector – typical process industry

Intense national and international competition

High temperature processes, that uses fossil – not possible to electrify and hard to abate

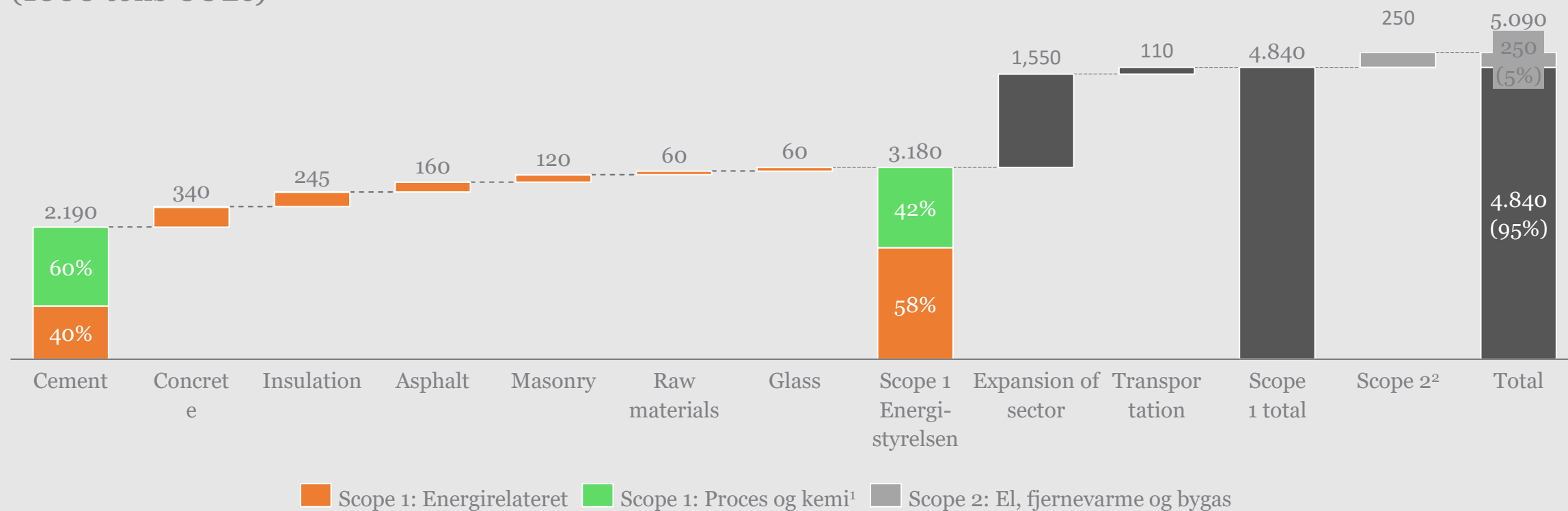
Energy is a mayor part of variable costs and therefor energy efficiency has always been in focus

One or few companies per sector

Part of the EU quota system ETS

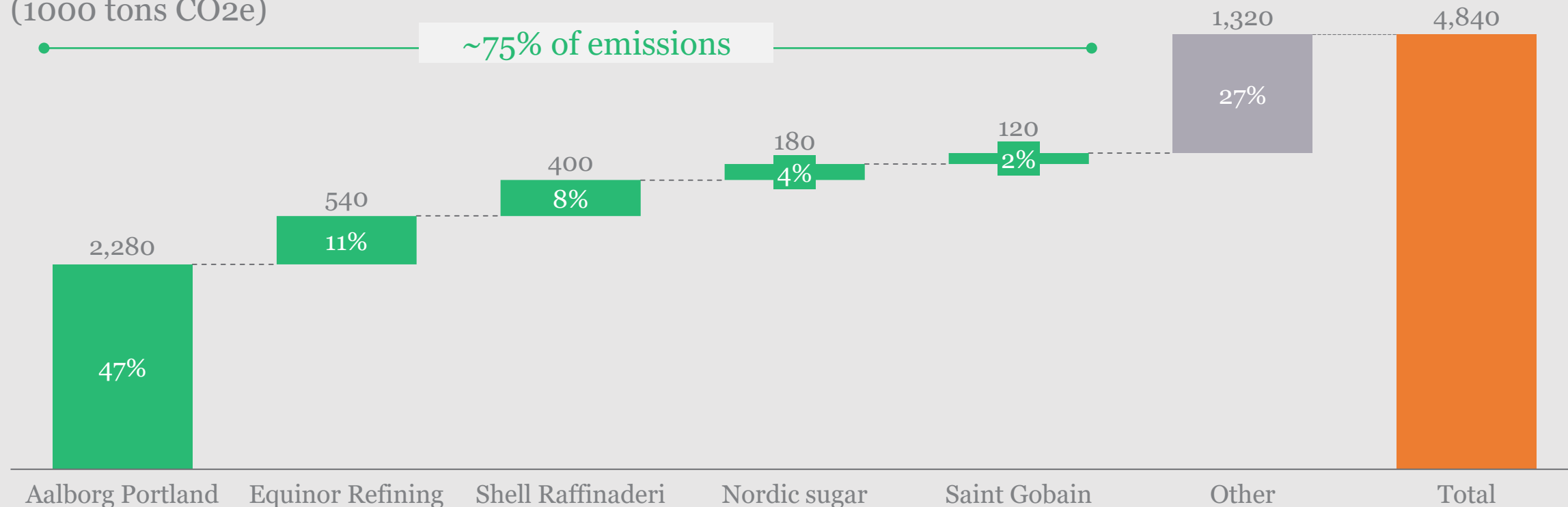
The emissions is mainly from the cement industry

2017 CO₂e emissions
(1000 tons CO₂e)



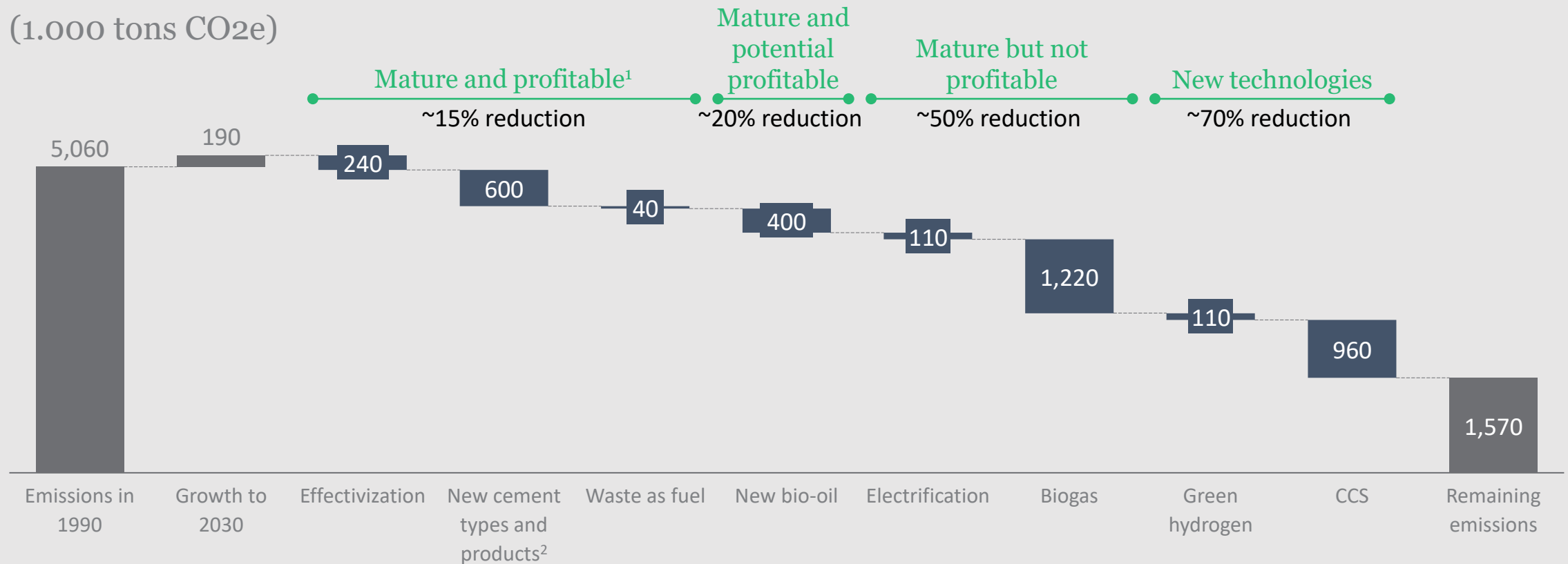
5 enterprises account for ~75% of the emissions

2017 CO₂e emissions
(1000 tons CO₂e)



70% reduction in 2030 is technical possible but requires use of not profitable, new technologies

Potential reduction
(1.000 tons CO₂e)



1. Profitable with current CO₂-price. 2. If the market demands new cement types



2020

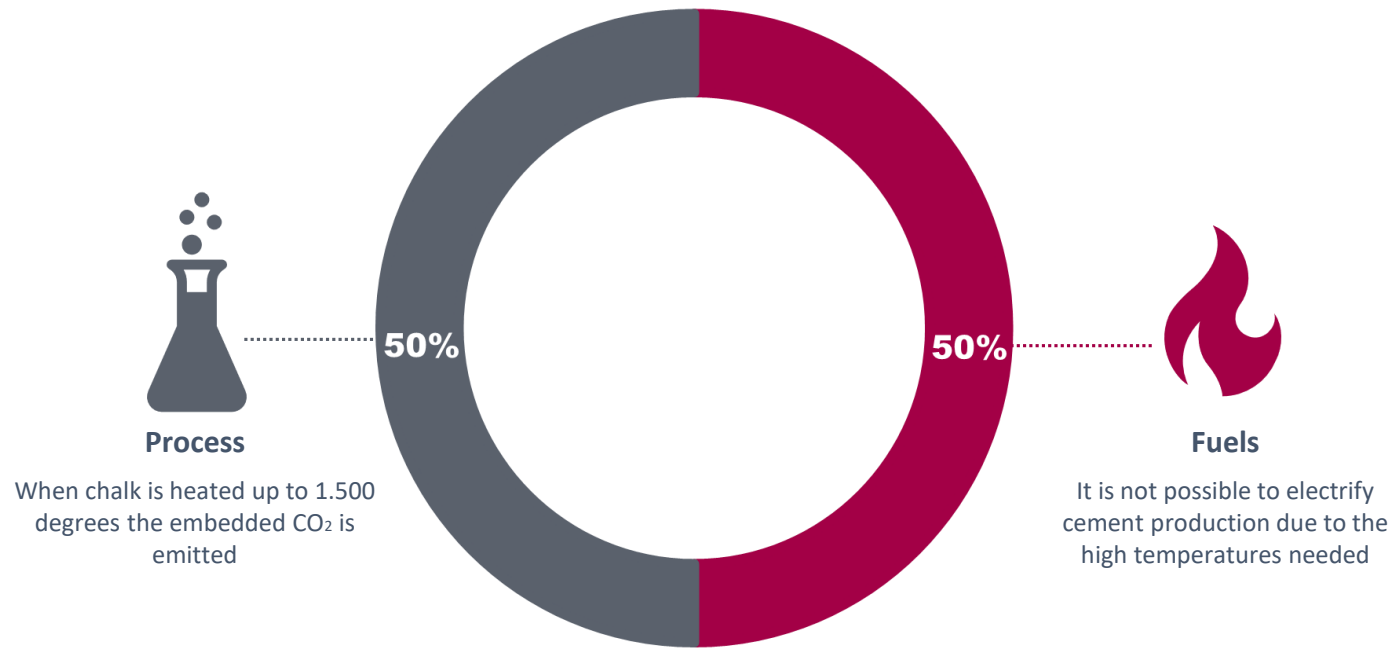
Grey cement: 1.7 million tons

White cement: 0.8 million tons

Turnover: 2.0 billion DKK

**Aalborg Portland
cement plant**

The CO₂-emissions from cement production comes from both the fuels and from the chalk itself



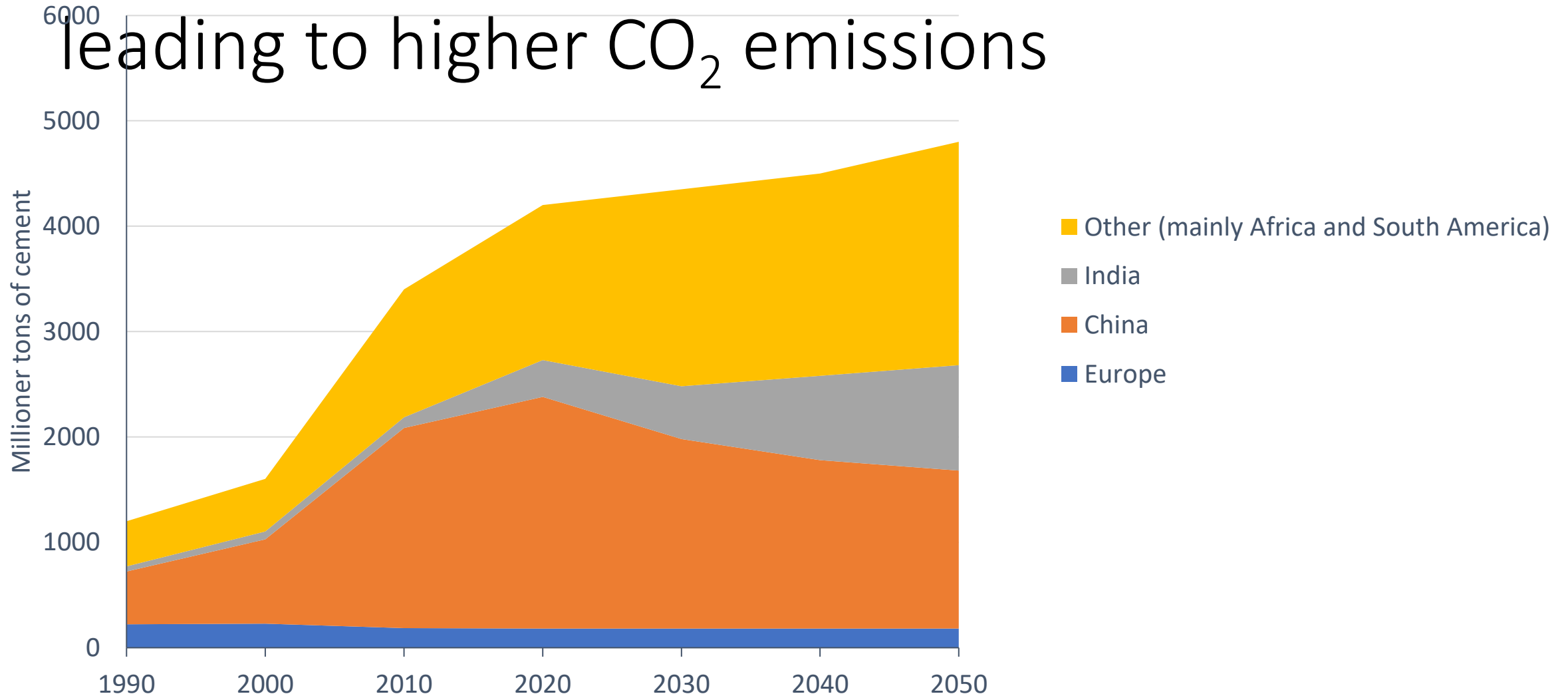
Why do we need cement?

Cement is the basic ingredient in concrete.

Concrete is an essential material for our infrastructure to house people and build roads and bridges.



Global consumption of cement is increasing - leading to higher CO₂ emissions



Producing cement is a dilemma

On the one side the product is indispensable and will be used even more.

On the other hand the energy-intensive production and mineralogical process emits large quantities of CO₂

So, the question isn't not to use cement and concrete.

But to make the production sustainable.

But how?

Global Cement and Concrete Association

Savings in clinker production

- thermal efficiency
- savings from waste fuels ("alternative fuels")
- use of decarbonated raw materials
- use of hydrogen as a fuel

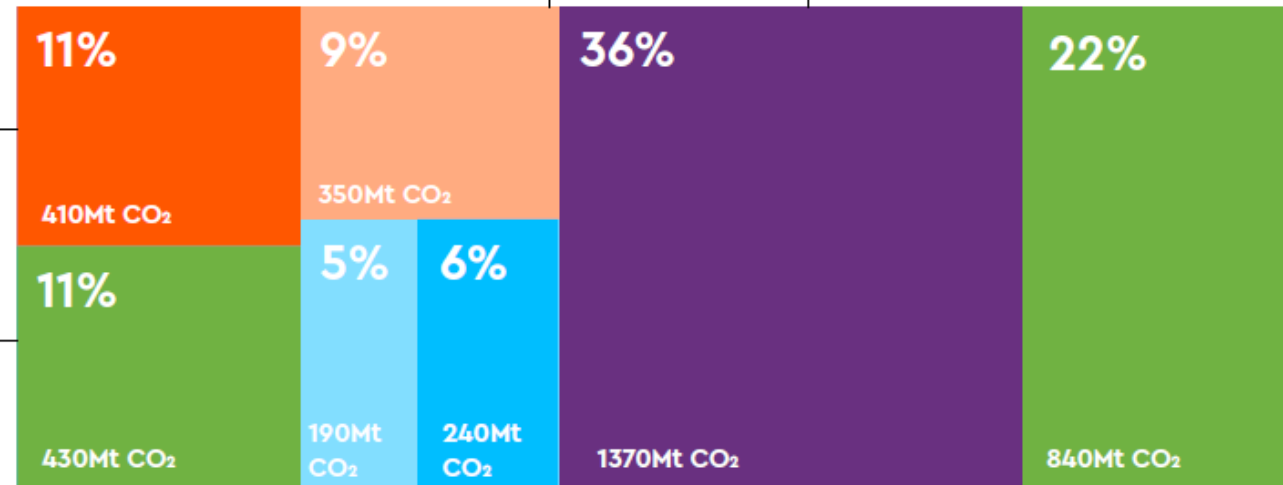
Savings in cement and binders

- Portland clinker cement substitution. Also expressed through clinker binder ratio
- alternatives to Portland clinker cements

Carbon capture and utilisation/storage

- carbon capture at cement plants

PERCENTAGE CONTRIBUTION TO NET ZERO AND CO₂ EMISSION SAVINGS IN 2050



Efficiency in concrete production

- optimised mix design
- optimisation of constituents
- continue to industrialise manufacturing
- quality control

Decarbonisation of electricity

- decarbonisation of electricity used at both cement plants and in concrete production

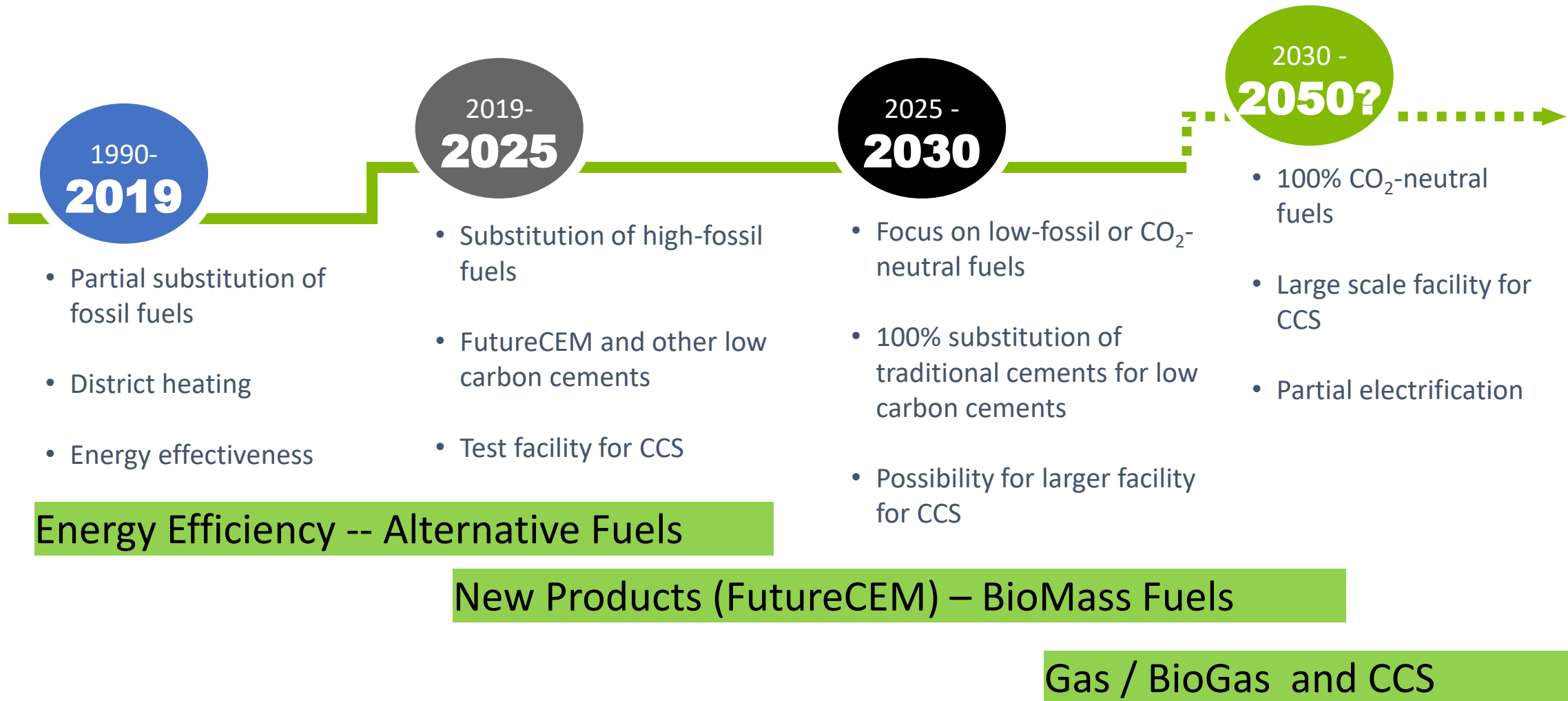
CO₂ sink: recarbonation

- natural uptake of CO₂ in concrete – a carbon sink

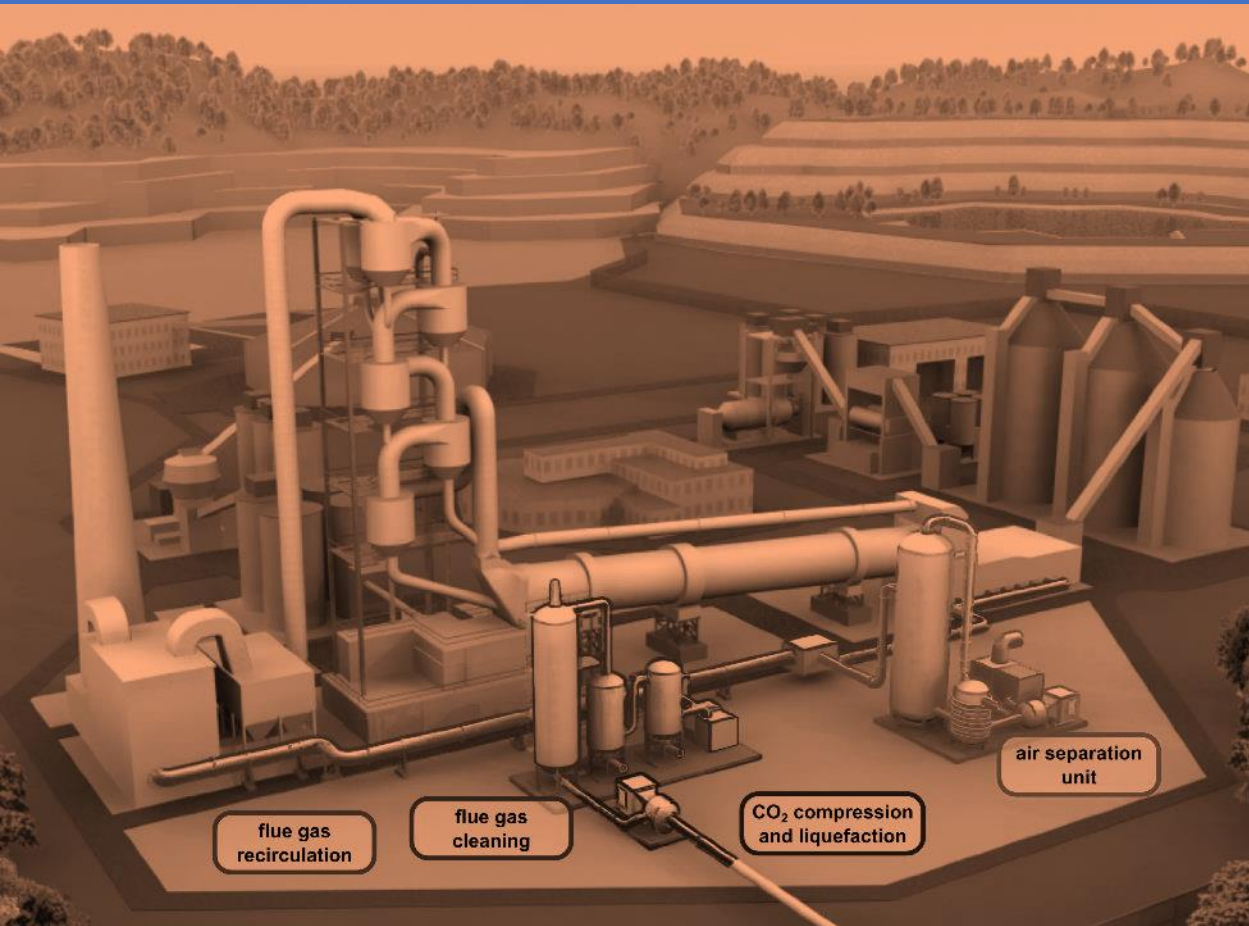
Efficiency in design and construction

- client brief to designers to enable optimisation
- design optimisation
- construction site efficiencies
- re-use and lifetime extension

