

“Food and Non-food use of rest raw-materials from fisheries and aquaculture”

By Ragnar Nystøyl

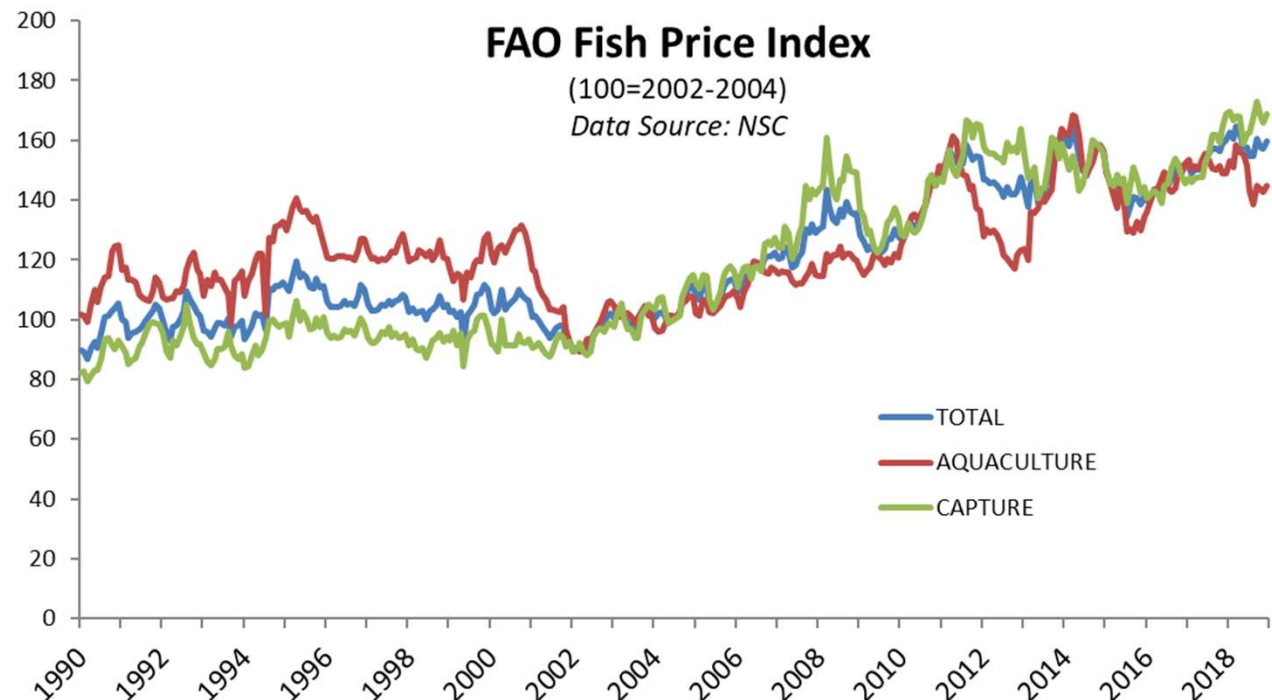
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FISH PROTEIN – INCREASINGLY MORE VALUABLE..... APPLICABLE ALSO FOR FISH BY-PRODUCTS

On the way through the value chains from catch to consumption;