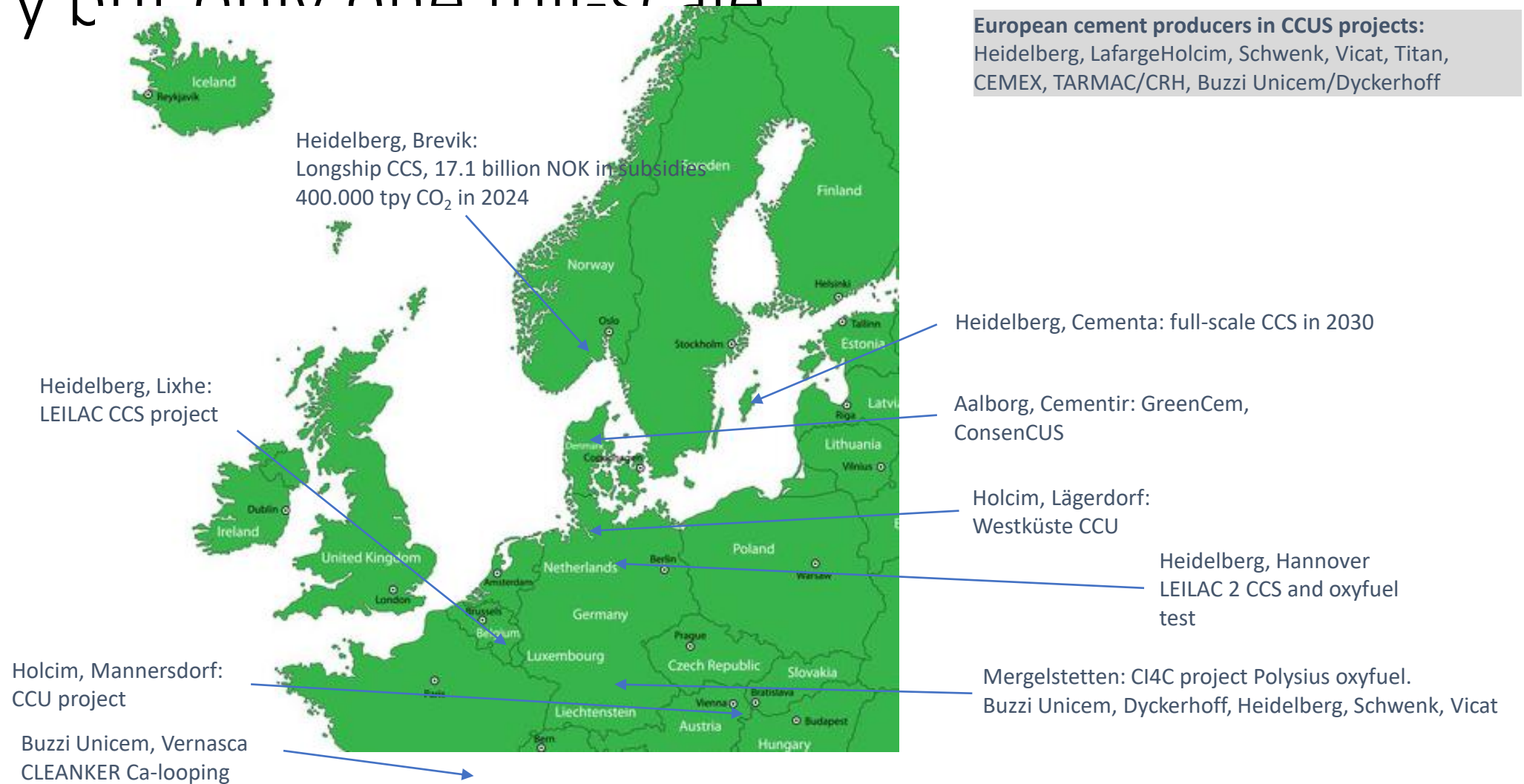
We have been working on sustainability for many years. The current agreement with a 30% reduction is the result of a targeted effort over longer periods of time



Carbon Capture in the production of cement



CCUS pilot tests are under way in the European cement industry but only one full-scale



On-going activities in Aalborg about Carbon Capture, Usage and Storage

GreenCem

- Funded through the Danish Energy Technology Development and Demonstration Program
- 7 partners
- Focus on capture and utilization
- Concept study for two options
 - 200.000 tons per year CO₂ demo plant
 - 1 mill. tons per year CO₂ full scale plant



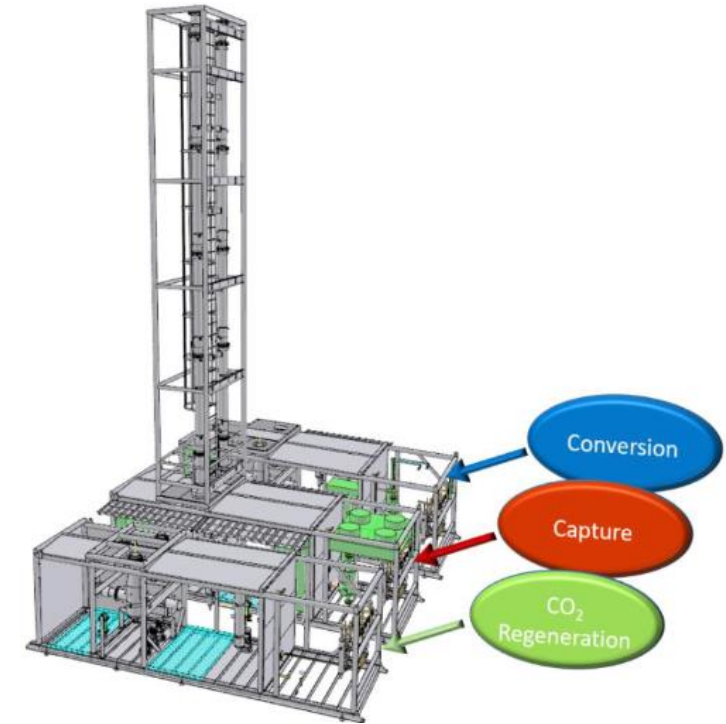
Greensand II

- Part of Advisory Board
- 29 partners
- Pilot carbon capture and storage in the North Sea
- Separate application for CO₂-capturing at Aalborg Portland



ConsenCUS

- Funded through the EU Horizon 2020 program
- 19 partners
- Both use and storage



Current status on CO₂-capturing at Aalborg Portland

- We have had continuous focus on CCUS for the past years.
- Besides involvement from existing organization (management, production, public affairs and R&D) we have employed a full-time CCUS-resource and have engaged a PhD on CCUS
- Currently a public CCS-pool will open for prequalification and potential negotiations – resulting by the end of 2022 in an agreement with one CO₂-emitter to capture and store 400.000 tons of CO₂ before 2025.
- We are presently investigating the tender criteria and hope to be in play for this funding.



QUESTIONS?

JUNE 1 - 3
SKAGEN
DENMARK

Ali
Samro

Director, Fishfacts

Pelagic Fisheries in the North Atlantic
– New Challenges in 2022



New challenges for the Pelagic industry

Skagen 3rd June 2022

Óli Samró



HOME

MAP

VESSELS

SERVICE PROVIDERS

EVENTS

CRM

ANALYTICS

CATCH & QUOTAS



HOME

MAP

VESSELS

FACILITIES

COMPANIES

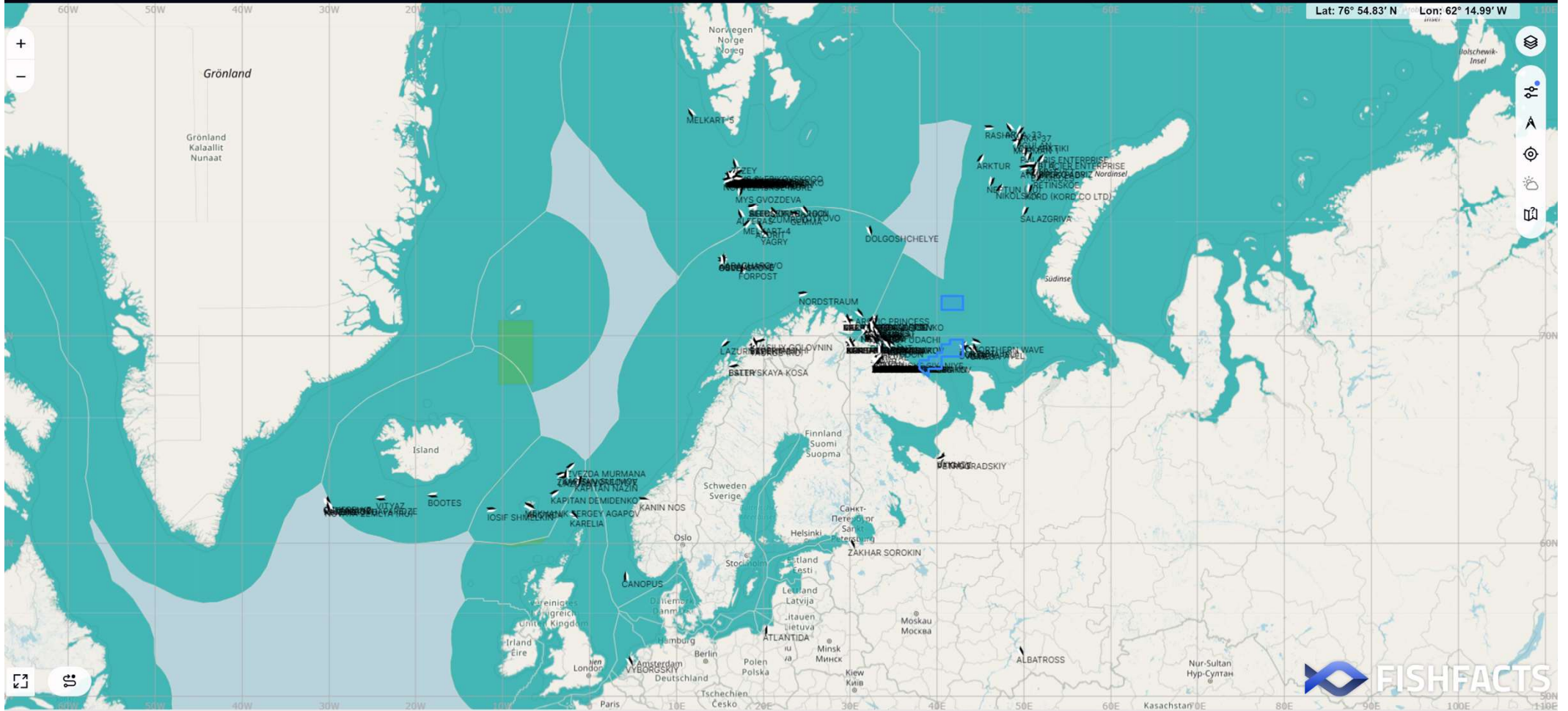
SERVICE PROVIDERS

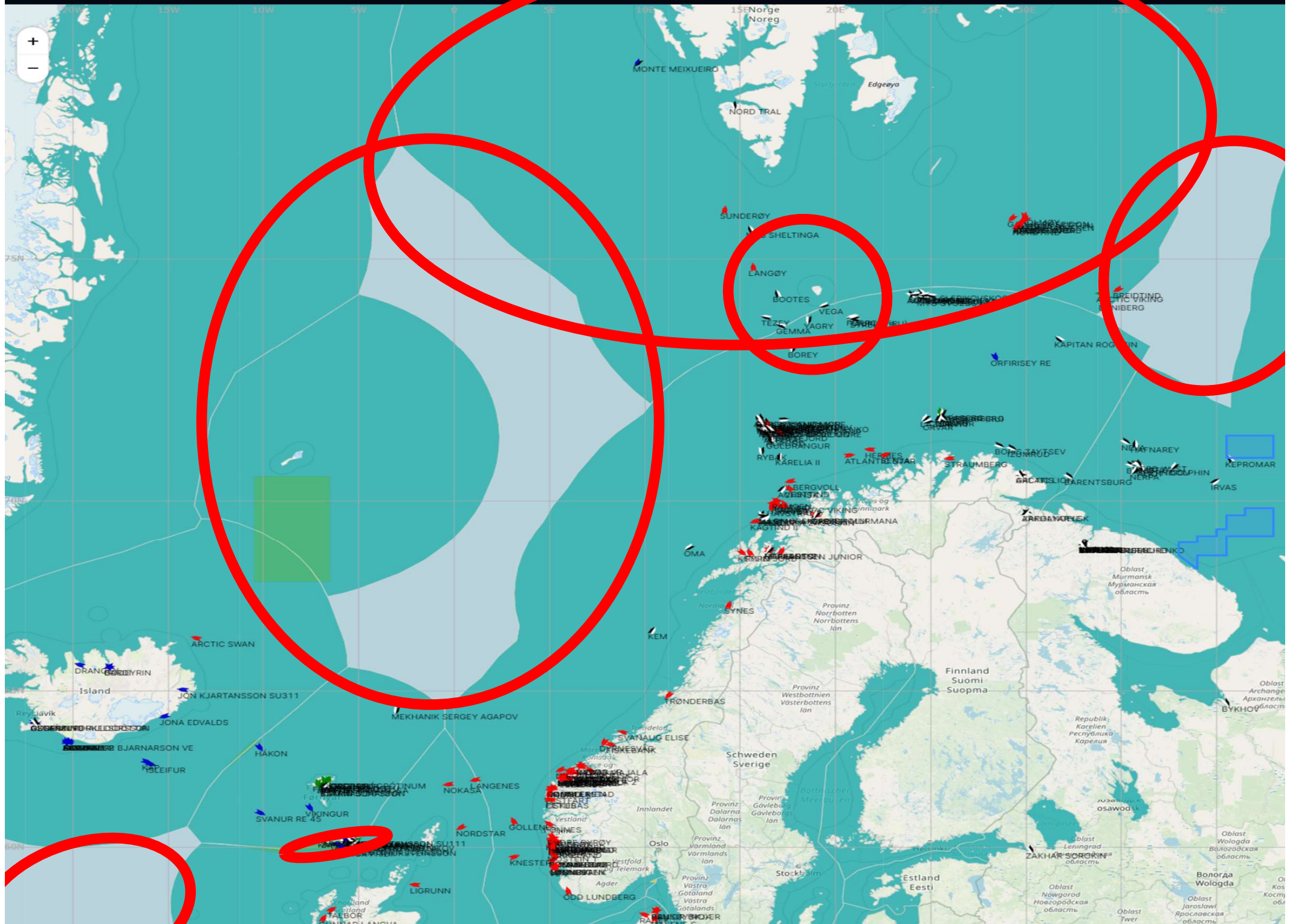
EVENTS

CRM

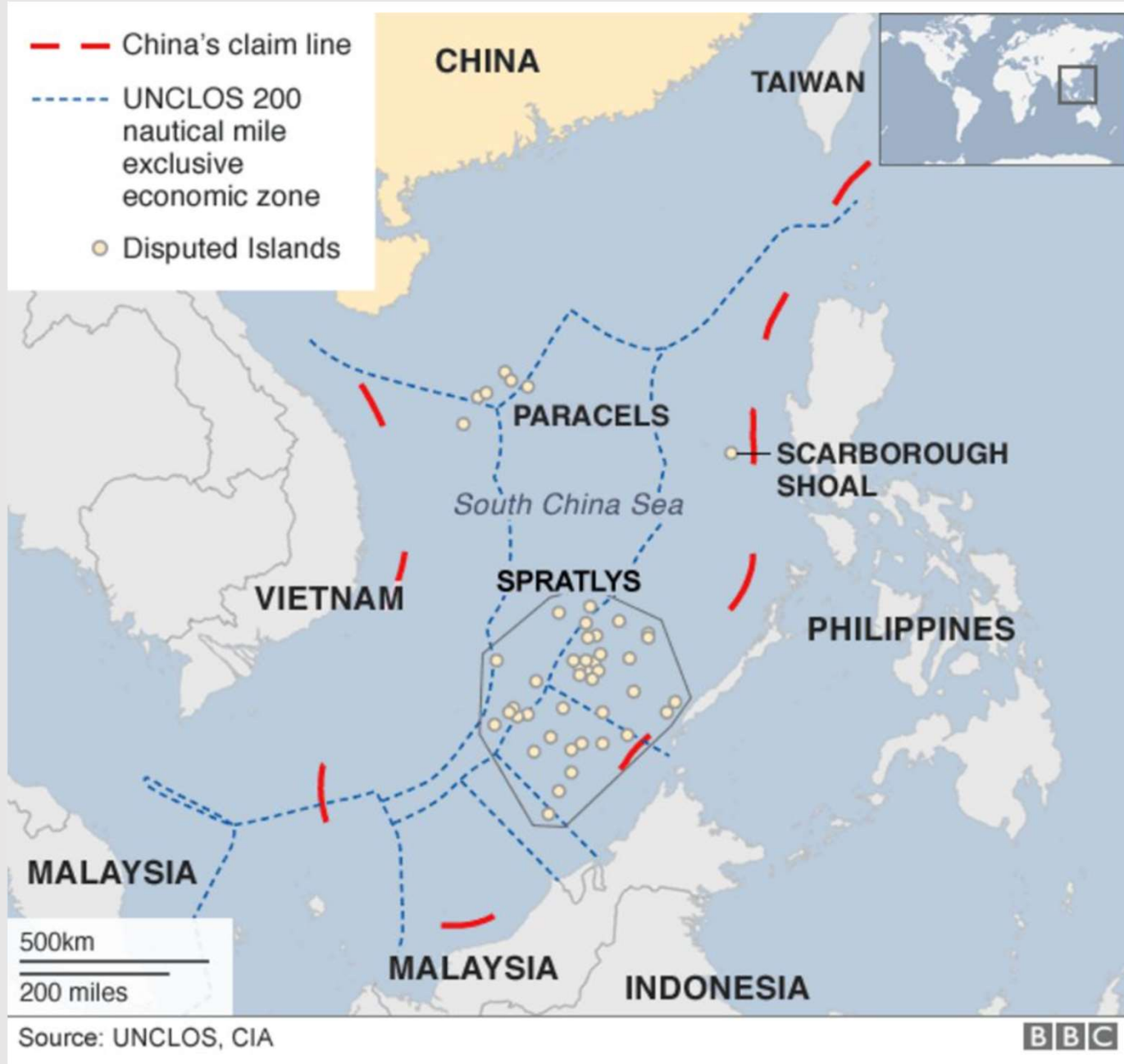
ANALYTICS

BIOLYTICS





China



Transshipments 2021

Norway: 120 t tons

FISHFACTS Search...

CATCH & QUOTAS

The data is limited to public information, i.e. it does not take into account "quota swappings", quotas transferred between years, prices might be unavailable, and in some cases discharges outside the country of origin is not public.

COUNTRY: Norway x FLAG: Russia x SPECIES: All species x FISHERY: All types x FLEETS: All fleets x TIME PERIOD: Year 2021

VESSEL NAME	SPECIES	AREA	QUOTA (t)	CATCH (t)
Mirakh	Cod		0	5,203
Tsafey	Cod	Nord for 62. breddegrad	4,459	4,320
Alleras	Cod		0	3,407
Melkart-2	Cod		0	3,299
Strelets	Cod		0	2,911
Taurus (ru)	Cod		0	2,755
Kapitan Gerashche...	Cod		0	2,579
Korund	Cod		0	2,486
Almak	Cod		0	2,323
Borey	Cod		0	2,217
Sayvros-1	Cod		0	2,194
...	Cod		0	2,067

TOTAL QUOTAS: 11,093 TOTAL CATCHES: 117,287
 TOTAL VALUES: 0
 LAST UPDATE: FO catch foreign vessel: 10-04-2022 05:51, IS catch and quotas: 15-04-2022 01:04, DK catch and quotas: 15-04-2022 01:11, FO quotas: 15-04-2022 01:32, NO quotas: 15-04-2022 01:32

Faroe Islands: 350 t tons

FISHFACTS Search...

CATCH & QUOTAS

The data is limited to public information, i.e. it does not take into account "quota swappings", quotas transferred between years, prices might be unavailable, and in some cases discharges outside the country of origin is not public.

COUNTRY: Faroe Islands x FLAG: Russia x SPECIES: All species x FISHERY: All types x FLEETS: All fleets x TIME PERIOD: Year 2021

VESSEL NAME	SPECIES	AREA	QUOTA (t)	CATCH (t)
Kapitan Nazin	Blue Whiting		0	20,829
Kapitan Demidenko	Blue Whiting		0	15,552
Arctica	Blue Whiting		0	13,550
Karela	Blue Whiting		0	12,592
Mekhanik Sergey ...	Blue Whiting		0	12,226
Boris Syromyatnikov	Blue Whiting		0	11,731
Yantarny	Blue Whiting		0	11,487
Ester	Blue Whiting		0	10,144
Baltiyskaya Kosa	Blue Whiting		0	10,073
Kurshskaya Kosa	Mackerel		0	9,971
Yantarny	AS Herring		0	9,159
...	Mackerel		0	8,090

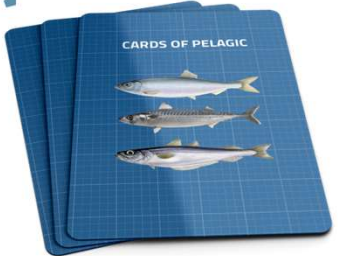
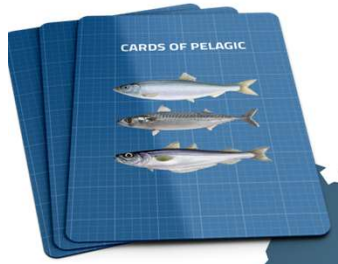
TOTAL QUOTAS: 0 TOTAL CATCHES: 349,245
 TOTAL VALUES: 16,129,523
 LAST UPDATE: FO catch foreign vessel: 10-04-2022 05:51, IS catch and quotas: 15-04-2022 01:04, DK catch and quotas: 15-04-2022 01:11, FO quotas: 15-04-2022 01:32, NO quotas: 15-04-2022 01:32

Blue Whiting

01.04.2022 - 22.04.2022

Mackerel

01.08.2022 – 31.08.2022



**Will Neighbouring countries ever
agree on migrating stocks?**

NO

Overfishing?

?

Thank you

Óli Samró
Fishfacts
Director/owner
oli@fishfacts.fo

JUNE 1 - 3
SKAGEN
DENMARK

Jonathan
Barberá
Rico

R&D Director, 3A
Antioxidants

Alternatives to the Natural Antioxidant
Tocopherol for the Stabilization of Fishmeal





ALTERNATIVES TO THE NATURAL ANTIOXIDANT TOCOPHEROL FOR THE STABILIZATION FISH MEAL



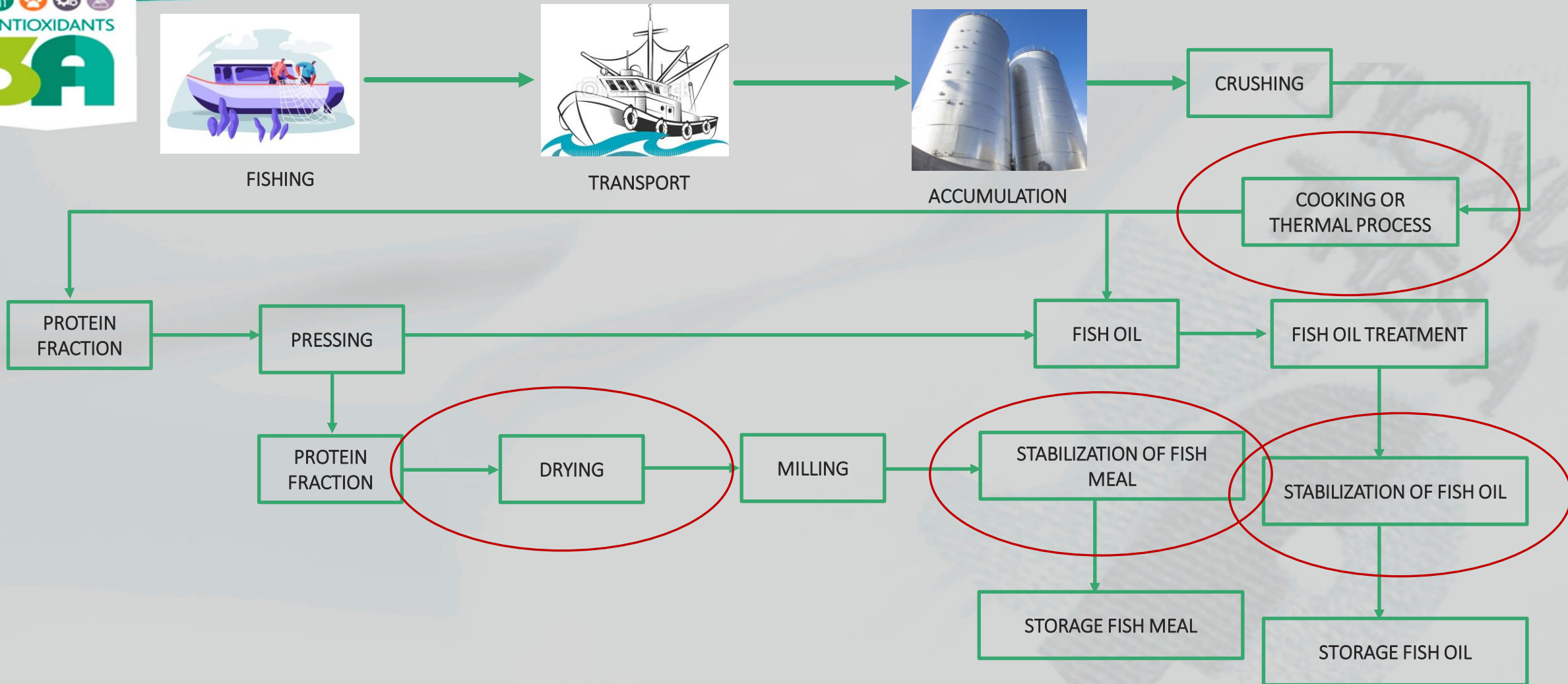
03.06.2022

TECHNICAL DEPARTMENT

Jonathan Barbera

INDEX:

1. FISH OIL AND MEAL PRODUCTION
2. RESTRICTION FOR THE MARINE TRANSPORT
3. TOCOPHEROL MARKET SITUATION AND TENDENCY
4. OPTIONS AND STRATEGIES FOR THE STABLIZATION
5. CONCLUSIONS



FACTORS IMPACT IN THE OXIDATION STAGE

1. FEEDING OF FISH
2. STRESS OF FISH DURING CATCHING
3. TIME LAPSE BEFORE THE PROCESS
4. CRUSHING
5. COOKING PROCESS
6. DRYING
7. MIXING WITH THE ANTIOXIDANT
8. TYPE OF ANTIOXIDANT

CONCERNS IN THE MIXING

1. WETTING THE SURFACE OF THE MIXER
2. TOO MUCH HEIGHT BETWEEN THE SPRAY OF ANTIOXIDANT AND MEAL
3. FREQUENCY OF THE SPRAY
4. INTERNAL AIR CURRENT MOVES THE ANTIOXIDANT CURRENT IN THE LONGITUDENAL AXIS
5. NO CONSTANT MEAL FLOW THROUGH THE MIXER
6. SPRAY PATTERN IS NOT FULL CONE



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IMDG CODE

MOISTURE CONTENT	5 – 12%	5 – 12%
FAT CONTENT	< 12%	< 15%
ANTIOXIDANT	NON TREATED	TREATED
CLASS	4.2	9
UN N°	1374	2216
CATEGORIZATION	SPONTANEOUSLY COMBUSTIBLE	DANGEROUS SUBSTANCES

LIST OF APPROVED AOX BY IMDG

BHT
TOCOPHEROL

WOULD IT BE INTERESTING
TO EXPAND THIS LIST WITH
MORE OPTIONS?

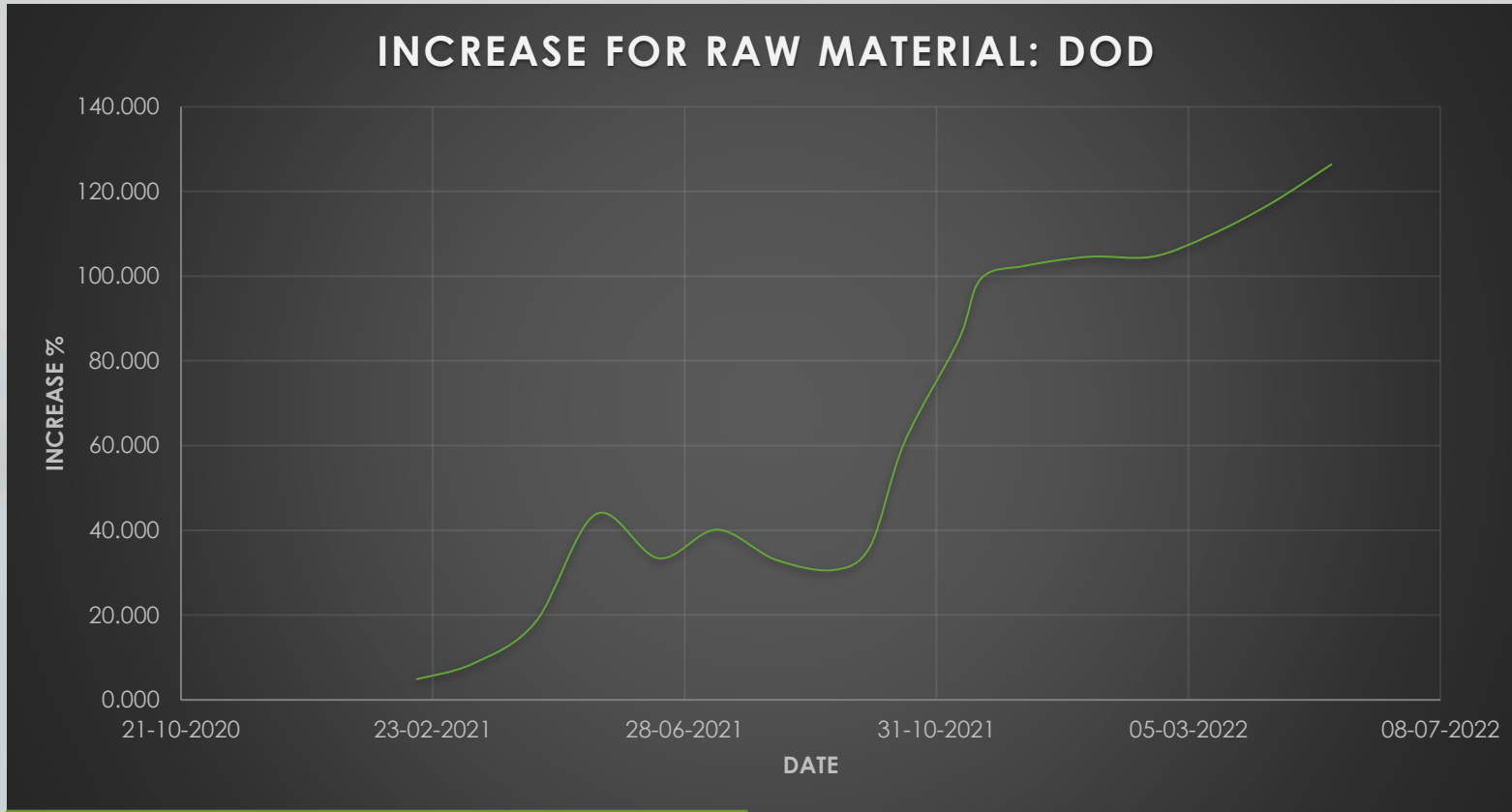


FACTORS AFFECT TO THE COMBUSTION

1. WEATHER AND SEA CONDITIONS
2. STOWAGE
3. TIME IN VESSEL
4. HEIGHT OF STOWAGE
5. VENTILATION SYSTEM IN VESSEL
6. PROCESS PRODUCTION
7. TYPE AND APLICATION OF THE ANTIOXIDANT

INDEX:

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DATA OBTAINED FROM TOCOPHEROL MANUFACTURERS

TRANSPORT COST
DELAY IN TRANSPORT
INCREASE OF DEMAND IN A SHORT
TIME

ENERGY COST



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OPTIONS FOR THE STABILIZATION AGAINST OXIDATION

➤ SYNTHETIC ANTIOXIDANTS:

➤ PROPOSALS WITH BHT OR ITS COMBINATIONS WITH BHA, PROPYL GALLATE

➤ BEBUTOX G-20 (BHT + CHELATING AGENT)

➤ BEBUTOX GP (BHT + PROPYL GALLATE+ CHELATING AGENT)

➤ ABUTOX CT (BHT + BHA + CITRIC ACID DERIVATIVE)

THE KNOWLEDGE IN HOW THE ANTIOXIDANTS WORK ALONG WITH THE RAW MATERIAL AND PROCESS ARE ESSENTIAL TO CONTROL THE OXIDATION OF FISH MEAL

OPTIONS FOR THE STABILIZATION AGAINST OXIDATION

➤ Natural antioxidants:

➤ Proposals with Tocopherol or its combinations with Natural extracts

➤ Naturnox-15 (Tocopherol) 200 ppm → 60 ppm

➤ Naturnox-10 (Tocopherol + Botanical Extract + Olive derivate) 200 ppm → 110 ppm

➤ Natox Prime (Tocopherol + Deodorized Rosemary extract+ Chelating agent)

➤ No Tocopherol: Green Tea + Rosemary

THE SYNERGIC EFFECT WITH THE DIFFERENT MOLECULES
ALLOW US THE MAXIMUM RESIDUAL OF TOCOPHEROL IN FISH
MEAL CUTTING DOWN ON THE TOCOPHEROL CONSUMPTION

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5. CONCLUSIONS

- IN TERMS OF OXIDATION, DIFFERENT FACTORS DEFINE THE STABILITY OF THE FISH MEAL.
- THE EXTENSION OF THE LIST OF ANTIOXIDANTS APPROVED BY IMDG GUARANTEES MORE RESOURCES TO STABILIZE PRICES IN THE MARKET
- TOCOPHEROL IS THE MOST KNOWN ANTIOXIDANT.
- RUNNING WITH SYNERGIC BLENDS BETWEEN DEODORIZED ROSEMARY EXTRACT AND TOCOPHEROL OFFERS DIFFERENT BENEFITS:
 - CUTTING DOWN ON THE TOCOPHEROL CONSUMPTION.
 - HIGHEST RESIDUAL OF TOCOPHEROL INTO THE MEAL.
 - REDUCING THE COST OF THE STABILIZATION



THANK YOU VERY MUCH INDEED

3A ANTIOXIDANTS

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info@tres-a.net

(+34) 968 839 004



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DENMARK

Stefan
Kirchner

Separators CEO at GEA
Westfalia Seperator Group
GmbH

Fish Collagen – a New Trend in the
Processing of Fish By-Products





Fish Collagen

A new trend in the processing of fish by- products

Stefan Kirchner
Skagen, June 2022

Introduction



Content

- **What is fish collagen**
- Typical raw materials
- **What is the different between collagen, gelatin and collagen-peptides**
- Typical processes for collagen peptide recovery
- **End Product specification**
- Summary

What is Fish collagen

... a Protein

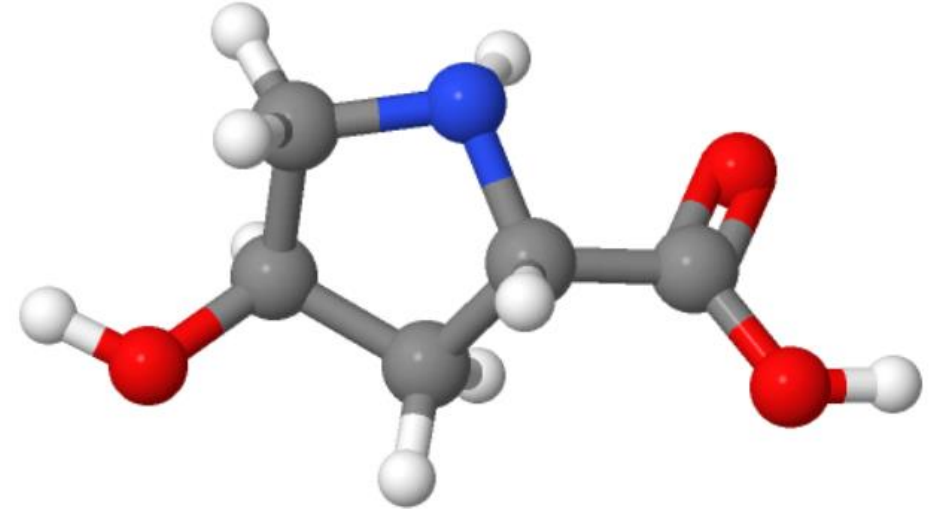
... a special protein with an important role for animals and fish

... a protein which provides structural support

... collagen can be found in skin, tendons and bones

What is Fish collagen

- ... a **Protein with a very special amino acid**
- 12 - 13 % of the amino acid is **Hydroxyproline**



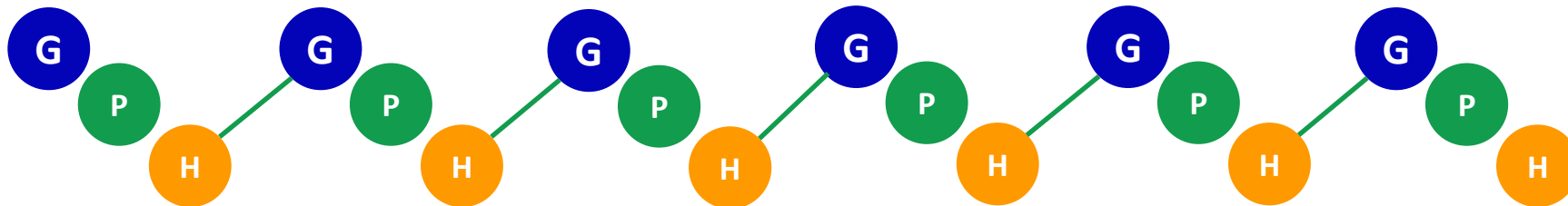
Hydroxyproline molecule, source: Wikipedia

- ... a **Protein with a very special amino acid sequence (primary structure)**
- Glycine/ Proline/ Hydroxyproline

What is Fish collagen

... a Protein which build up in a helix structure (secondary structure)

- Most common is the sequence Gycine – Proline- Hydroxyproline which will build a helix structure of the amino acid chain (**a-chain**)



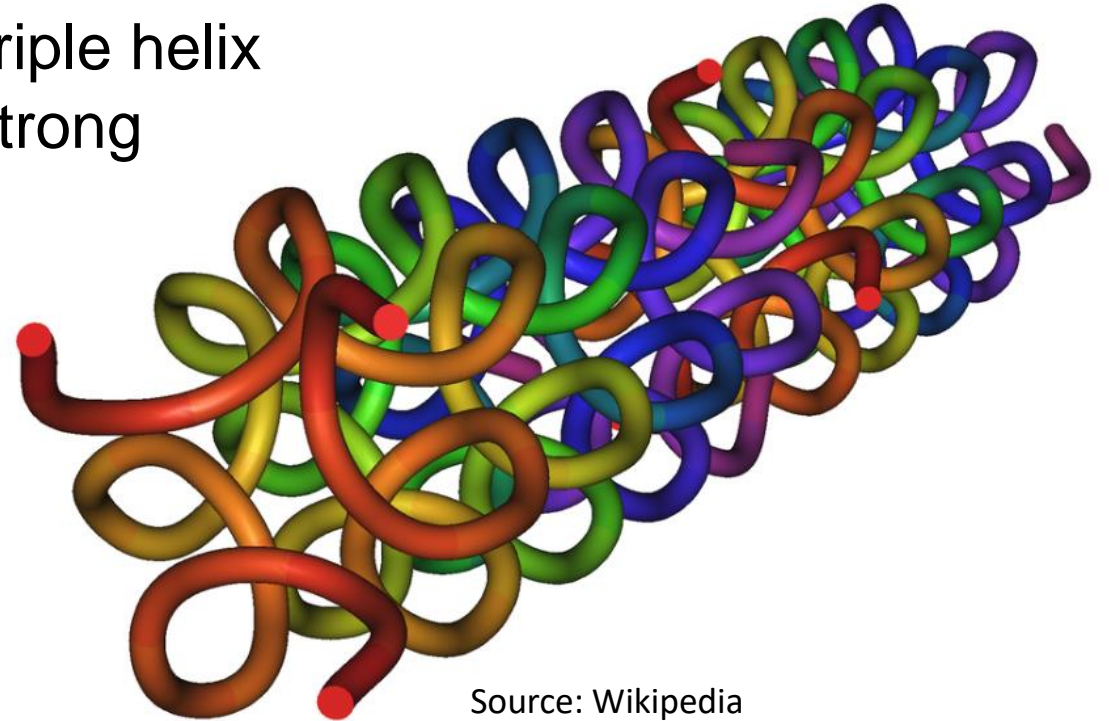
What is Fish collagen

... a Protein which builds a triple helix (tertiary structure)

- 2 x α_1 -chain and 1 x α_2 -chain will build a triple helix
- Intermolecular connections build a very strong structure protein


Impact to processing:

- Collagen is not soluble in water





Source: Wikipedia




Typical raw materials (fish, examples)

Source/ Raw material	Protein/ Collagen Content	Other components
Skin 	Compositon (example tuna): <ul style="list-style-type: none">- 42 % DS- 7,8 % ash- 17,8 % Protein- 23,8 % fat Recovery rate collagen peptide: 4 -6 % Hydroxiprolin content: 8- 10 %	<ul style="list-style-type: none">- Non Collagen Proteins- Fat

Typical raw materials (fish, examples)

Source/ Raw material	Protein/ Collagen Content	Other components
<p>Skin</p> 	<p>Compositon (example tuna):</p> <ul style="list-style-type: none"> - 42 % DS - 7,8 % ash - 17,8 % Protein - 23,8 % fat <p>Recovery rate protein peptide: 4 -6 % Hydroxiprolin content: 8- 10 %</p>	<ul style="list-style-type: none"> - Non Collagen Proteins - Fat
<p>Bones</p> 	<p>Compositon (example tuna):</p> <ul style="list-style-type: none"> - 53 % DS - 27,7 % ash - 18,8 % Protein - 1,7 % fat <p>Recovery rate collagen peptide: 5 -8 % Hydroxiprolin content: 7- 9 %</p>	<ul style="list-style-type: none"> - Minerals

Typical raw materials (fish, examples)

Source/ Raw material	Protein/ Collagen Content	Other components
Skin 	Compositon (example tuna): - 42 % DS - 7,8 % ash - 17,8 % Protein - 23,8 % fat Recovery rate protein peptide: 4 -6 % Hydroxiproline content: 8- 10 %	<ul style="list-style-type: none"> - Non Collagen Proteins - Fat
Bones 	Compositon (example tuna): - 53 % DS - 27,7 % ash - 18,8 % Protein - 1,7 % fat Recovery rate protein peptide: 5 -8 % Hydroxiproline content: 7- 9 %	<ul style="list-style-type: none"> - Minerals
Scales 	Compositon (example demin. Tilapia): - 89 % DS - 0,2 % ash - 88 % Protein - 0,3 % fat Recovery rate collagen peptide: > 80 % Hydroxiproline content: 10 -13 %	<ul style="list-style-type: none"> - Minerals

Summarize Raw material

Main raw material:

- Skin
- Clean bones (from hydrolyzation)
- Scales

Requirements for Raw Material :

- Food grade
- High content of Hydroxyproline
- Low grade of contaminations

General principle of process: **Preparation**

Bones/ Scales

Crude material

Demineralization

Collagen rich material

Acid

Skin

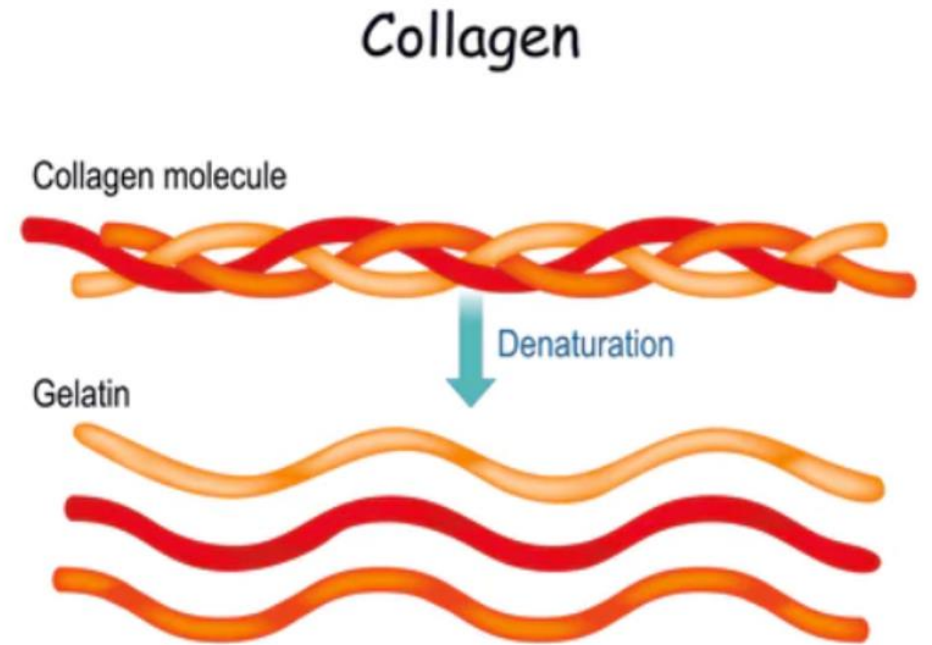
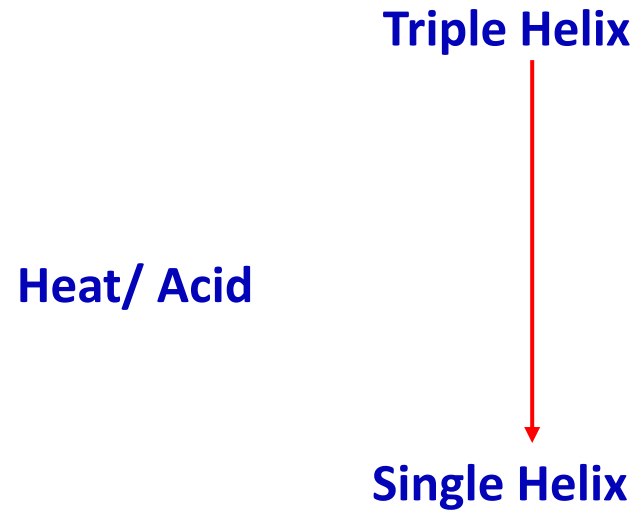
Crude material

Washing

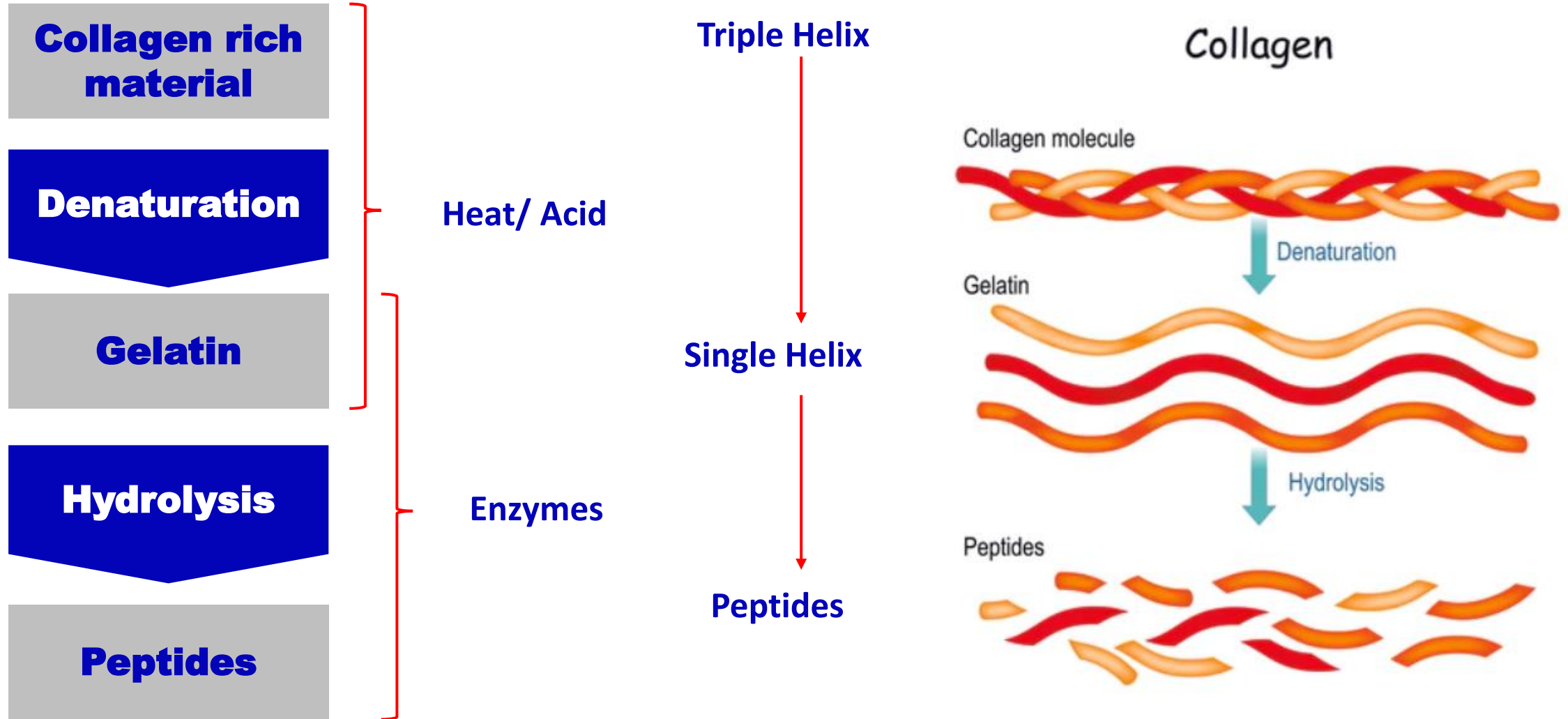
Collagen rich material

Cold water

General principle of process: **Denaturation**

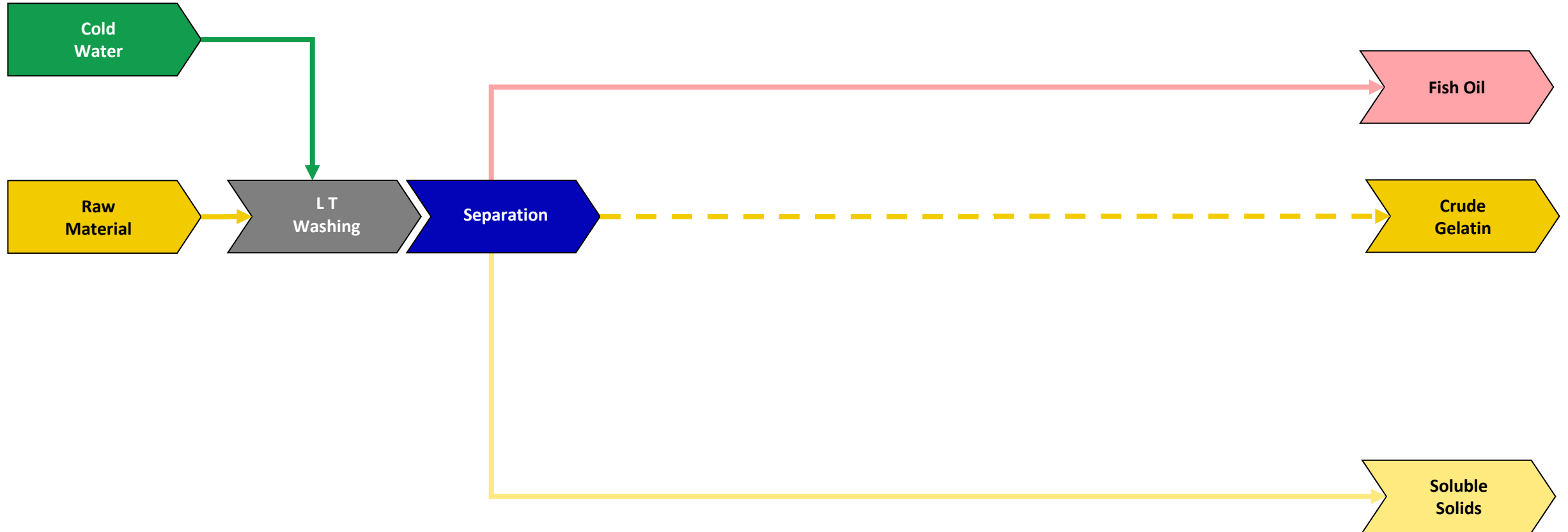


General principle of process: **Hydrolysis**



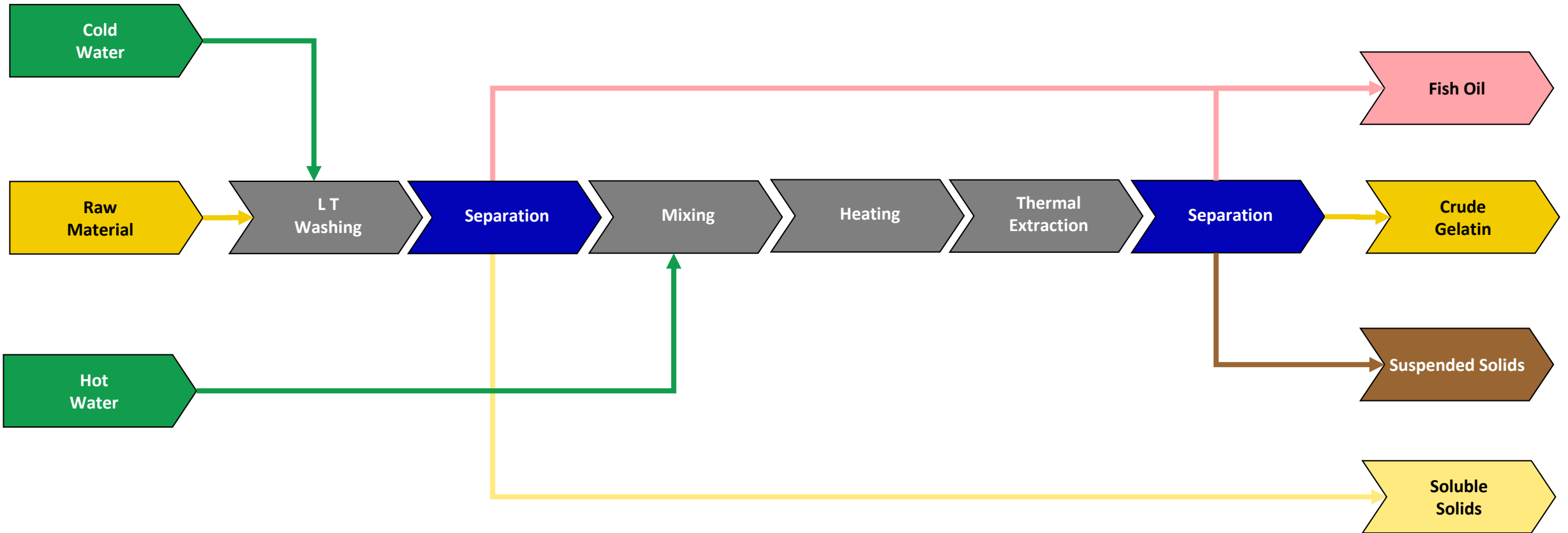
Typical process for: Skin (**Gelatin and Peptides**)

Pre-treatment



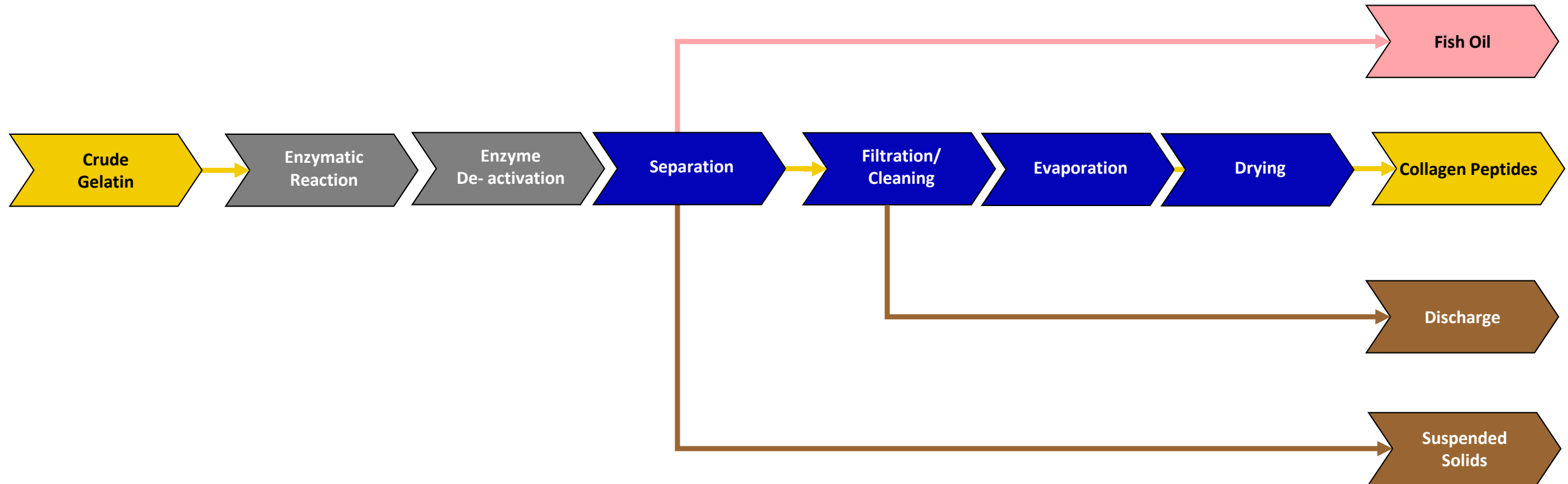
Typical process for: Skin (**Gelatin and Peptides**)

Pre-treatment/ De-naturation (thermal extraction)



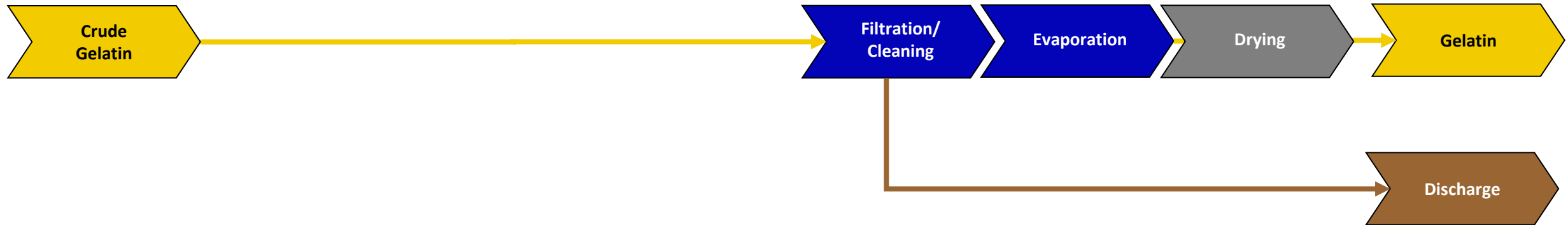
Typical process for: Skin (collagen-peptide)

Enzymatic treatment/ Fractionation/ Concentration



Typical process for: Skin (**Gelatin**)

Fractionation/ Concentration



General Design Features

Process:

- Sanitary design
- Food grade
- CIP cleanable



Summarize Process

Pre- treatment:

- Different process steps for different raw materials



Collagen Peptides:

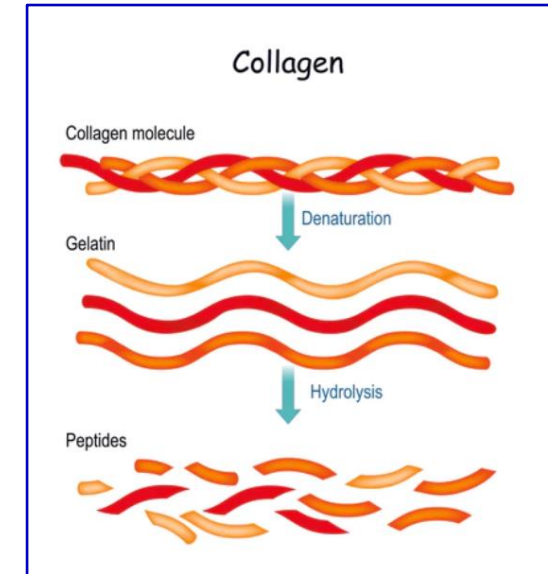
- Thermal extraction and enzymatic extraction
- More equipment but less complicated

Gelatin:

- Thermal extraction
- Less equipment but more difficult to get a product quality

Fish gelatin vers collagen peptides

	Gelatin	Collagen Peptide
Function	<ul style="list-style-type: none"> • Water binding • Viscosity • Gel building • Gel strength • Transparency 	<ul style="list-style-type: none"> • Water solubility • digestibility • “Health improvement”
Use	<ul style="list-style-type: none"> • Food ingrediencies 	<ul style="list-style-type: none"> • Nutraceutical • Food supplement
		



Advantages of Gelatin and Collagen Peptides

General:

- Gelatin and collagen- peptides are water soluble
- Better digestible than collagen
- Both products contain high amounts of amino acids
- Ethic aspects enlarge the group of consumer

Collagen Peptides:

- Collagen- Peptides as Nutraceutical (amino acids)

Gelatin:

- Gelatin in food applications for increasing of viscosity

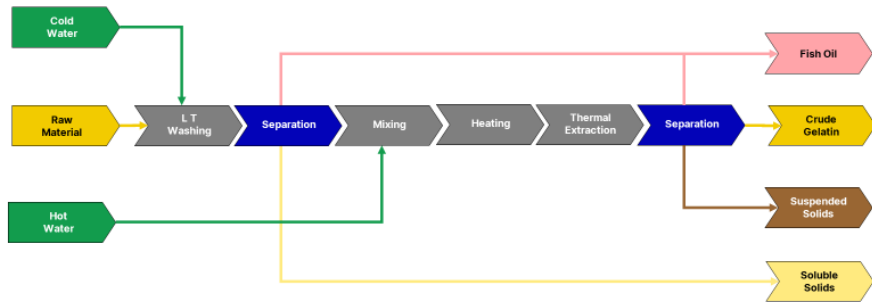
Summary: Fish Collagen Peptides

General:

- Different raw materials available
- Complex process with different by products
- Competition from animal raw materials
- Food grade design

Typical process for: Skin (Gelatin and Peptides)

Pre- treatment/ De- naturation (thermal extraction)

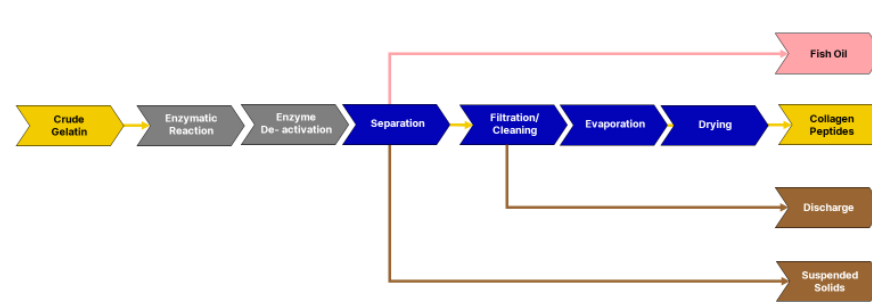


GEA Fish Collagen - a new trend in processing of fish by- products

01 June 2022 16

Typical process for: Skin (collagen- peptide)

Enzymatic treatment/ Fractionation/ Concentration



GEA Fish Collagen - a new trend in processing of fish by- products

01 June 2022 17

GEA Engineering
for a better
world.

JUNE 1 - 3
SKAGEN
DENMARK

Ragnar
Sverrisson


Héðinn hf.

Protein Recovery in a Compact, Cost-Effective
and Environmentally Sustainable Manner



The logo consists of the letters 'HPP' in a bold, sans-serif font. The 'H' is a solid block, while the 'P's have a circular cutout at the top.

PROTEIN PLANT

The background of the slide is a blue-tinted photograph of a hiker with a backpack standing on a rocky trail in a mountainous landscape. The hiker is positioned in the center-left of the frame, looking towards the right. The mountains are rugged and partially covered in snow or light-colored rock. The overall tone is serene and adventurous.

Héðinn hf & HPP PROTEIN PLANT

Ragnar Sverrisson - Managing Director HPP Solutions

03.06.2022

The History



Héðinn established 1922

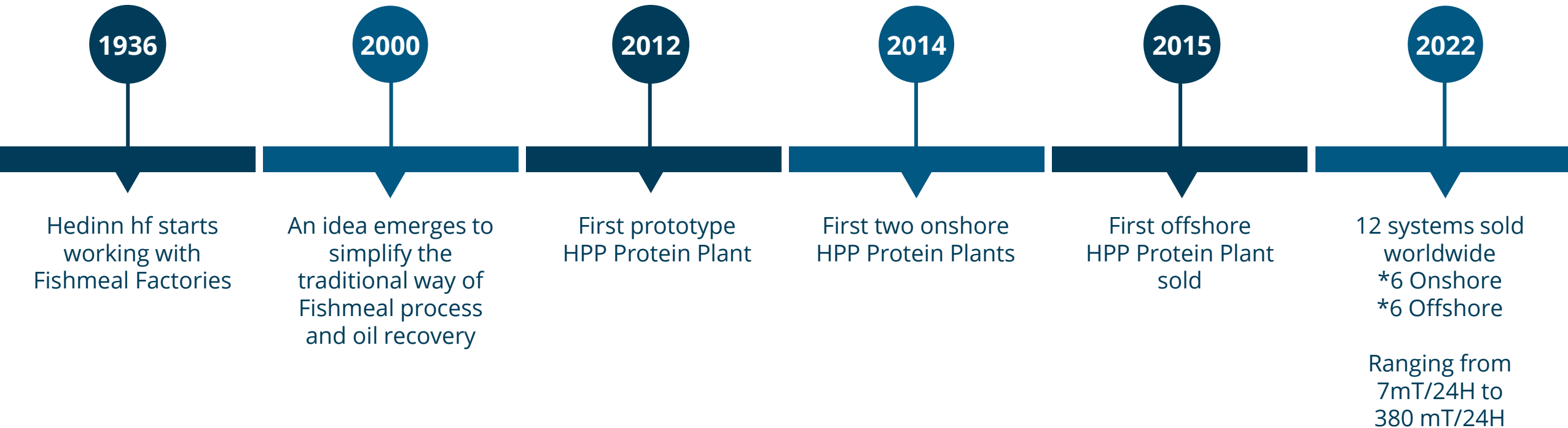
100+ employees

100 years anniversary



The development of HPP Protein Plant

Smaller and simpler machines making high quality meal and oil, in energy efficient way.



HPP Protein Plant Current & Future Markets

Smaller and simpler machines making high quality meal and oil in energy efficient way.

FISH



Aquaculture

- Salmon
- Trout
- Tuna
- Carp



Whitefish

- Cod
- Haddock
- Saithe
- Redfish



Pelagic

- Herring
- Mackerel
- Sprat
- A.Pollock



Shrimp



Crab



Poultry

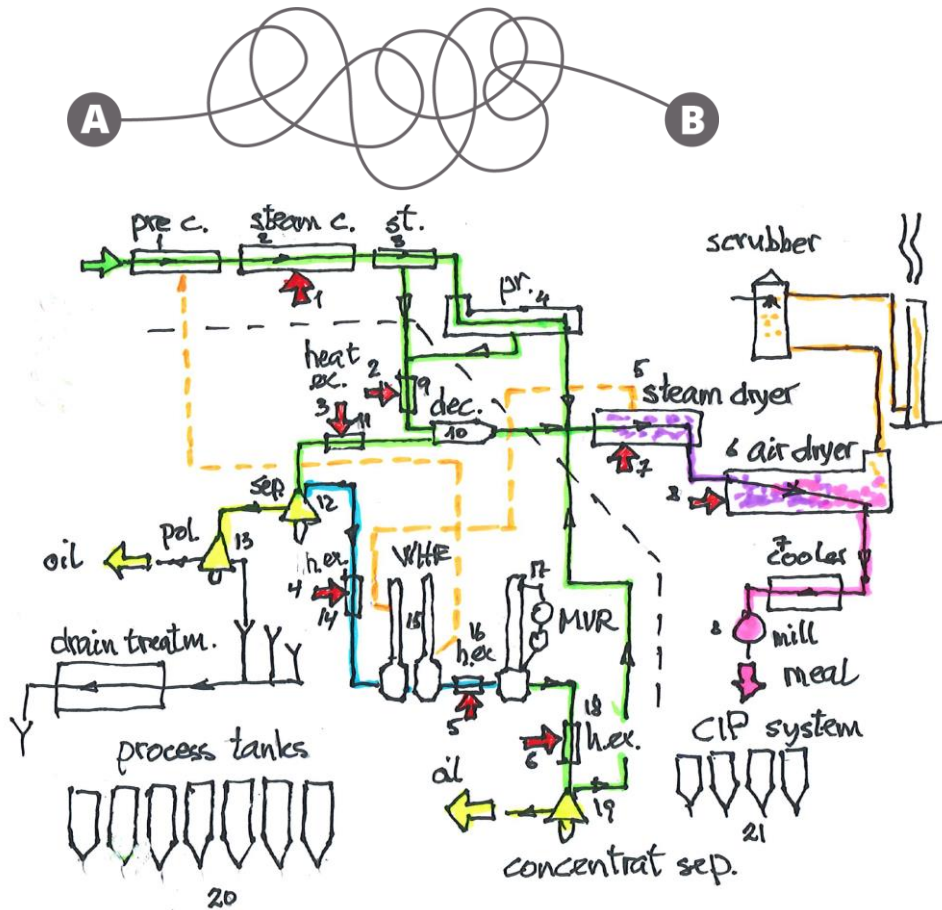


Meat

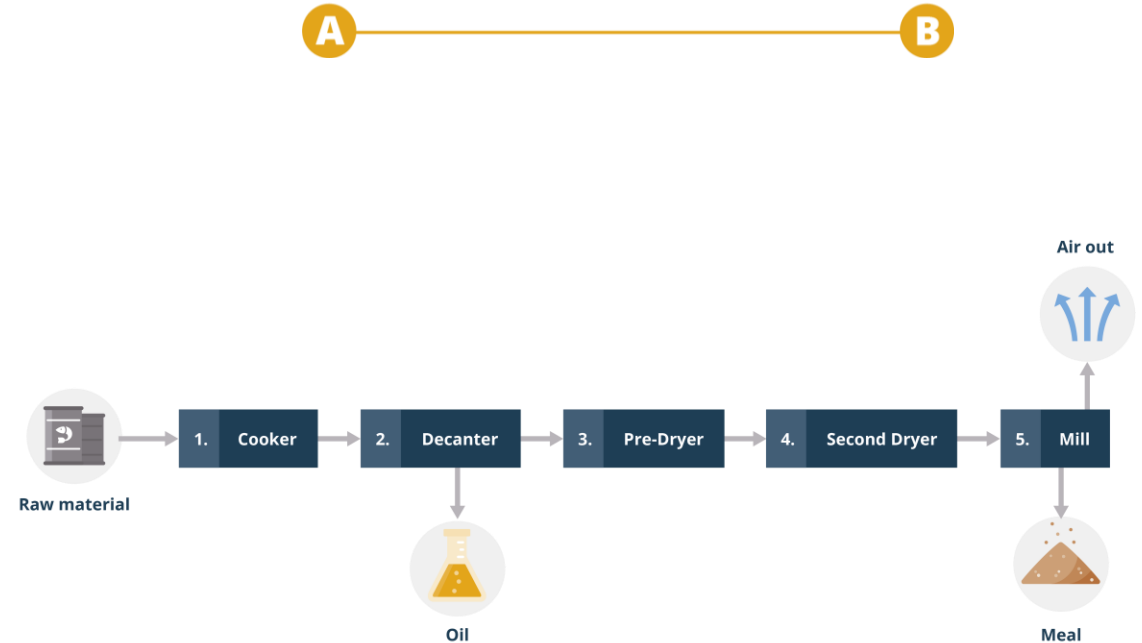
CRUSTACEANS

FUTURE

Smaller machines need to be simpler to be economical



Traditional Fishmeal plant



HPP Protein Plant



Where is HPP?



HPP at North Star

Started operation end of year 2021

Meal with higher protein values. Full utilization of proteins.

Not good ballance between frezzing hold and meal/oil storage



HPP at SVN

Two lines total of 400 tn/h of RM

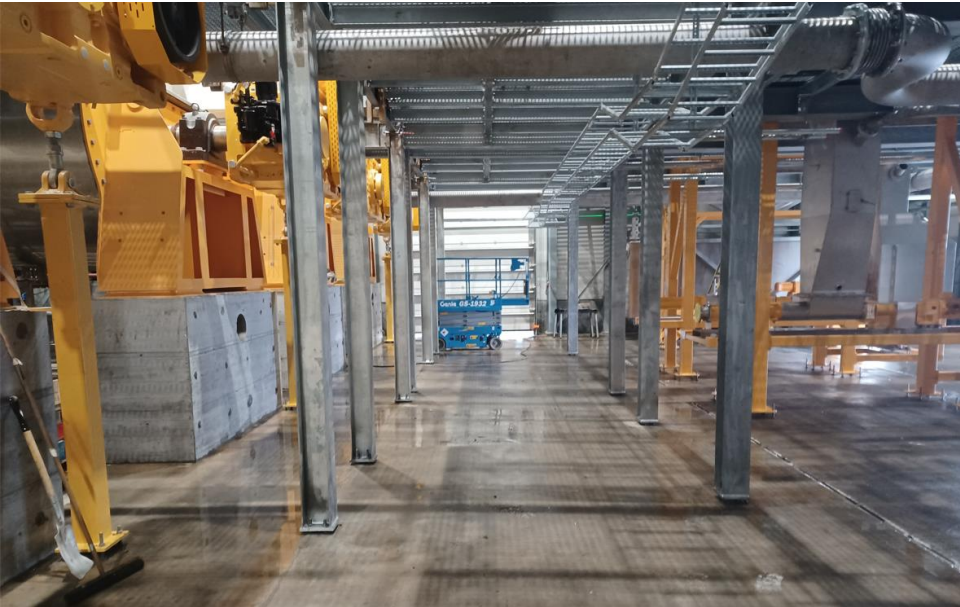
Startup in August 2022

70 tn/d to 2400 tn/d

Better RM quality, less buffering

Minimize cleaning time

Lower energy cost. Minimize starting/stopping



30%

lower energy use
being resourceful with energy usage

100% utilization
of raw material

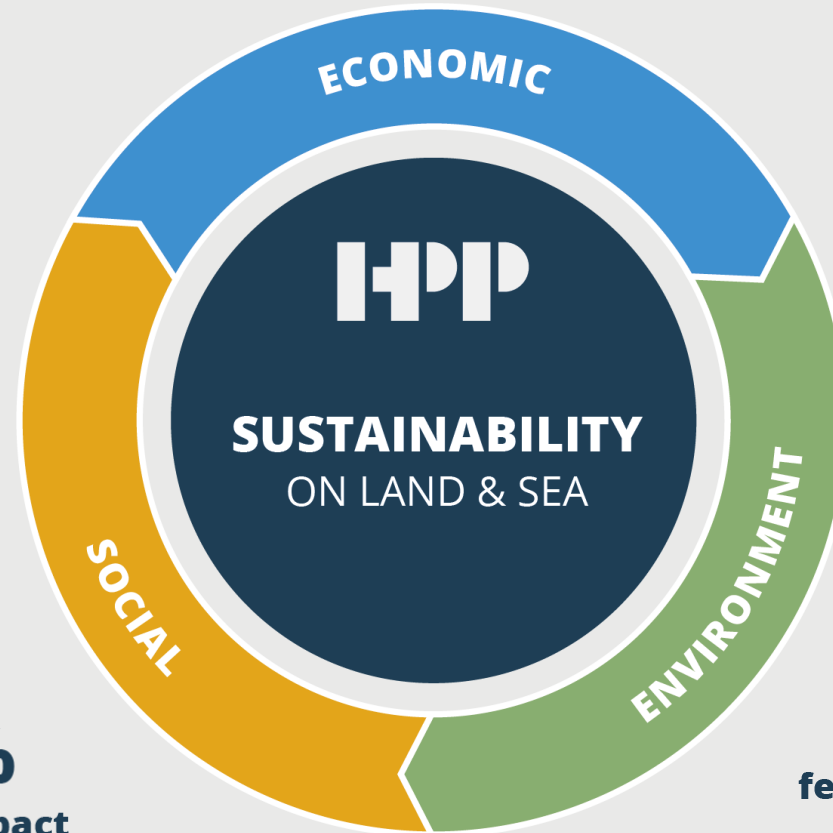
Local business
Produce & sell protein
and oil locally for feed
or human consumptions

Quality feed from waste
Create feed for animals that
will feed the locals in
a sustainable manner

30%
more compact

30%
fewer components
Fewer resources
used for equipment

**Green
technology company**
Technology intended to
reduce the impact of humans
on the environment



We are part of the solution

HPP Protein Plant is contributing to the fight for a more sustainable future.

Working in harmony with business goals and the environment

HPP Solutions | sales@proteinplant.is | proteinplant.is



HPP Solutions | sales@proteinplant.is | proteinplant.is

JUNE 1 - 3
SKAGEN
DENMARK

Matteo
Betti

Global sales, Food
Industry decanters, Alfa
Laval

Alfa Laval – Oil Stripping Decanter



מחנה
המנוחה

מחנה
המורים

Oil Stripping Decanter

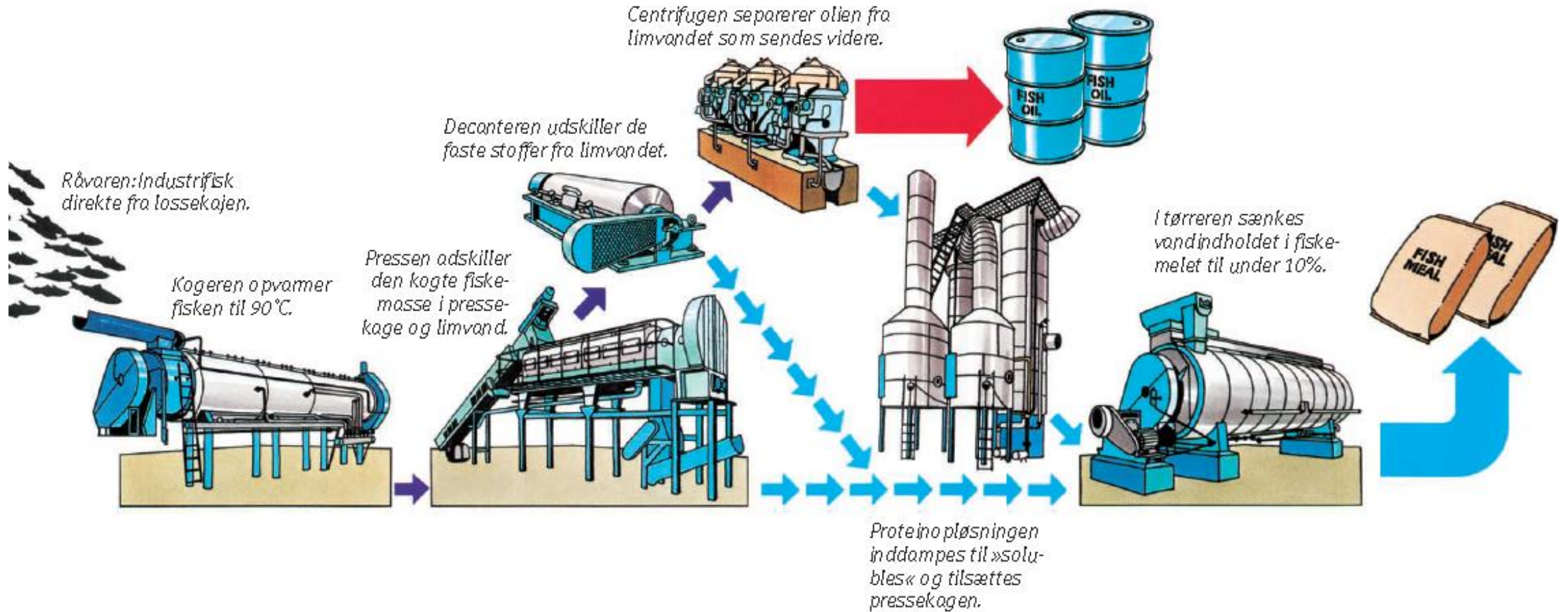
- *Alfa Laval latest decanter technology to recover more fish oil and produce low fat fish meal*



Matteo Betti
Global Sales, BU Decanters

Conventional fish meal process

- A brief overview on traditional technology



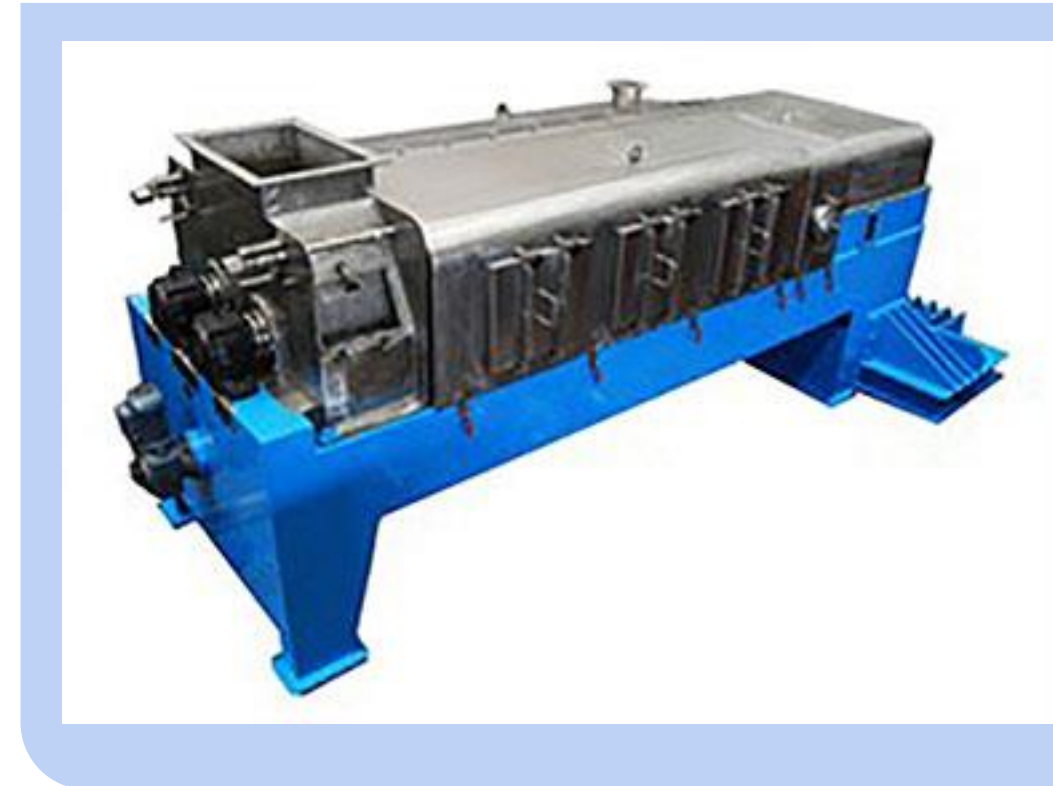
Kilde: Foreningen for Danmarks Fiskemel og Fiskeolieindustri.

Conventional fish meal process

- Press based process

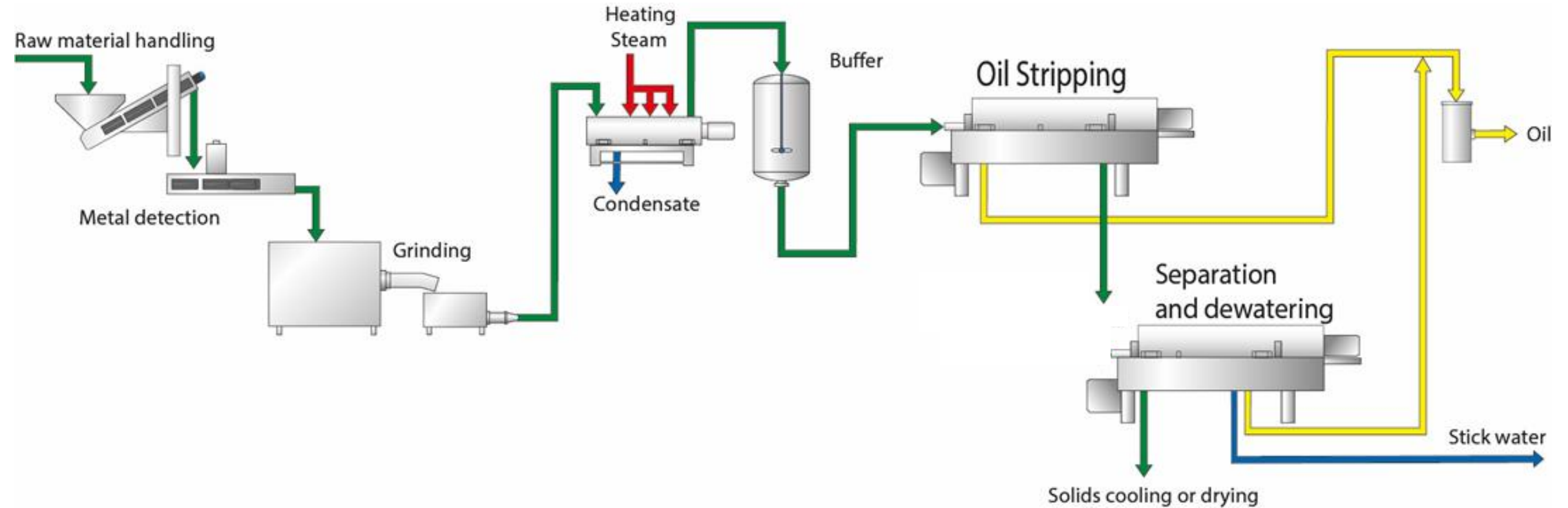


- Good de-watering and average de-oiling action on large species of fishes
- Difficult to use when soft fish
- No food execution available



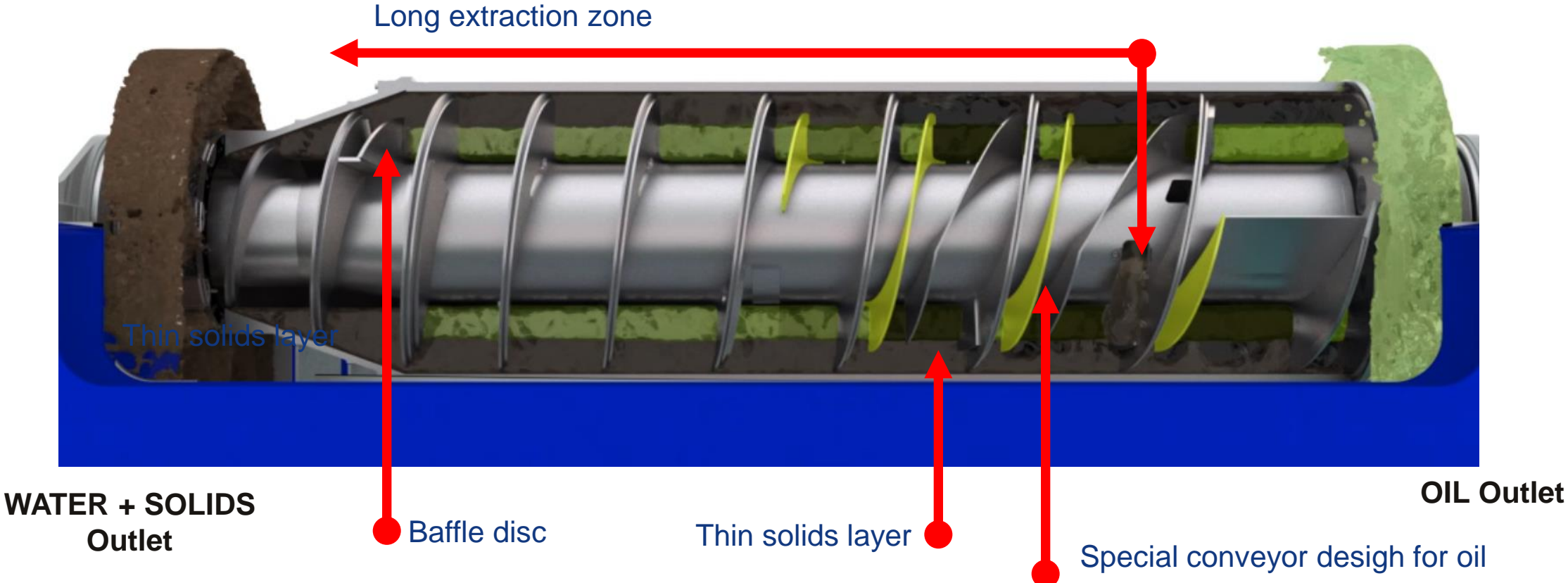
CentriFlow concept with double decanter

- Double stage decanter fish process



Oil Stripping Decanter

Oil stripping design



CentriFlow concept with double decanter

- Advantages

- Applicable to all species or fish of fish parts conditions
- Maximum oil extraction up to 2% less oil in the meal (Sand Eel and Norway Spout)
- Similar or better cake dryness If compared with press and decanter
- Faster process as\ oil is immediately removed from the fish with positive impact on quality
- Simple to operate no adjustment between different feed composition
- Clean oil from Oil Stripping Decanter
- Easier duty for second decanter
- Clean stick water from second decanter

1-2 % reduction
Of fat in meal

(FiDM) when comparing to
dewatering alone

Alternative applications

– Oil Stripping Decanter



- Same technology can be applied to many other fish process such as
 - Sileage de-oiling
 - Hydrolisate de-oiling
 - Soluble de-oiling
 - Pre-press de-oiling
 - Post-press de-oiling
- Test module available



Thank you

JUNE 1 - 3
SKAGEN
DENMARK

Coffee Break

Sponsored by Unit
Pump

UNIT-PUMP



JUNE 1 - 3
SKAGEN
DENMARK

Michael
Thomsen

Key Account Manager, FM
Bulk Handling

**The Solution to Accurately Add Antioxidant
and Mix Fishmeal Before Storage**





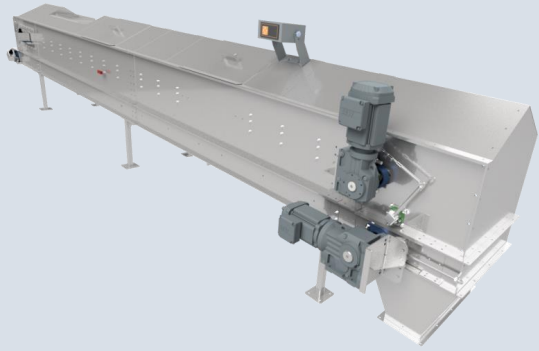
03/06 2022

FM Bulk Handling – Fjordvejs

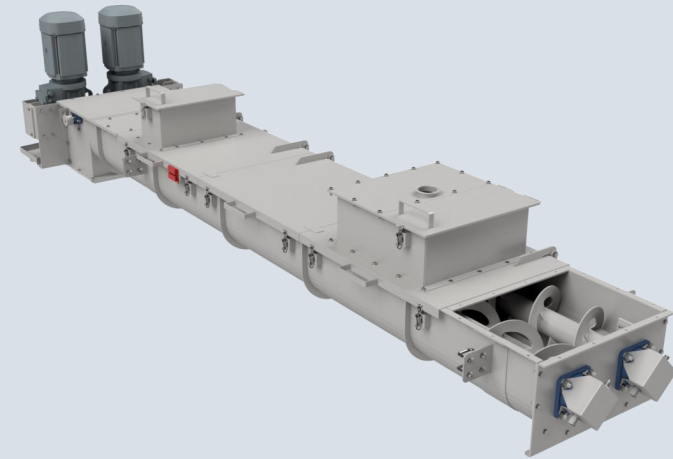
How to accurately add antioxidant to fishmeal before storage

System for adding antioxidant

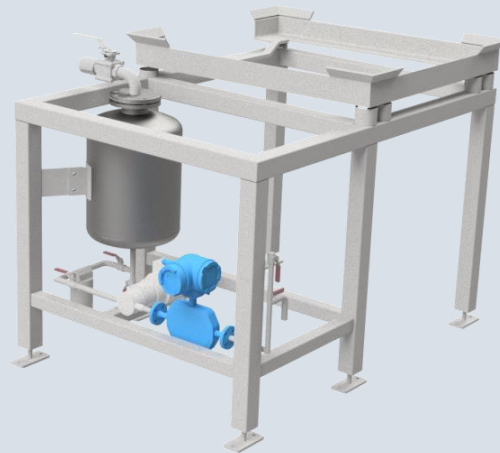
- Weighing unit
- Dosing unit
- Mixing unit



Scale – belt conveyor



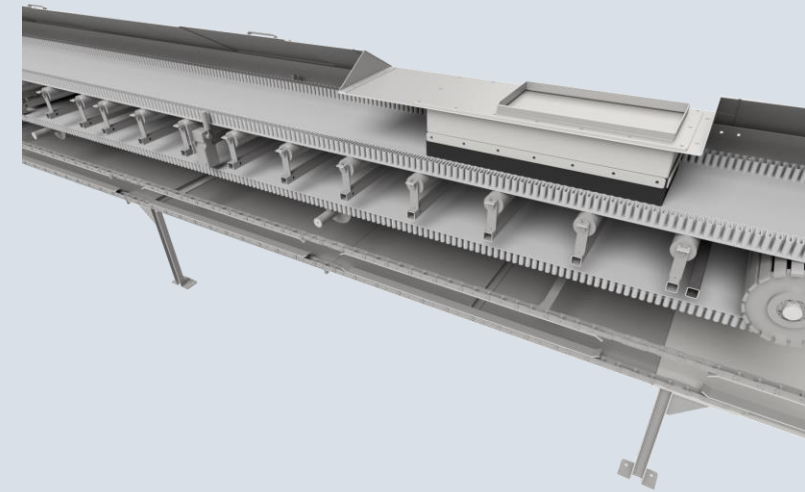
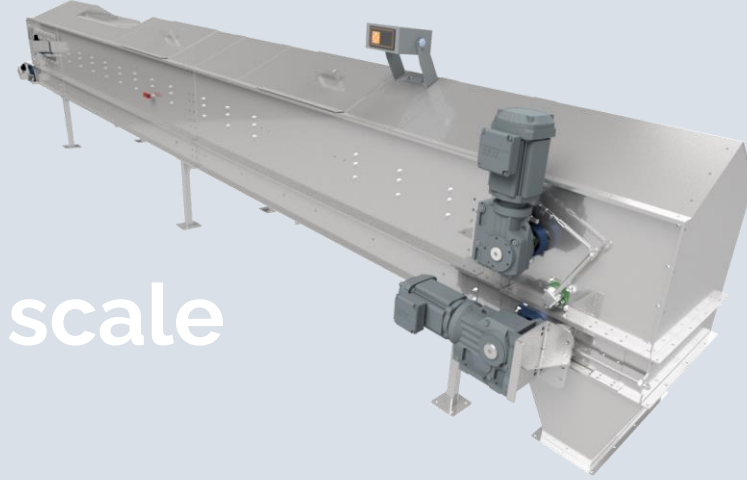
Ribbon mixer – screw conveyor



Dosing unit for IBC container

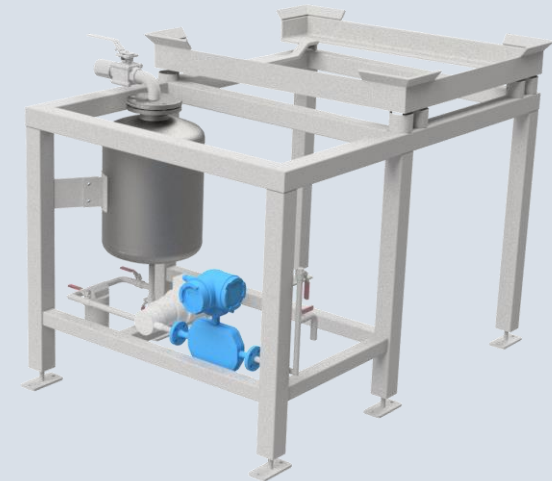
Weighing unit

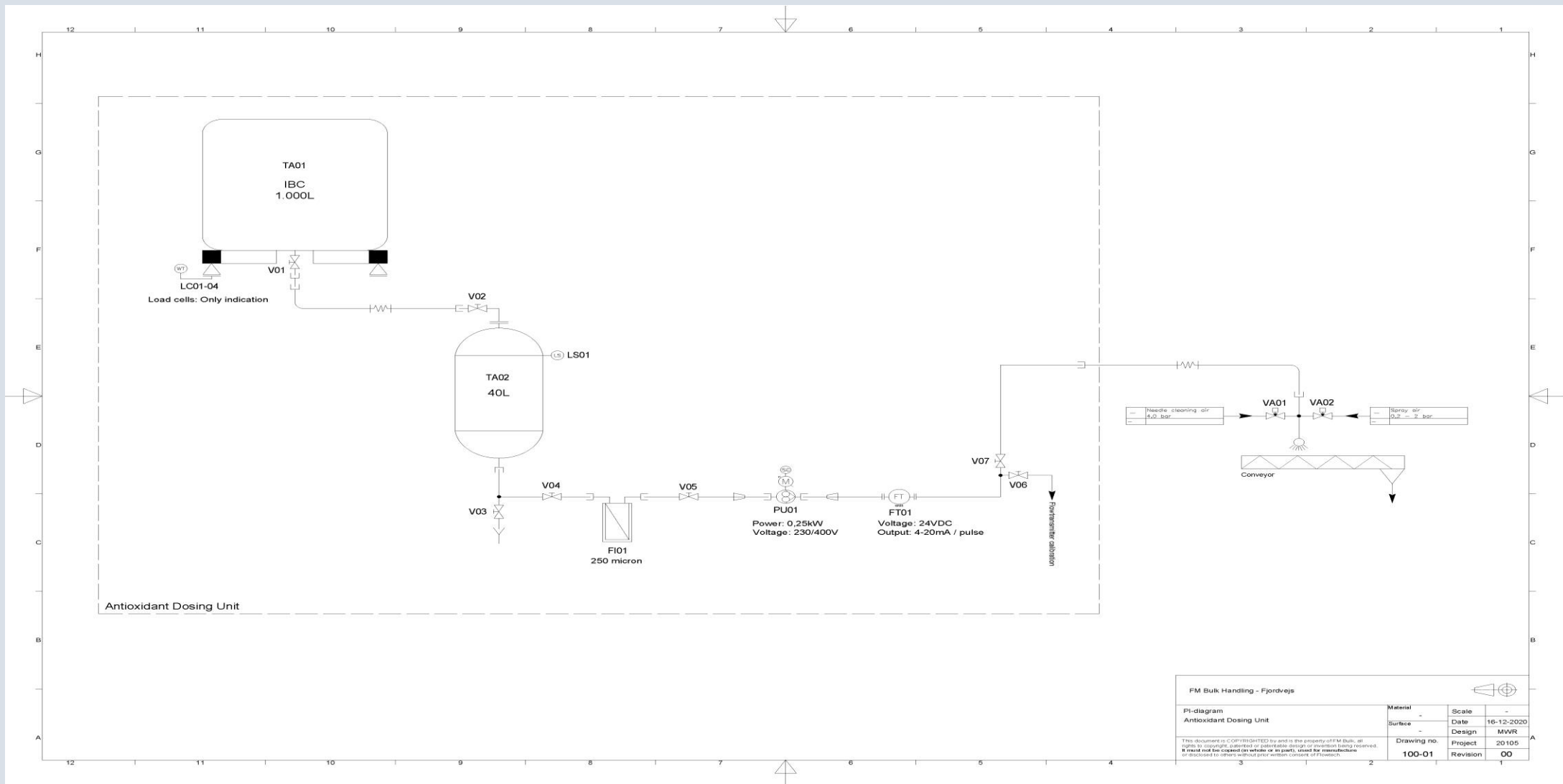
- Belt conveyor with built-in scale
 - Closed design
 - No dust
 - Clean
 - Output to customers controlsystem



Dosing unit for IBC containers

- Accurate dosing
- Input/output to/from customers controlsystem
- Calibration option
- Automatic nozzle cleaning
- Weight indication for IBC



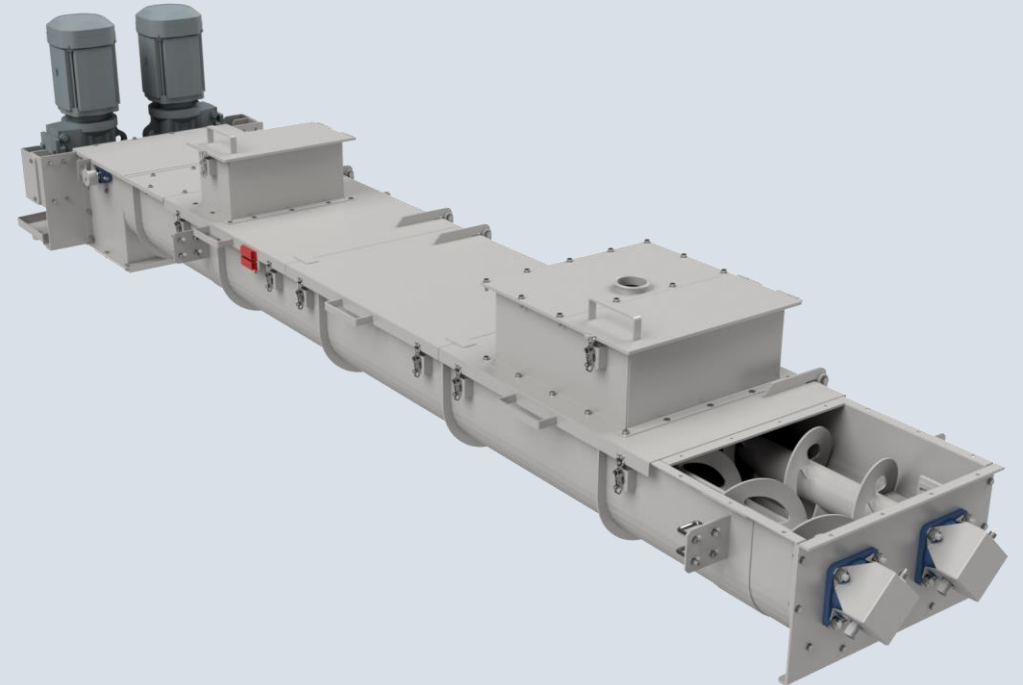


FM Bulk Handling - Fjordvejs			
PI-diagram	Material	Scale	-
Antioxidant Dosing Unit	Surface	Date	16-12-2020
		Design	MWR
	Drawing no.	Project	20105
	100-01	Revision	00

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Mixing unit

- Ribbon mixer – screw conveyor
 - Efficient mixing
 - Closed design
 - No dust
 - Easy cleaning





What is your needs?

JUNE 1 - 3
SKAGEN
DENMARK

Leif Gunnar
Madsen

Fjell Technology Group

Energy Efficiency in the Fishmeal Industry





FJELL
TECHNOLOGY GROUP

ENERGY EFFICIENCY IN FISH MEAL PLANTS

Composed by Dr. Asbjørn Strand

EFFOP, Skagen - June 2022



Leif Gunnar Madsen
Fjell Technology Group
Business Development

www.fjelltg.com

FTG-2022-ENERGYEFFICIENCY

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50

Technology **Fast 50**
2020 NORWAY **WINNER**



Medlem i
NCE AQUATECH CLUSTER



Content Overview

About Fjell Technology Group

- History
- Our Vision
- Quality standards
- Business Areas

Improvement of Existing Process Lines

Fjell Turbodisc Dryer Atmospheric and Vacuum

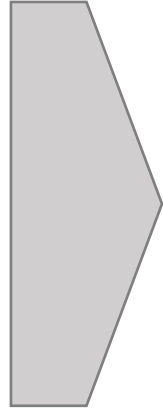
LT Meal Line

2 stage Disc Dryer Line

Steam Disc Dryer & Vacuum Dryer Line



PAST vs. FUTURE



New strategy with focus on innovation and Greentech



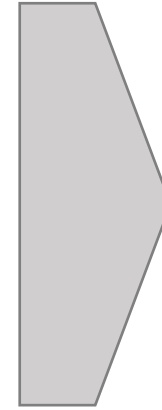
Core technology is thermo-dynamics and pressurized rotating equipment for mass and heat transfer



FTG owned patented solutions, as well as installation of market leading solutions



Sales, R&D, Engineering and Project Management of FTG deliveries



Moving our Head Office to Bergen City, Norway



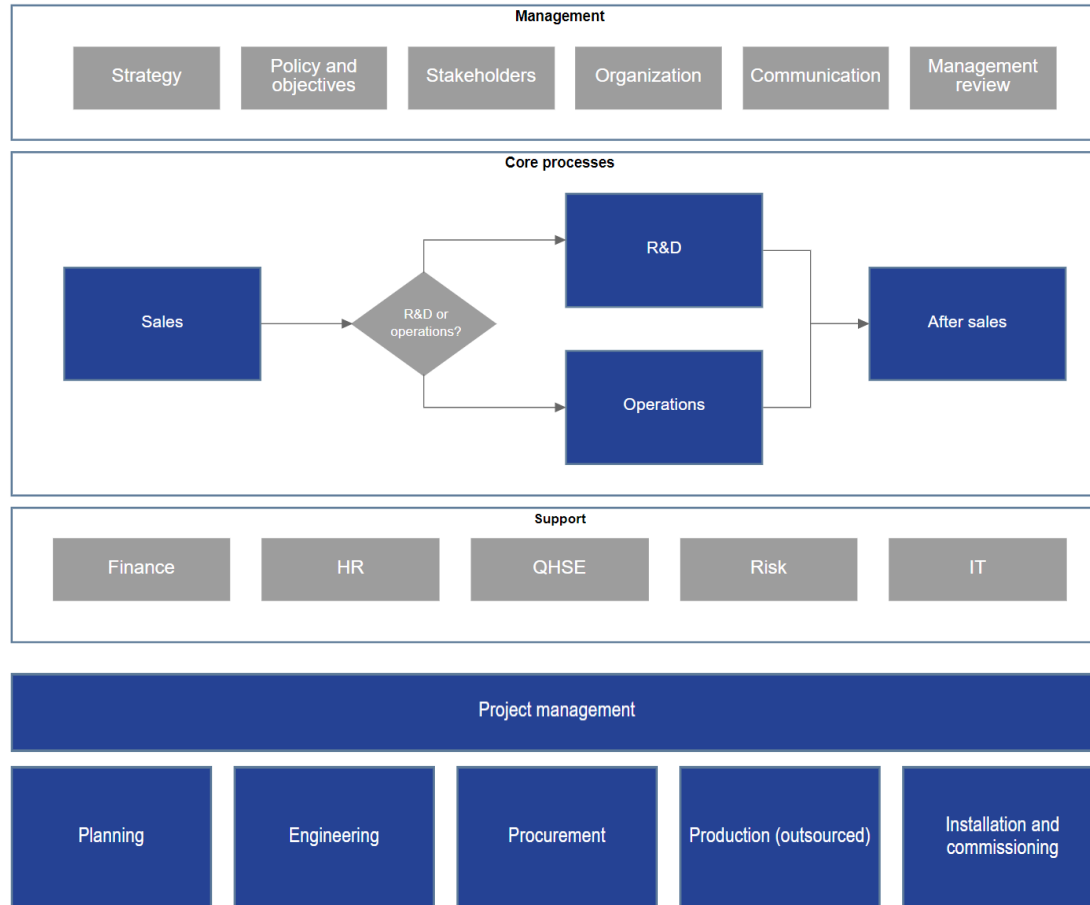


*The FTG delivers innovative process
technology for a sustainable future*

*Reliable
Innovative
Responsible*



Standardized project execution



Management System Certificate

To certify conformity with // Godkjent overensstemmelse med
the Management System Requirements of // Styringssystemkravene i henhold til

NS-EN ISO 9001:2015

awarded // tildelt



Fjell Technology Group AS
Thormøhlens Gate 49A, 5006 Bergen

Manufacturing/supplying following products/services:
for produksjon/leveranse av følgende produkter/tjenester:

**FTG is certified for research, design, manufacturing, assembly and
commissioning of stationary and rotating process machinery
and solutions for heat- and mass transfer.**

Certificate No // Sertifikat nr.:

2107



Business Areas – Fjell Technology Group

40 years experience as supplier of process technology for sludge treatment and resource recycling.

Core technology is pressurized rotating equipment for mass and heat transfer.

We will always propose solutions that represent the optimum trade off between energy usage, environmental issues, and operational concerns.

Your partner for
mass & heat transfer technology



GreenTech Development

Biosludge & Municipal Waste Water

Waste Water Treatment



CO2 Capture and Hydrogen

CO2 Capture using Solid Sorbents

Compact CO2 Capturing

Green Hydrogen production



Oil & Gas

Air Coolers

Heat Exchangers

Pressure Vessels

Process Modules & Skids



Protein Recycling and the environment

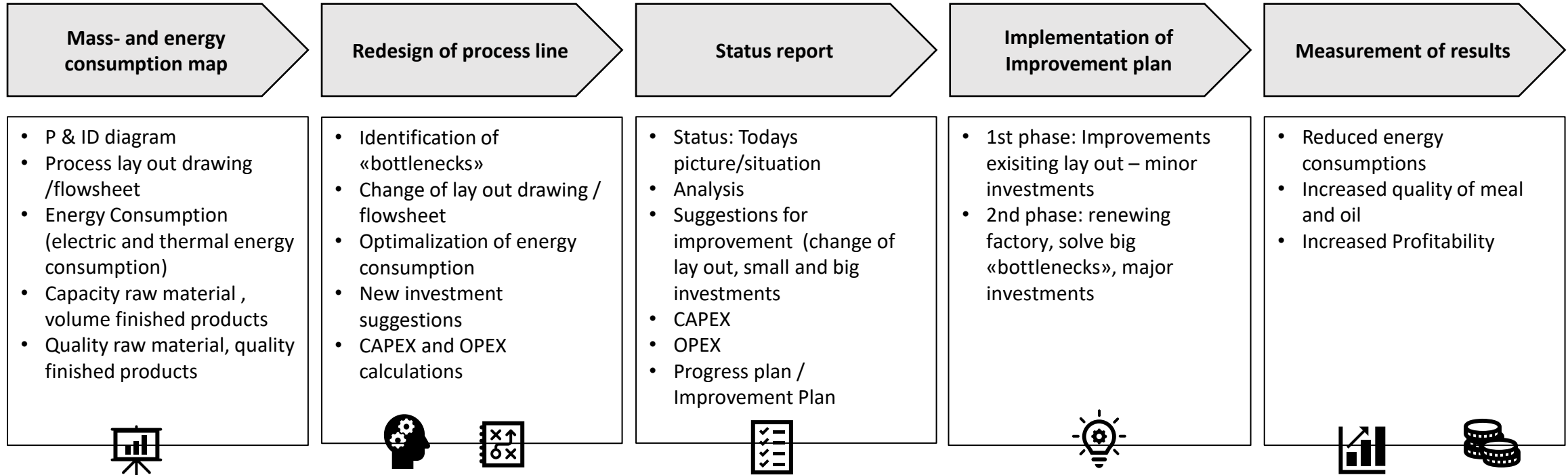
Fish meal & Omega 3 Processing

Rendering Meat & Poultry



Improvement of Existing Process Lines «The Fjell Way»

How FTG increase our customer's margin

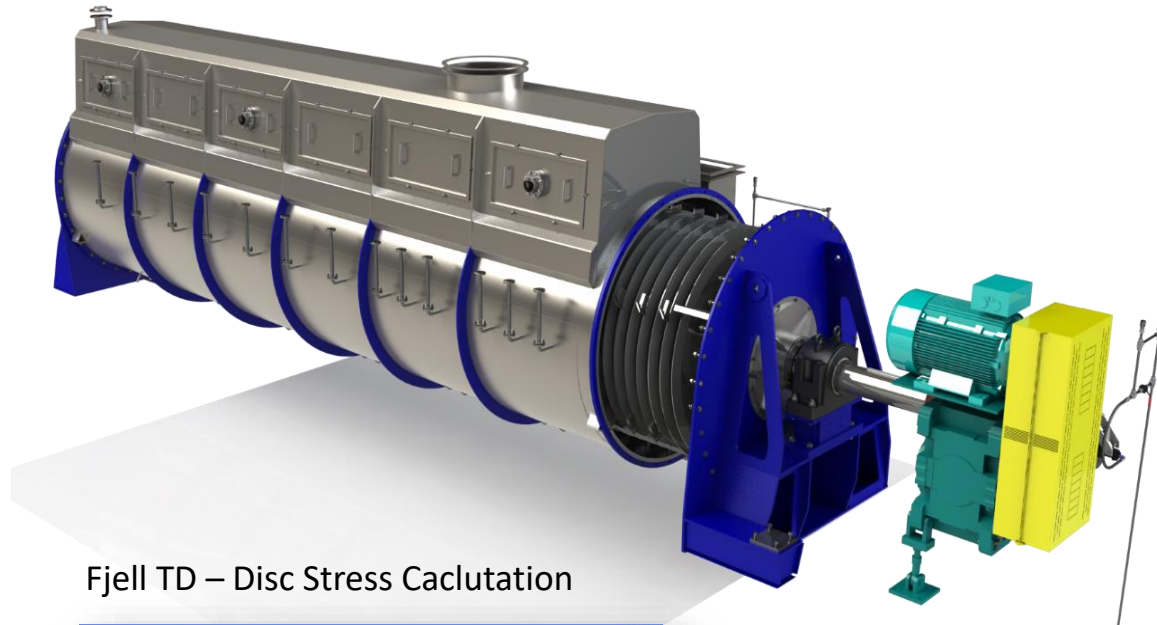


Most important is to look at the overall picture, through an energy balance - to identify the opportunities that give the most effect on margin. Different equipment relies on other equipment in the process to be most energy efficient.

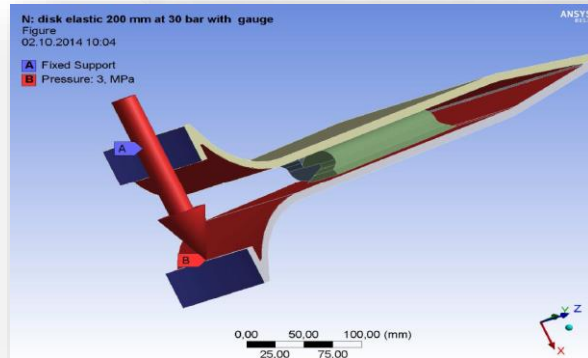


Indirect Dryer – Fjell Turbo Disc Dryer

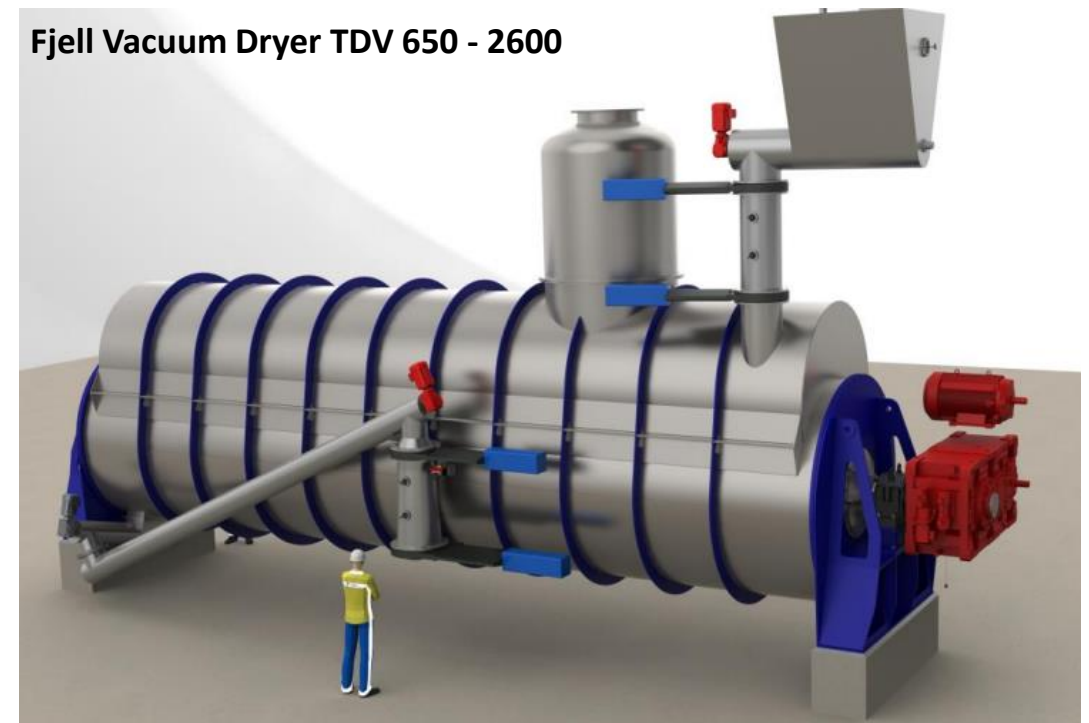
Fjell Turbodisc Dryer TD300 - 1900



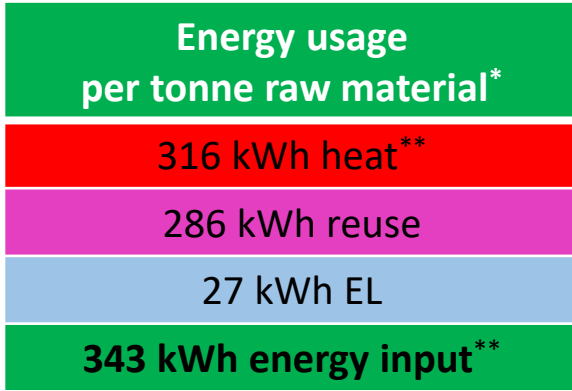
Fjell TD – Disc Stress Caclutation



Fjell Vacuum Dryer TDV 650 - 2600

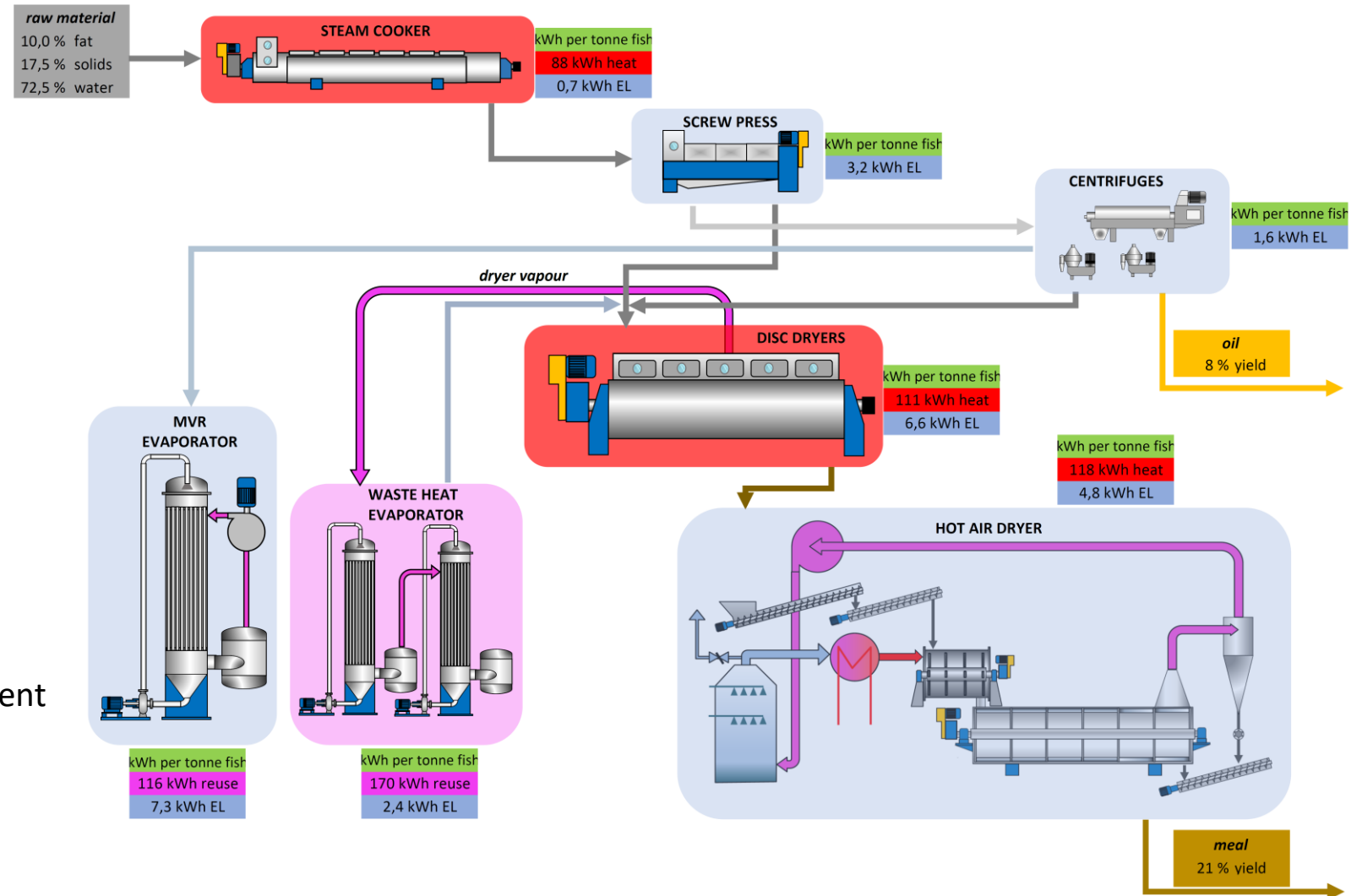


LT-meal line



*Only shown process line included
 **10% heat loss added in each stage

- Conversion to electric air heater will save 5-10% heat and eliminate emissions to air.
- Fjell is still offering the Dyno-Jet technology.
- Perhaps less attractive with the present energy market?

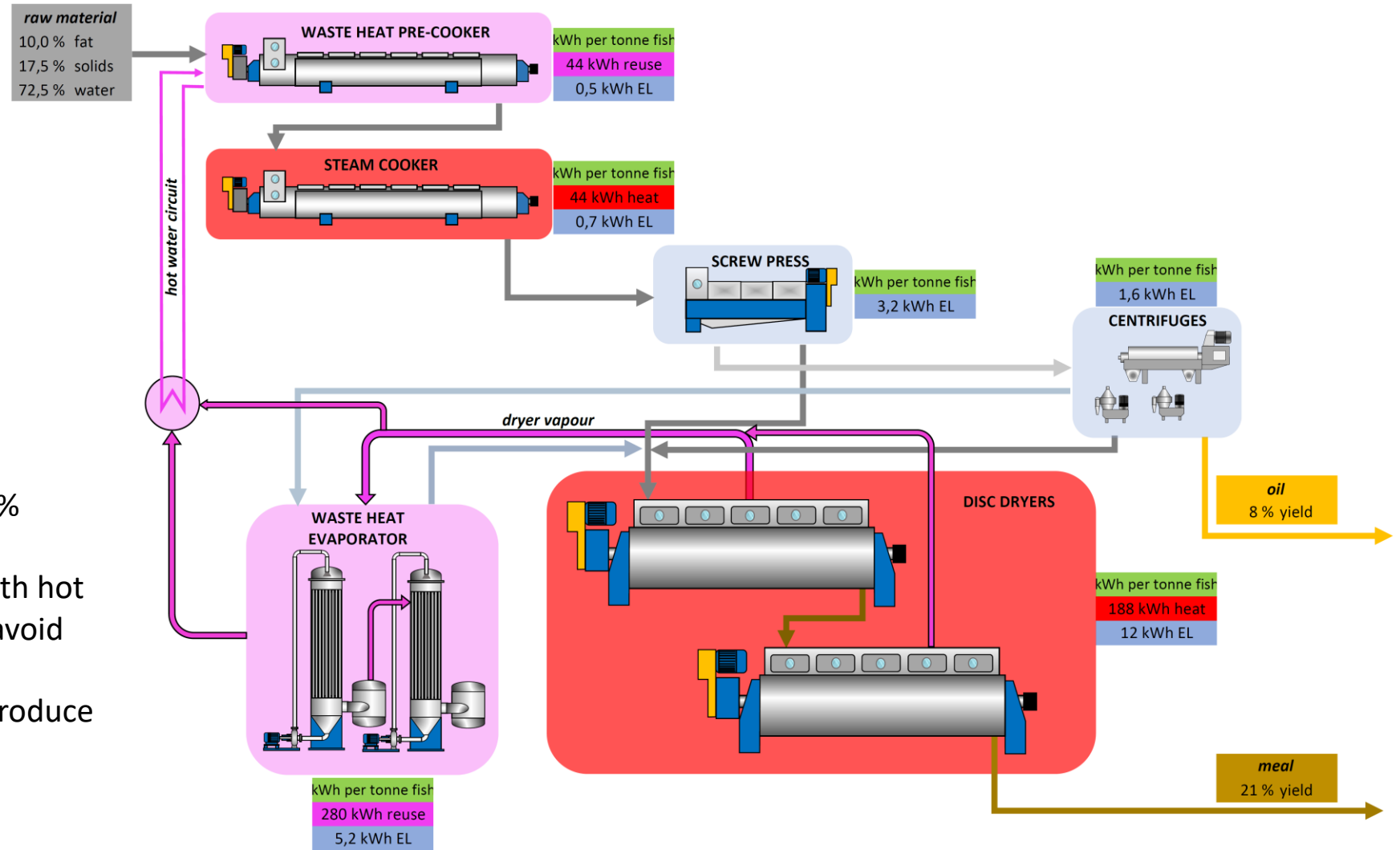


Two stage disc dryer line

Energy usage per tonne raw material*
227 kWh heat**
329 kWh reuse
23 kWh EL
250 kWh energy input

*Only shown process line included
 **10% heat loss added in each stage

- Waste heat pre-cooker saves 15% steam.
- Fjell is offering screw cookers with hot water circuit to save space and avoid autolysis.
- Modern plants with such lines produce high quality meal.



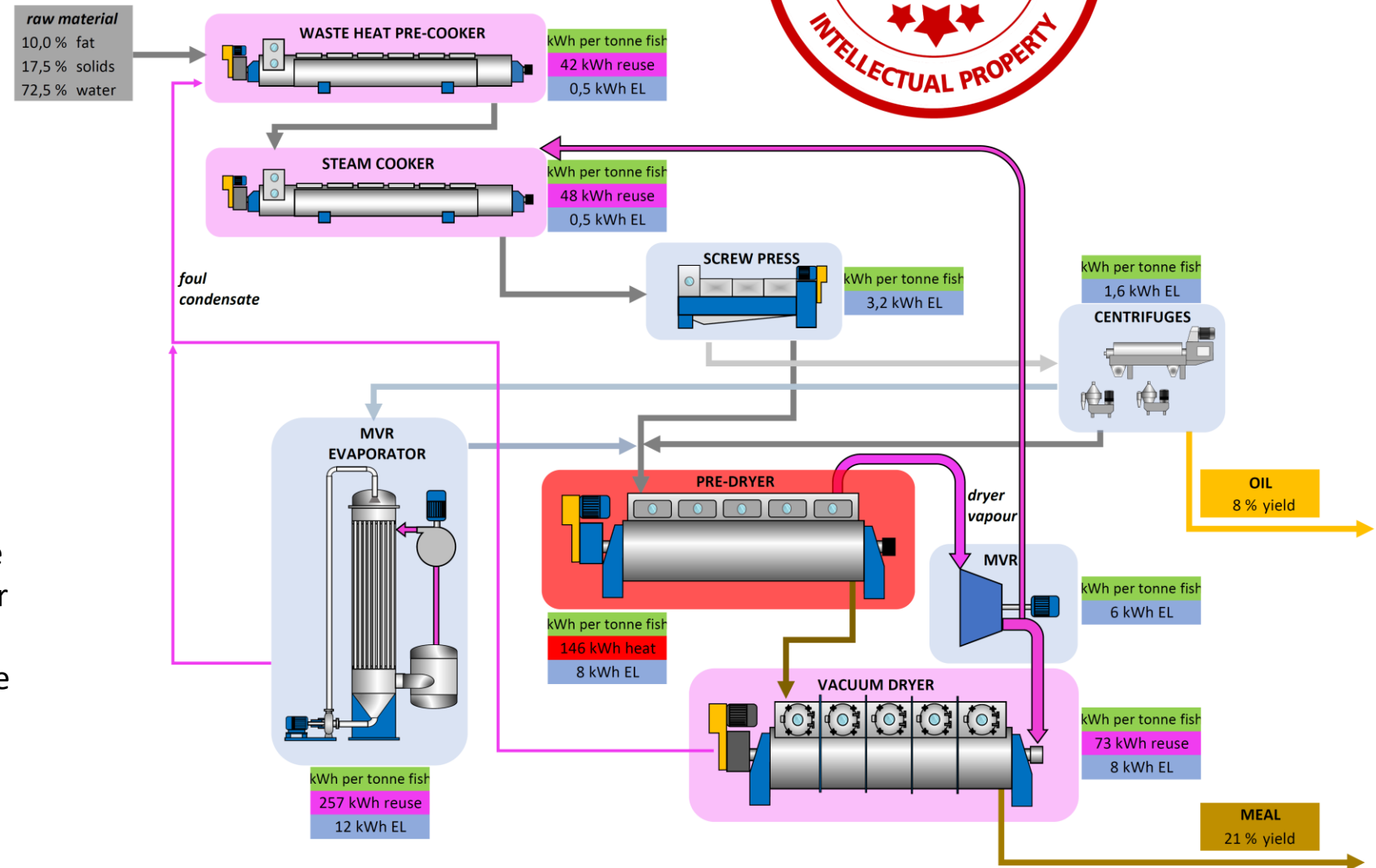
Steam disc dryer + vacuum dryer line



Energy usage per tonne raw material*
146 kWh heat**
420 kWh reuse
40 kWh EL
186 kWh energy input

*Only shown process line included
 **10% heat loss added in each stage

- Lowest theoretical energy input of practically possible process lines?
- Pre-drying in closed dryer to secure hygienisation and high-quality dryer vapour for reuse.
- Meal quality in industrial scale to be demonstrated.





FJELL

TECHNOLOGY GROUP

Your partner for
mass & heat transfer technology

RELIABLE – INNOVATIVE – RESPONSIBLE

JUNE 1 - 3
SKAGEN
DENMARK

**Jon Vestengen &
Jette Kristensen**

CEO at Lofoten Biomarine AS

**Process & Application Manager,
Håarslev Industries A/S**

**New Low Energy Fish Protein
Concentrate Process**



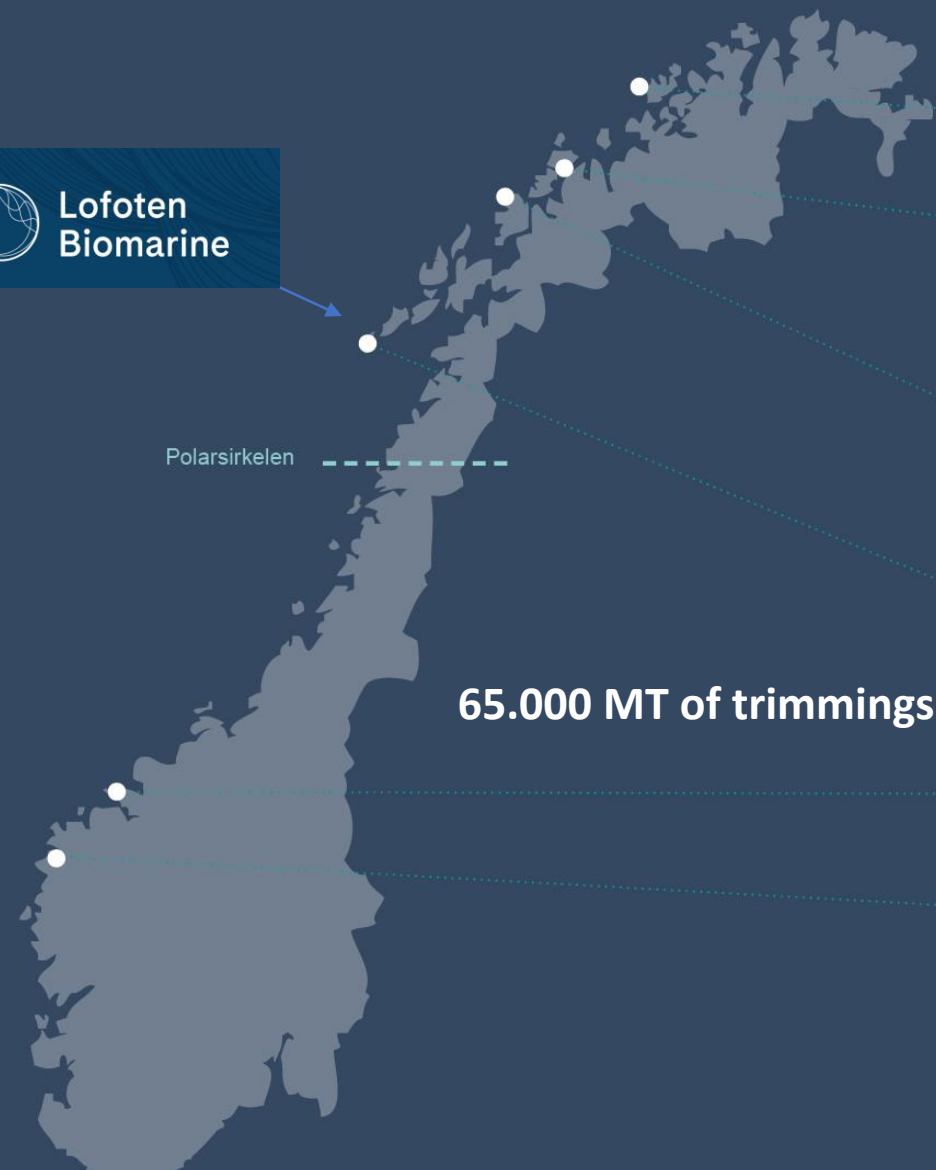


Lofoten Biomarine

A part of the Nergård group



LOKASJONER

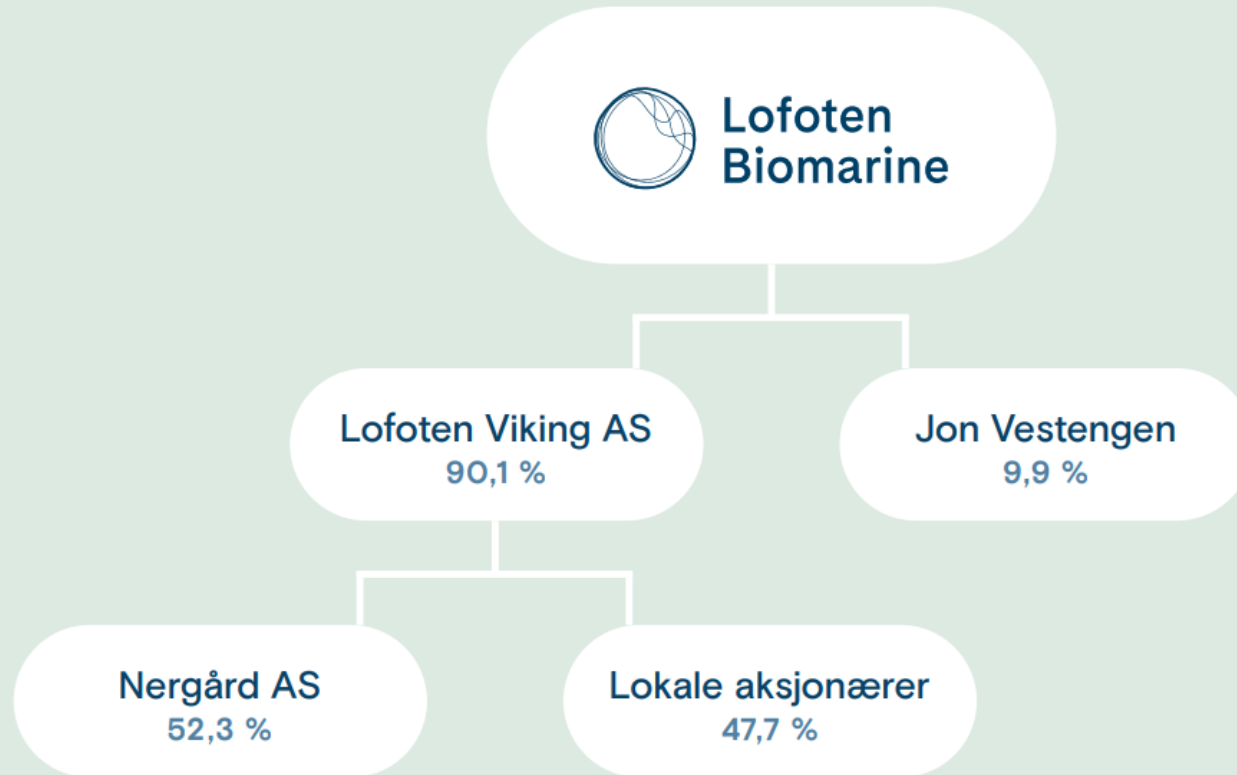


Polarsirkelen

65.000 MT of trimmings

- 1 **Sørøya**
Nergård Sørøya AS
- 2 **Tromsø**
Nergård AS – Head office
Nergård Seafood AS – Sales
Nergård Havfiske AS
Global Sales AS
- 3 **Senja**
Nergård Fisk AS
Nergård Sild AS
- 4 **Værøy**
Lofoten Viking AS
- 5 **Ålesund**
Global Sales AS
- 6 **Florø**
Global Florø AS

SHAREHOLDERS



BASED ON SUSTAINABILITY

Lofoten Biomarine supports UNs 2030-agenda



TARGET:

Develop and utilise new modern process technologies use energy across businesses



TARGET:

Support Lofoten Green Islands, Build local society, create new jobs.



TARGET:

100 % use of all byproducts, create minimum waste



TARGET:

Zero emission factory, NO carbon footprint

NERGÅRD



Location

- Værøy is Norway's 7. largest fishing harbour
- Close to Aquaculture market
- Close to fishing ground
- Large fresh water supply
- 30MW Hydroelectric power



HIGH CO2-EMISSION BY TRADITIONAL PRODUCTION

OLDER FACTORIES THAT ARE NOT ENERGY OPTIMISED

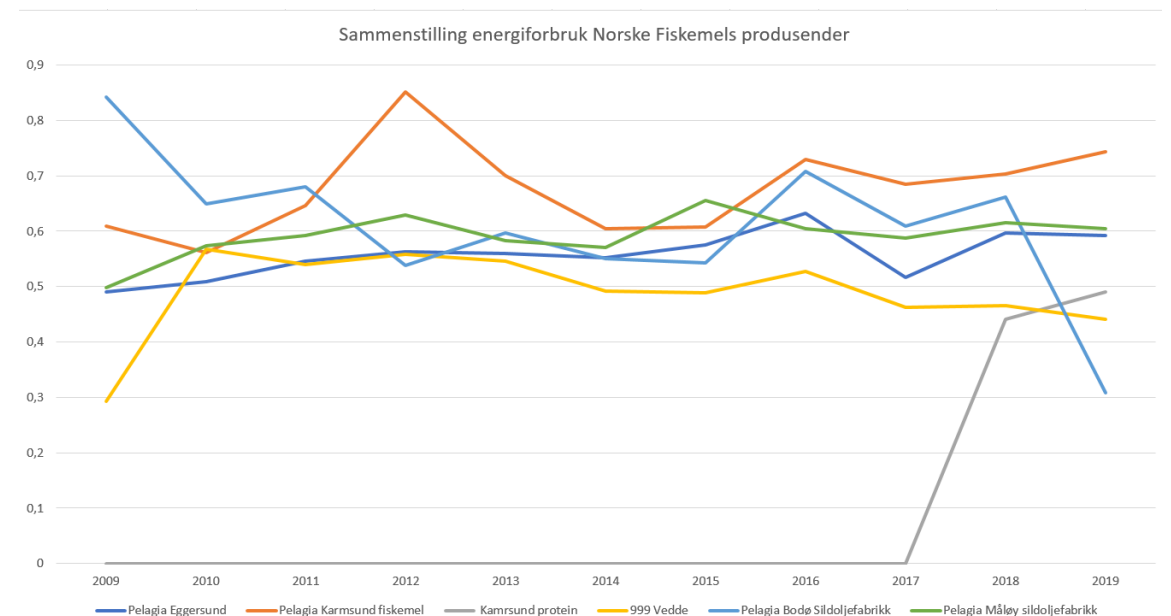
Production of marine proteins and oil are done in older factories without modern energy systems and low efficiency

HUGE ENVIRONMENT EFFECTS

High CO2-footprint and discharge of other environmental gases causes an unnecessary environmental consequence.

TRADITIONELLE FABRIKKER MED HØYT CO2-UTSLIPP

Average CO2-emission norwegian factories are in the area of 14 000 MT CO2 which corresponds to emission from 5 000 cars per factory.



MARKET

- Fish meal and oil
- Hydrolysates
- Proteine concentrates

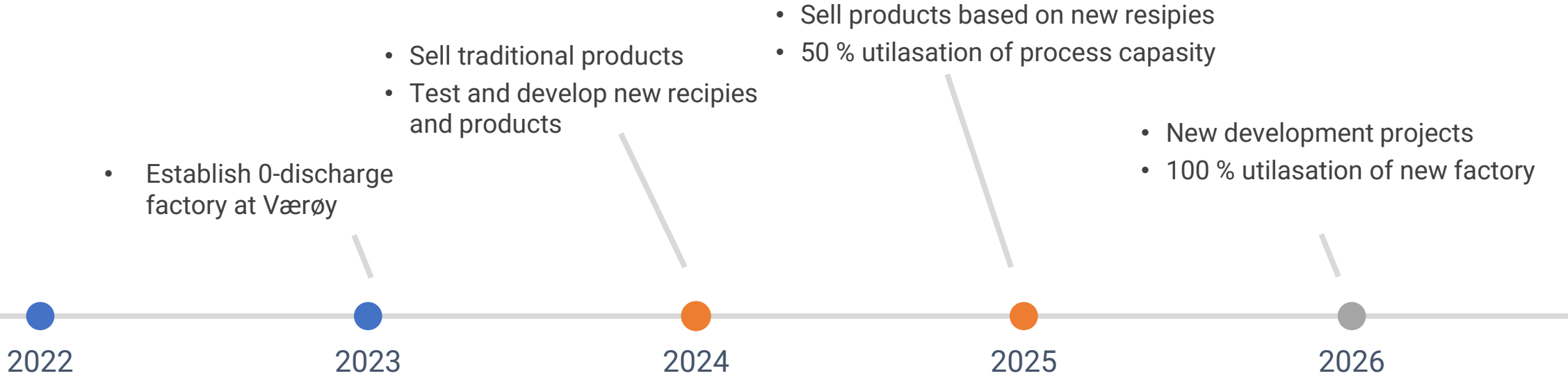


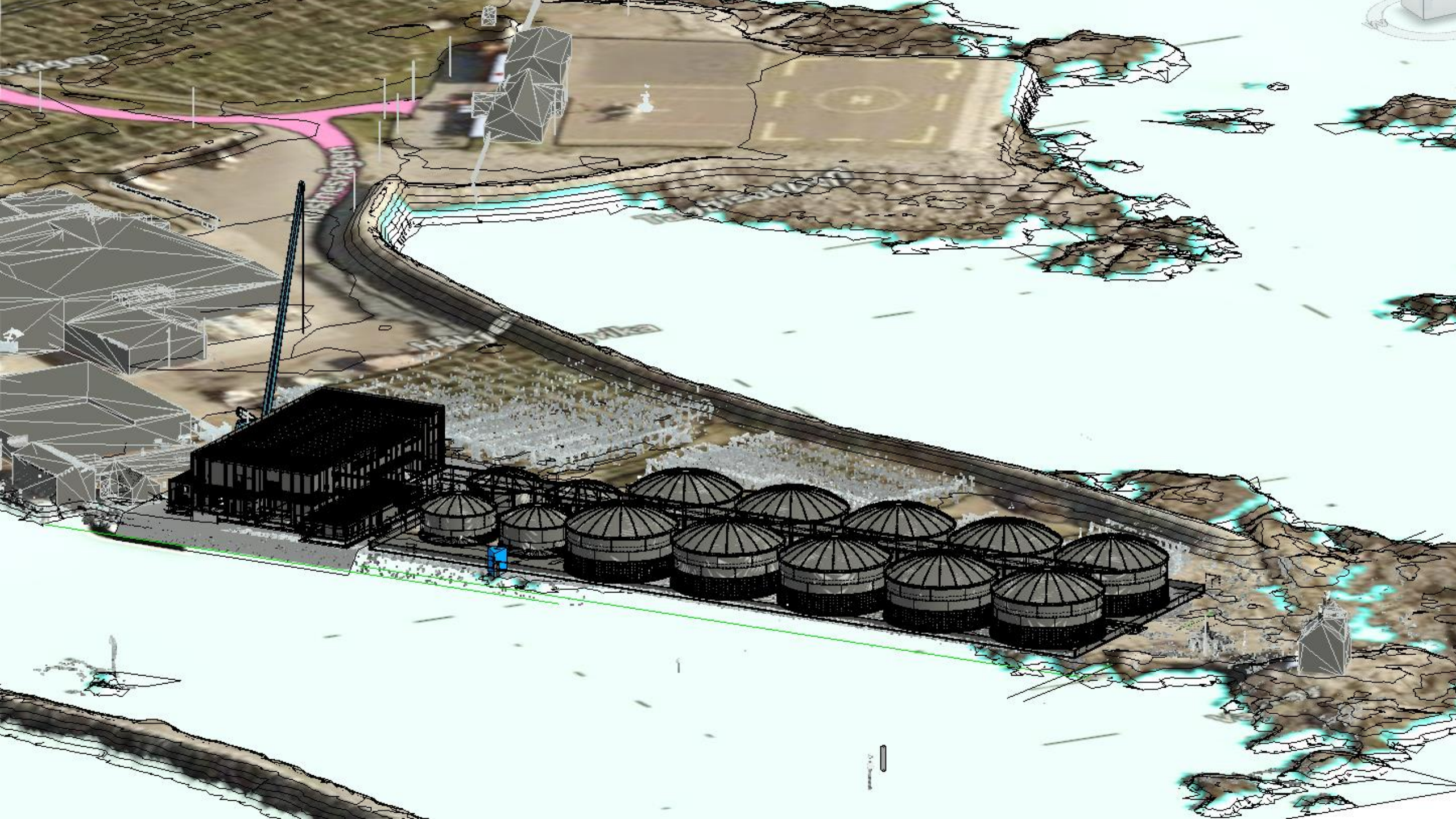


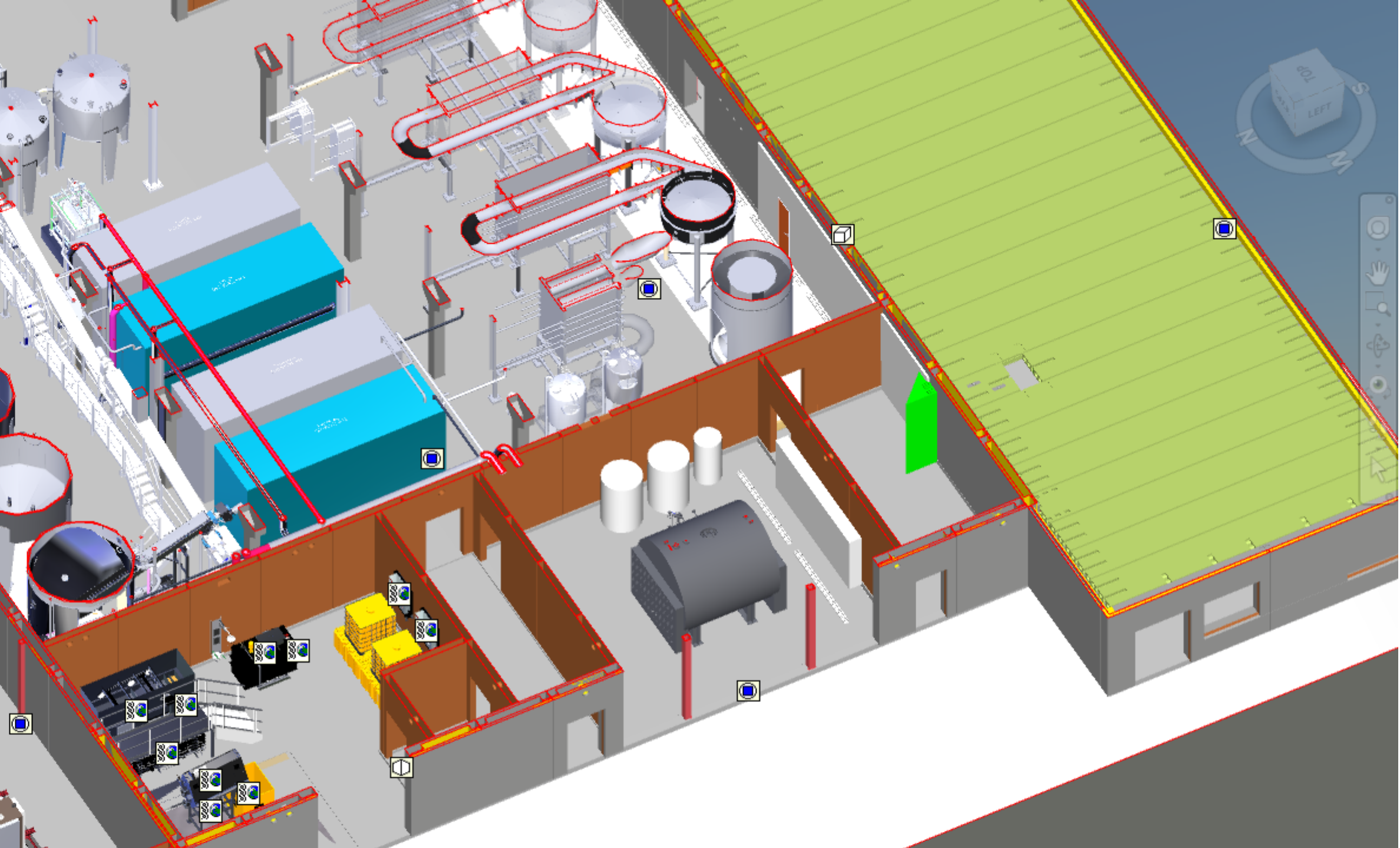
TECHNOLOGY

- New freezing tunnels based on CO2 as refrigerant with excess heat emission to hot water (70deg).
- No steam factory
- Heatpump ready design
- Waste heat to district heat

Progress plan











HAARSLEV™

Processing Technology

NEW LOW ENERGY FISH PROTEIN CONCENTRATE PROCESS



HAARSLEV™
Processing Technology

NEW LOW ENERGY FISH PROTEIN CONCENTRATE PROCESS

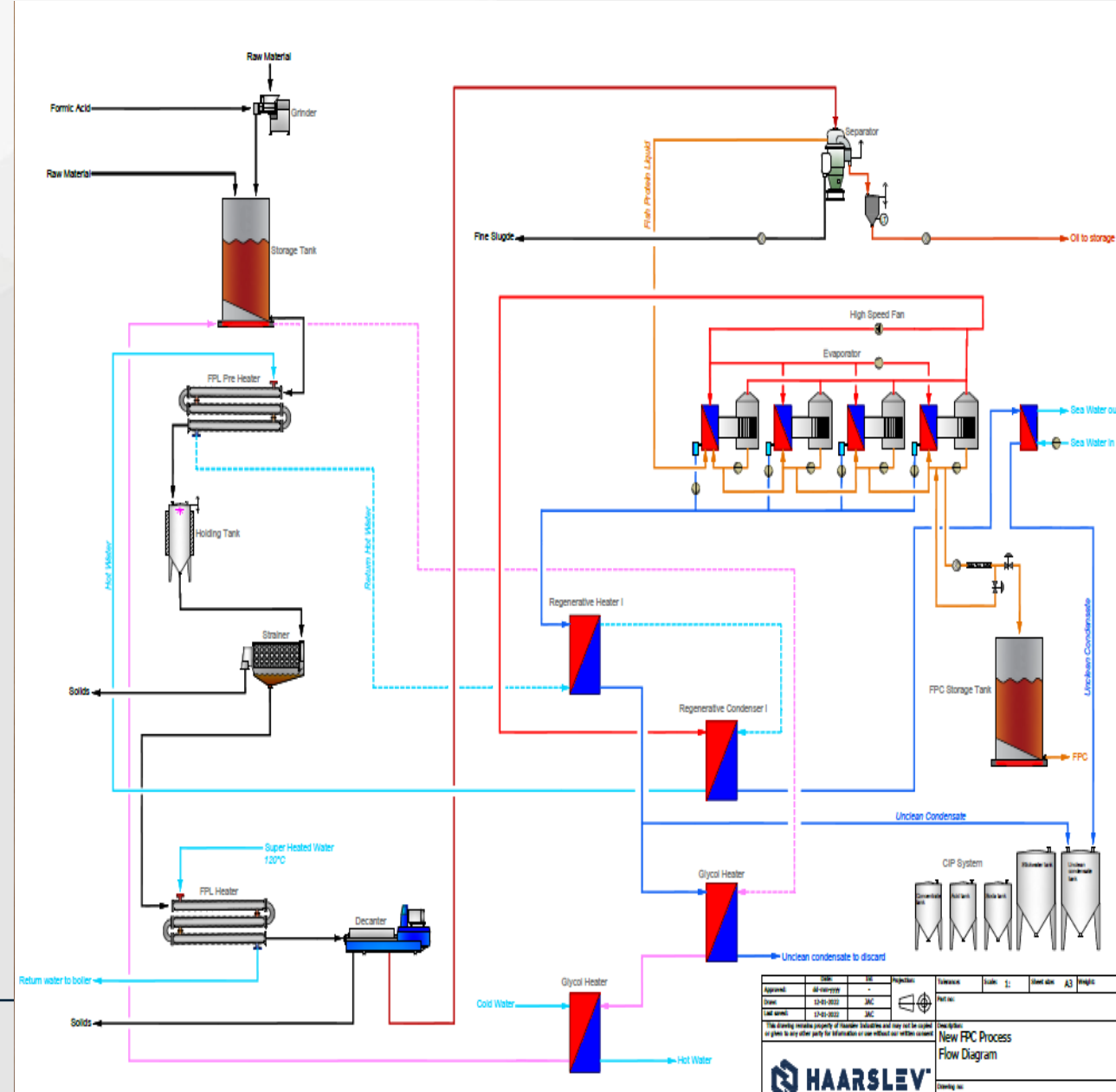
Key Elements of the FCP process.

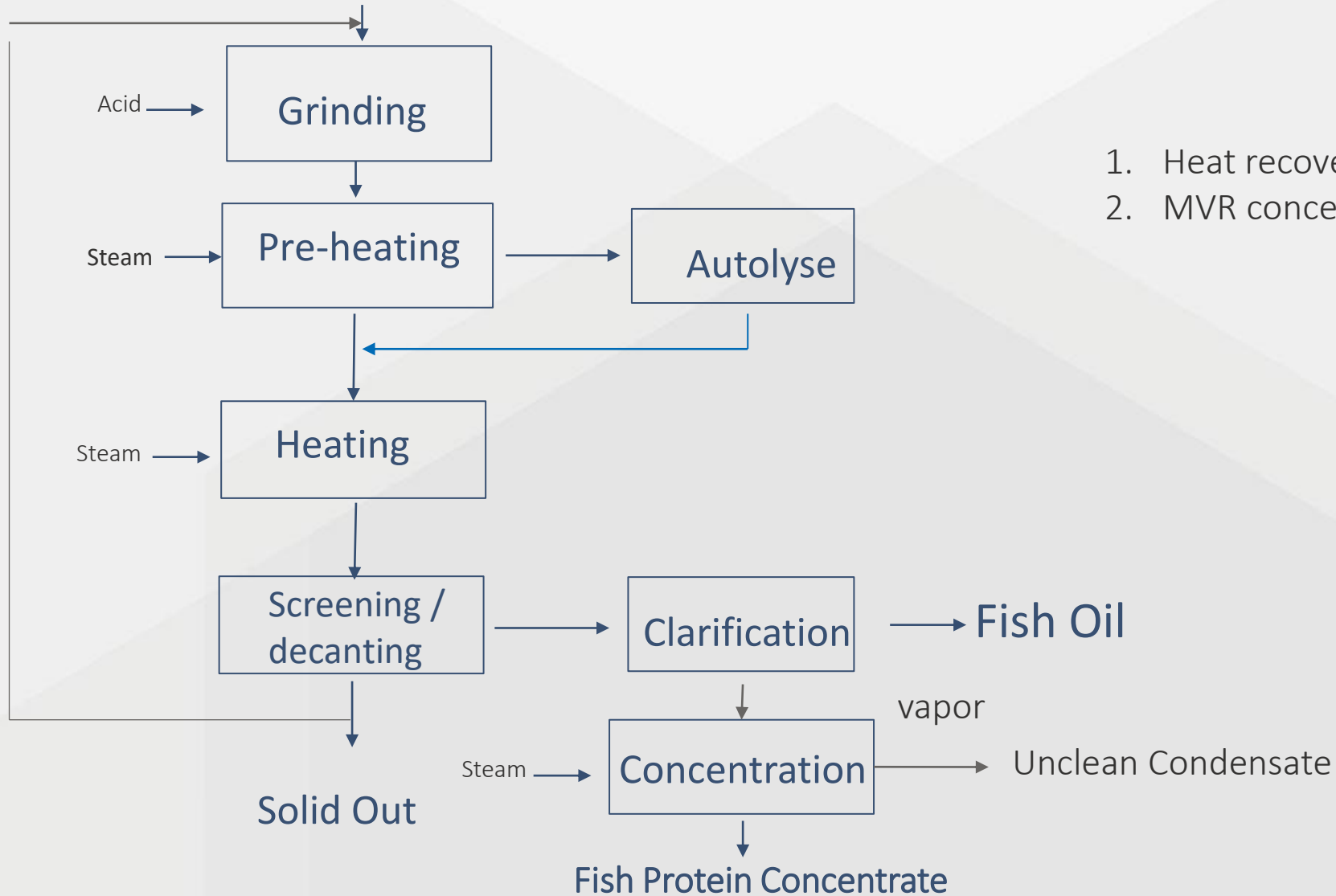
Jette Lund Kristensen

3-Juni 2022

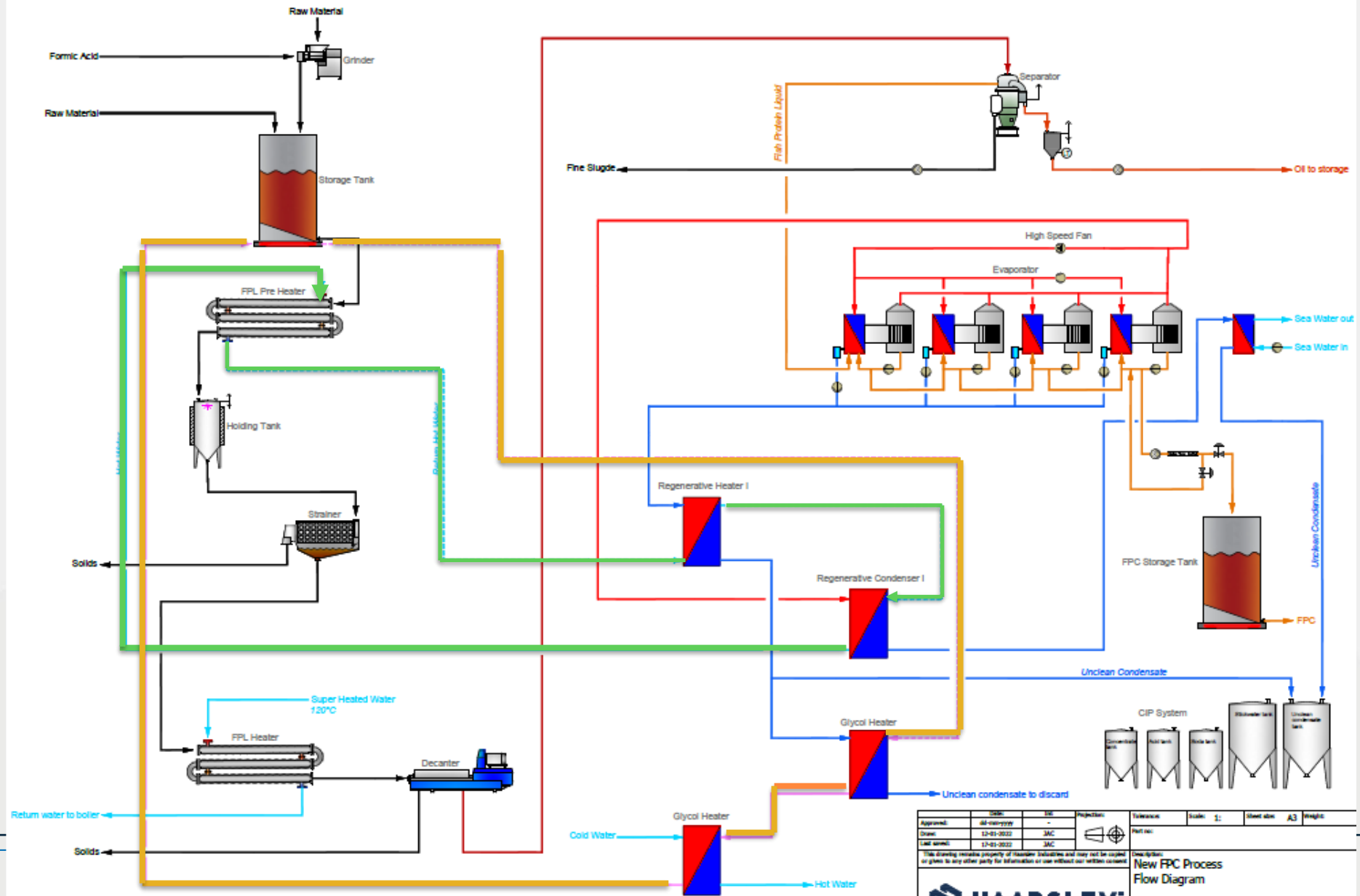
Challenges for a new FCP process:

1. Feed capacity 50 t/h, 5 days a week.
2. Various product oil content from trimmings with 2- 22 %
3. Not allowed to use steam
4. Absolute minimum water consumption
5. No stop during week days, back up plan/ solution.
6. Closed system
7. Full CIP
8. Building height limitation






1. Heat recovery needed
2. MVR concept for evaporation

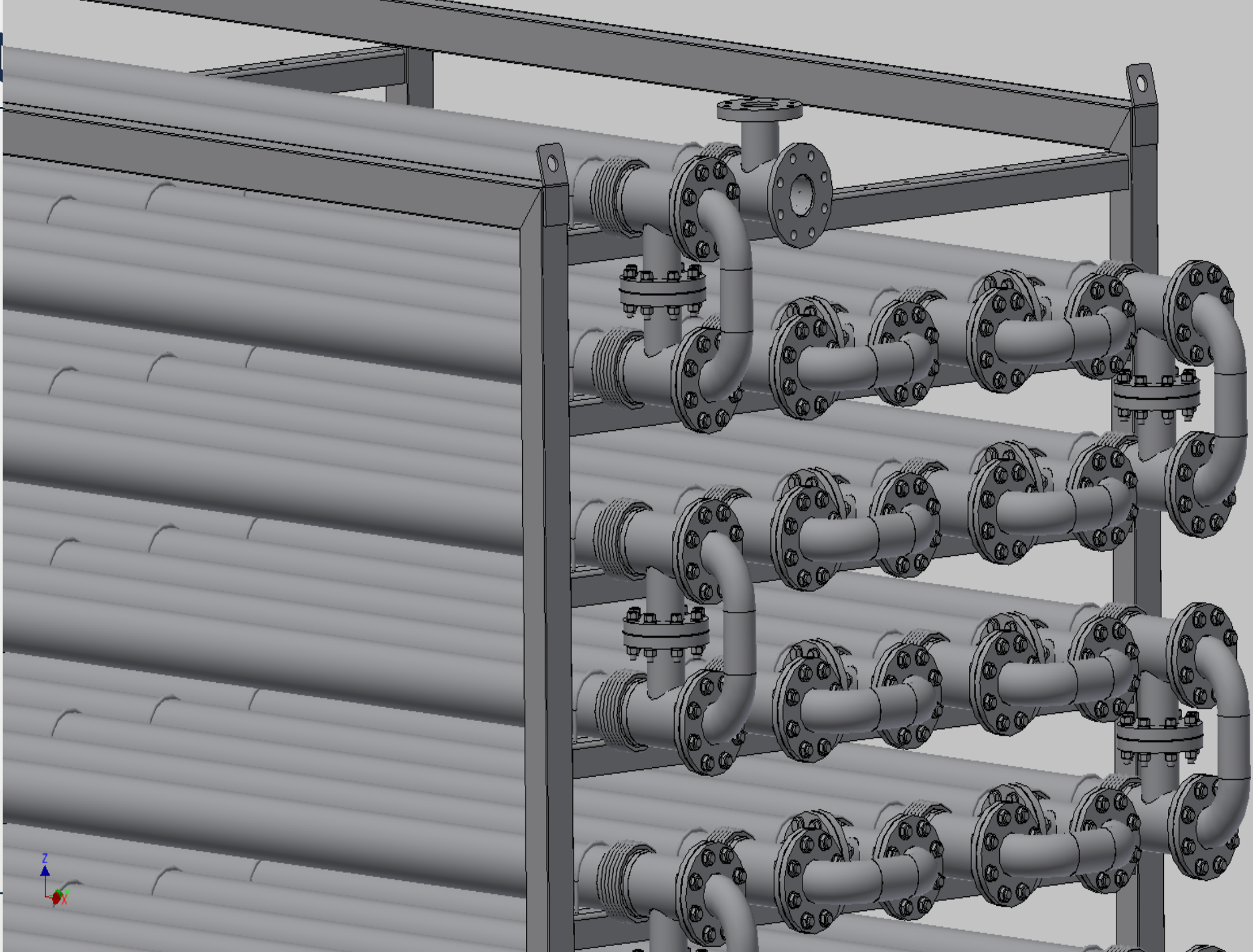


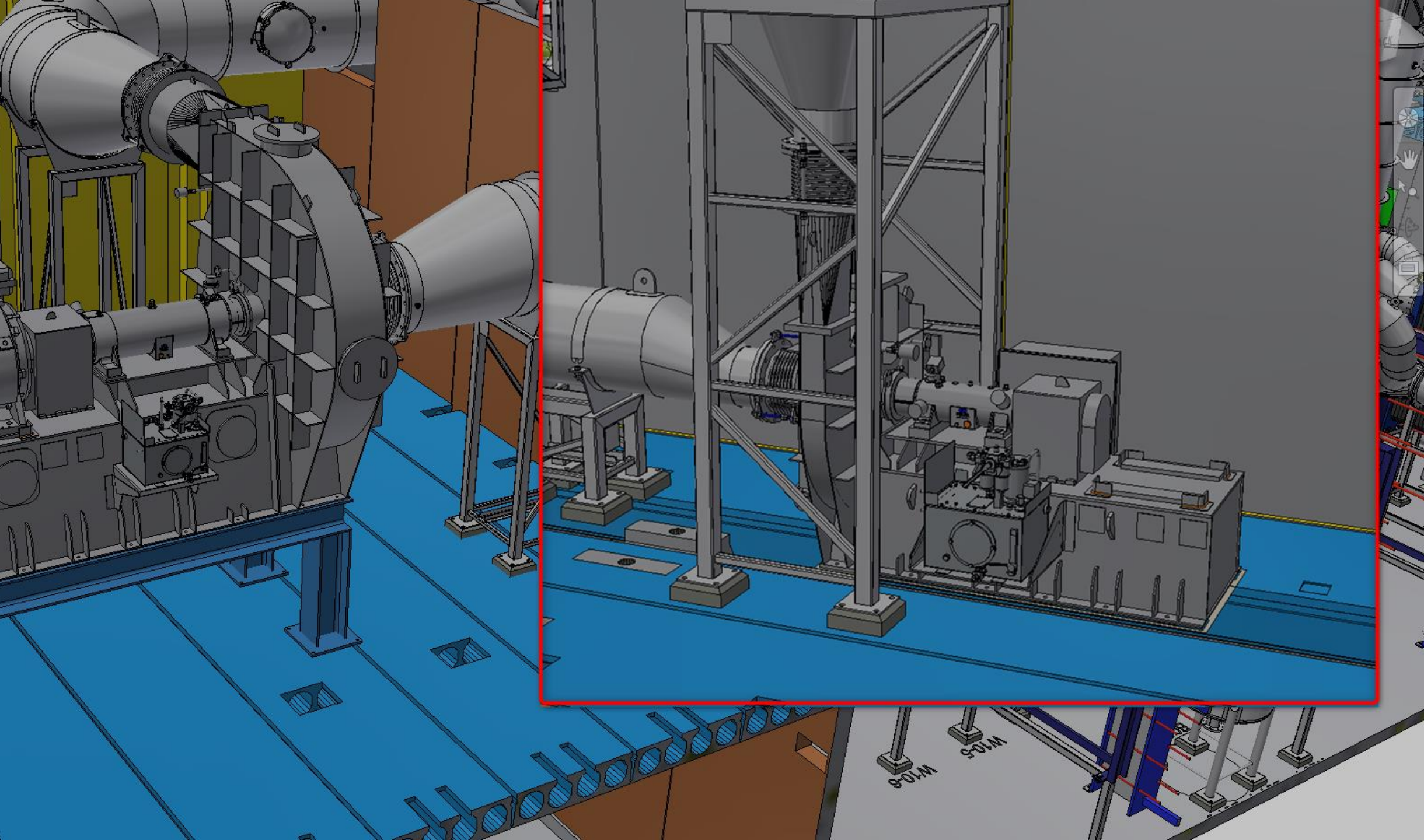
Approved:	Date:	Proj. No.:	Tolerance:	Scale:	Sheet No.:	Sheet Size:	Weight:
12-01-2022	12-01-2022	12-01-2022	1:1	A3			

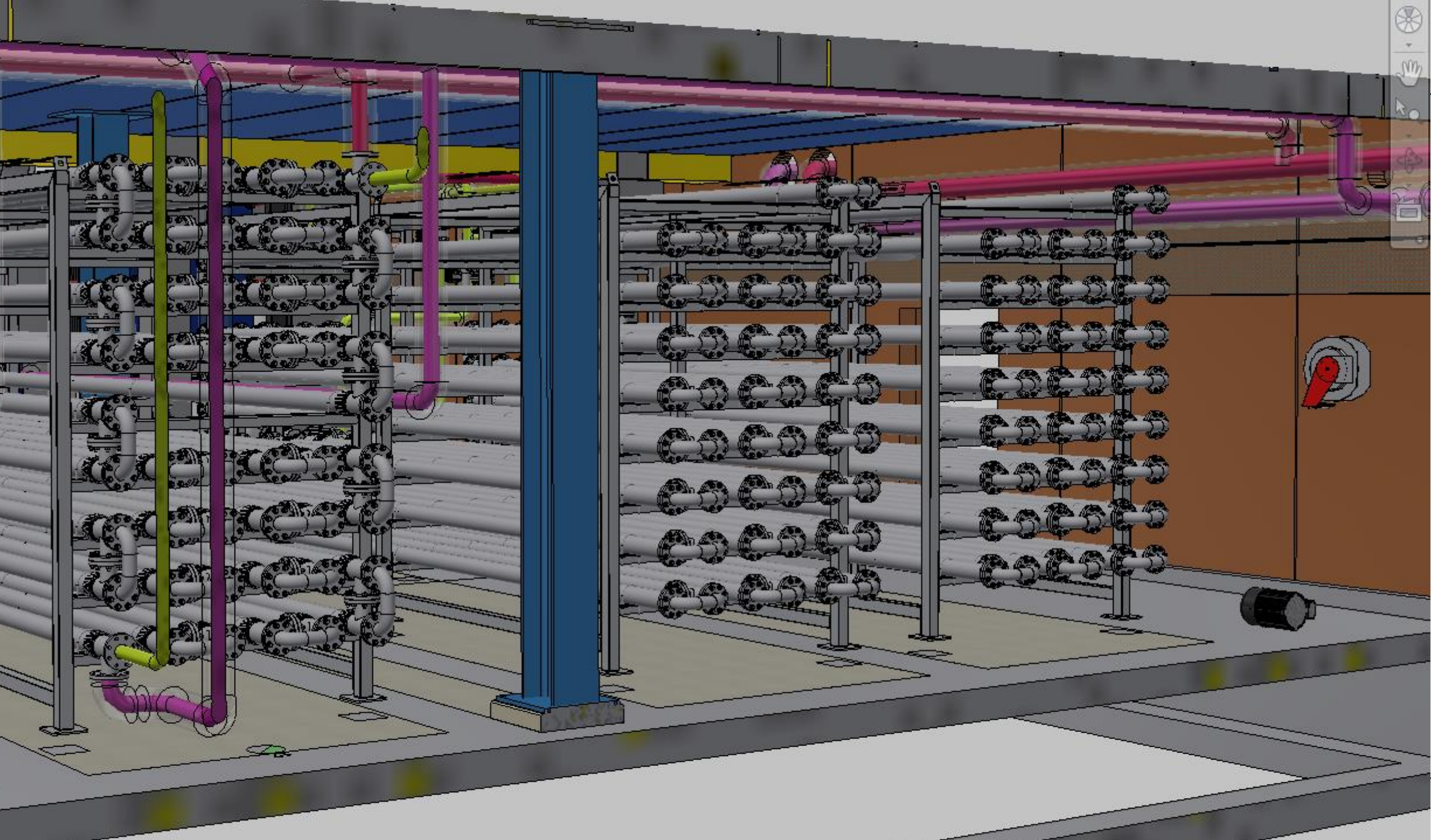
Approved: 12-01-2022 Draw: 12-01-2022 Last work: 12-01-2022	SMC SMC SMC	 Part no.: Description: New FPC Process Flow Diagram Drawing no.:
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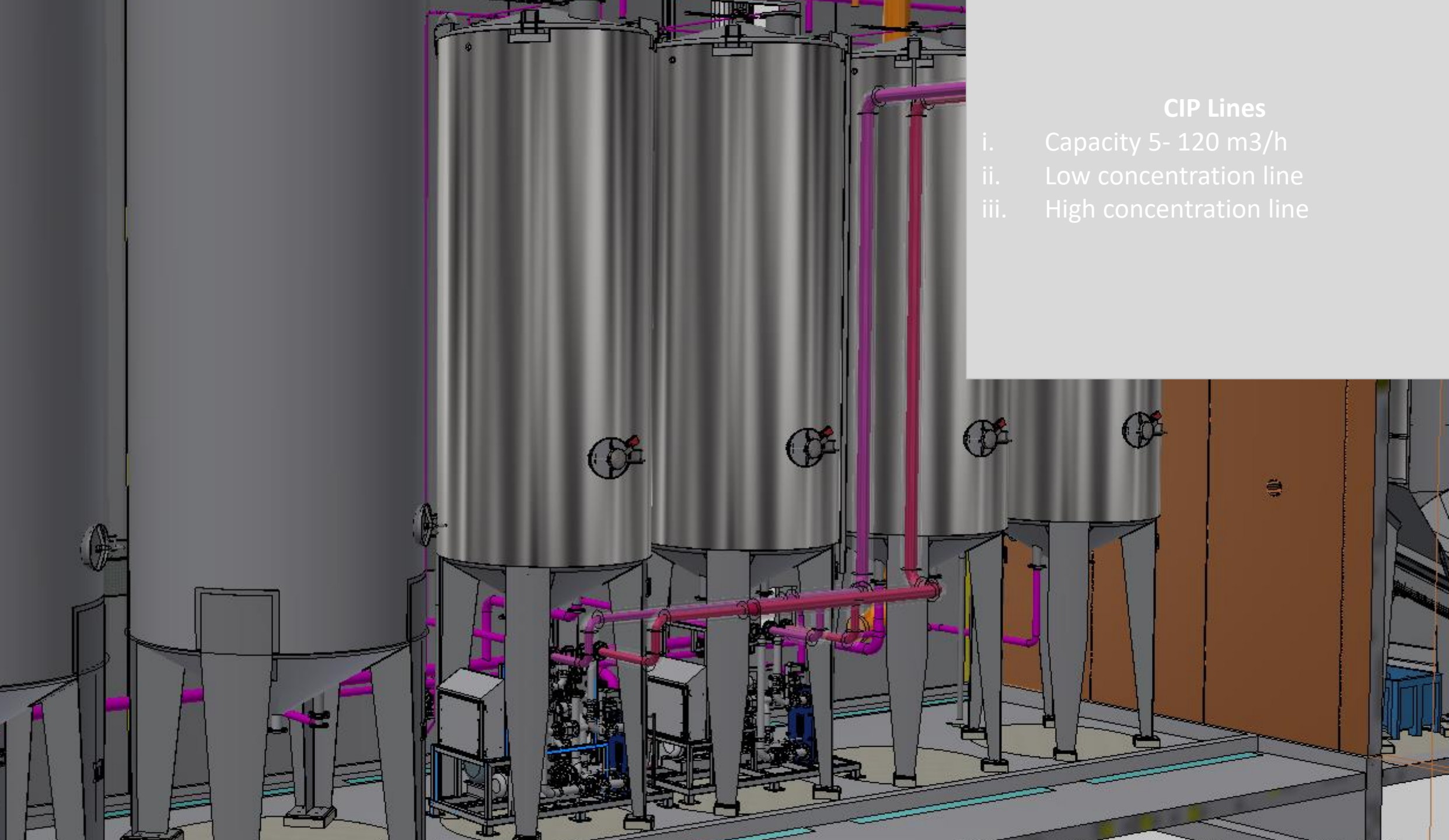
HAARSLEV™

- Processing bony material that needs to be pumped and process without settling at a flow of 50 m³/h.
 - ✓ Bones in water settles due too low velocity
 - ✓ Important in the raw material and heating stage
 - Ph adjustment solubilize protein and bone material.
 - ✓ Protein easy solubilize completly
 - ✓ Bone mass is more slow proccess and form calcium chart.
 - ✓ Not same solubization degree on bone mass
-



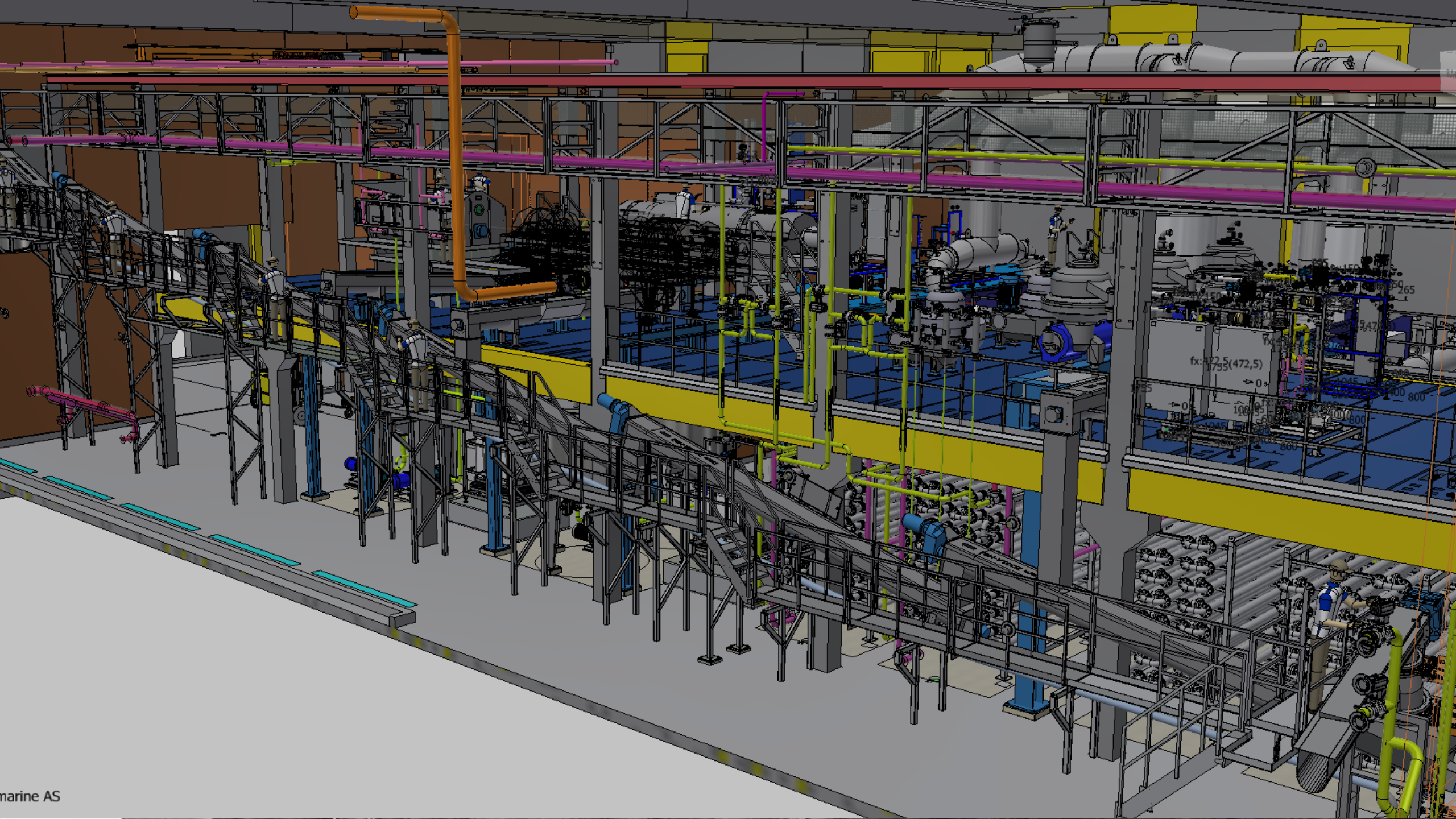






CIP Lines

- i. Capacity 5- 120 m³/h
- ii. Low concentration line
- iii. High concentration line



1. We have designed the plant and used Jon's recommendation to equipment
 - i. The plant operates without steam.
 - ii. Heating is done with hot water 120 oC.

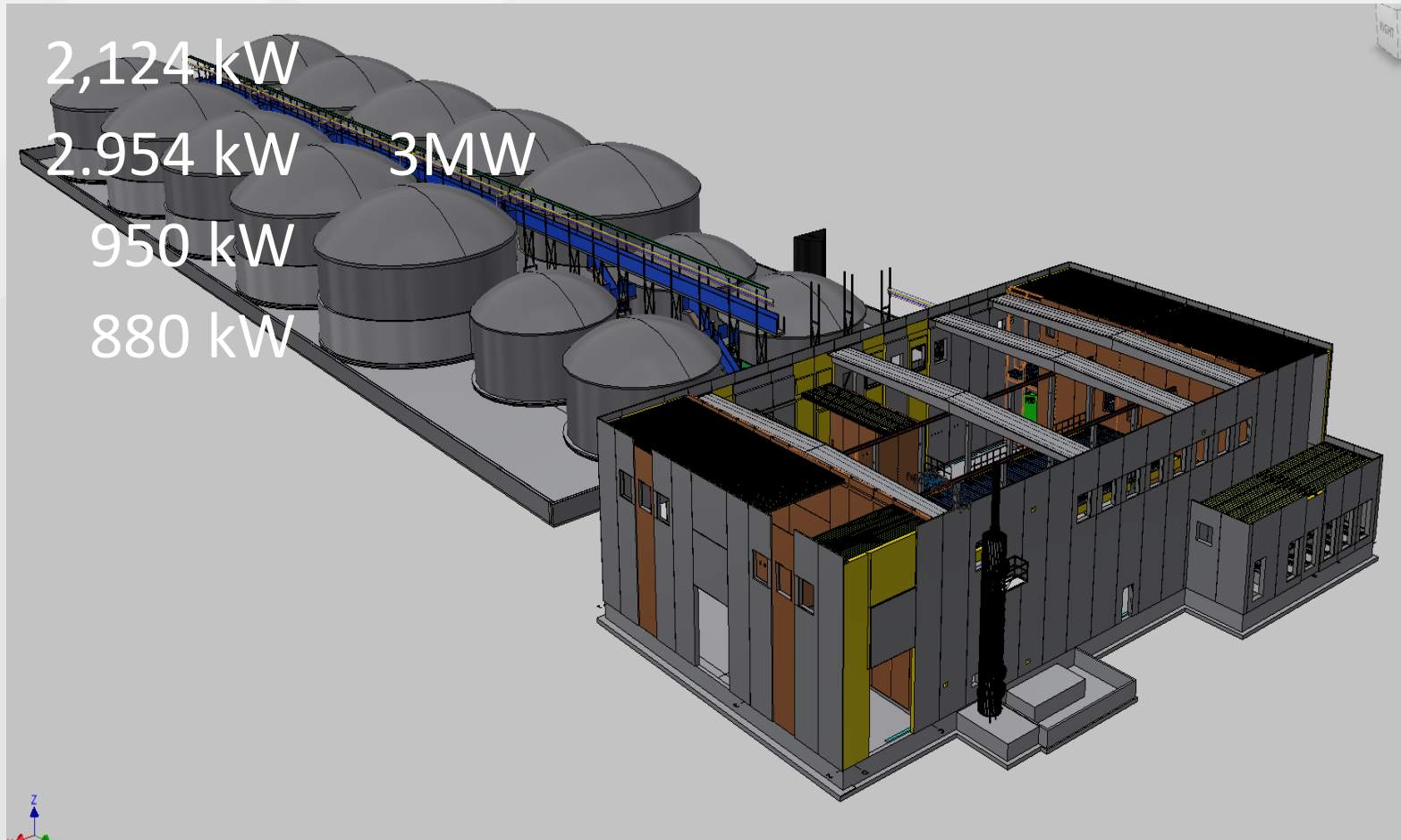
 2. Heating medium hot water done by electricity . Nearby further heat pumps to be implemented.

 3. Evaporation by mechanical high- speed fans.
 - I. Dual fan set to operate with a flash stage 4 for extra high concentration.
 - II. Flexibility to take one stage out for CIP during production
-

Heat consumption:

MRV consumption:

Installed power:



JUNE 1 - 3
SKAGEN
DENMARK

Frank Trearty

Chairman of European
Fishmeal, CEO, Pelagia
Killybegs

End of the Conference and Closing
Remarks