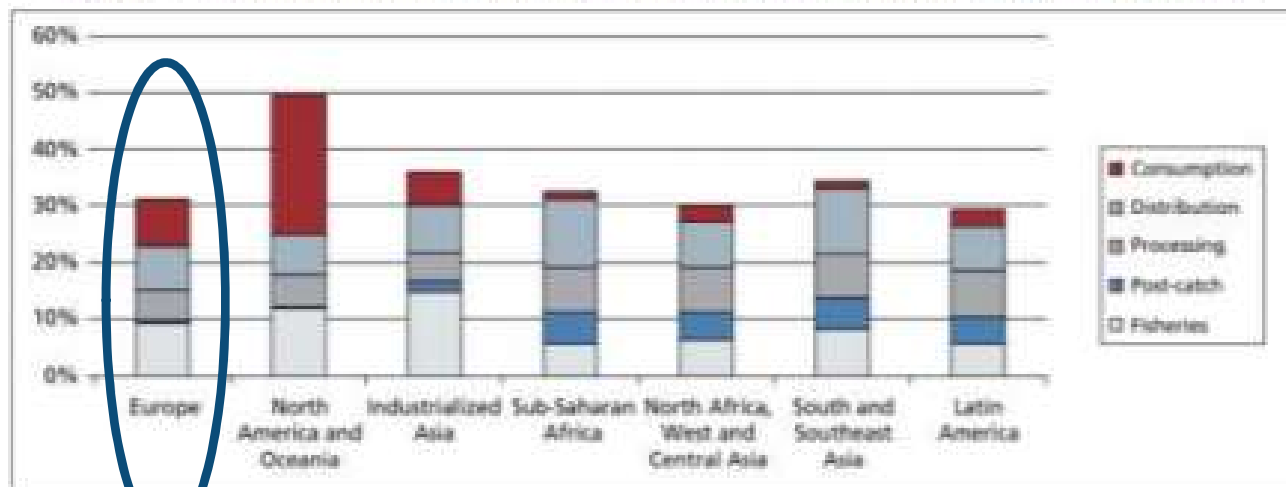
30 – 70 % of the fish is estimated to become **by-products / RRM** (Rest Raw-material)



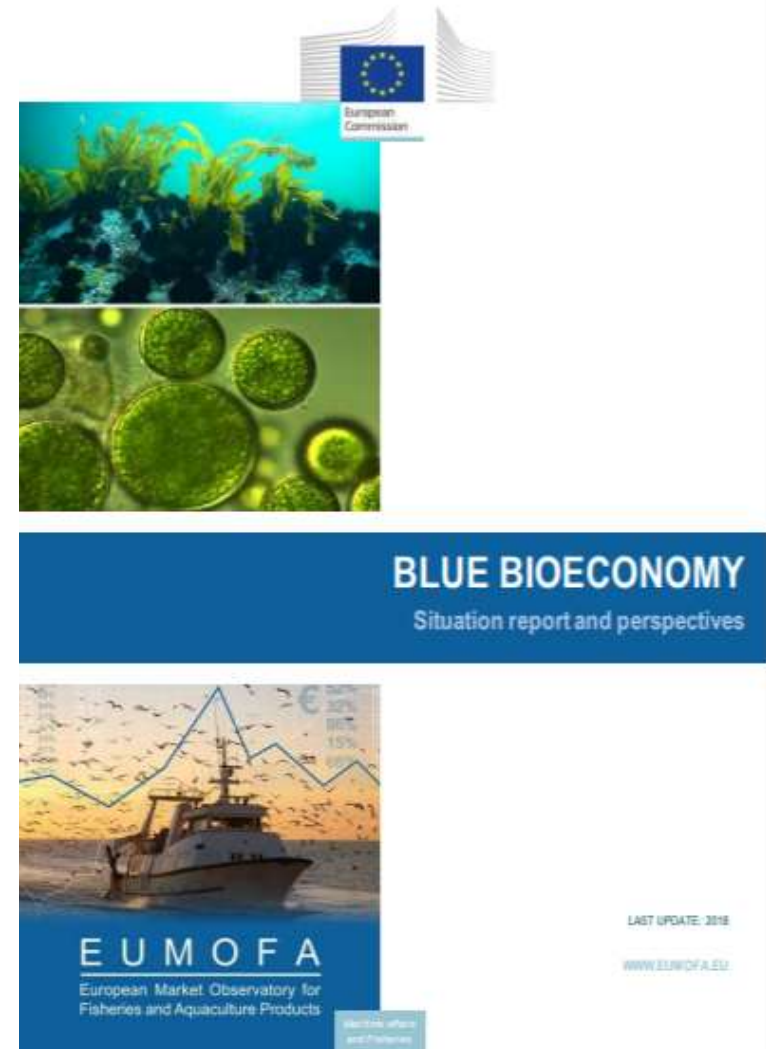
FISHERIES AND AQUACULTURE BY-PRODUCTS FOR FOOD AND NON-FOOD USES

- The further out in the value chain, the more inaccessible for high-value use
- A «uncertain» total amount of RRM in the EU / Europe

Figure 4 - Losses through the supply chain by discards, disposals and wastage by stage and region



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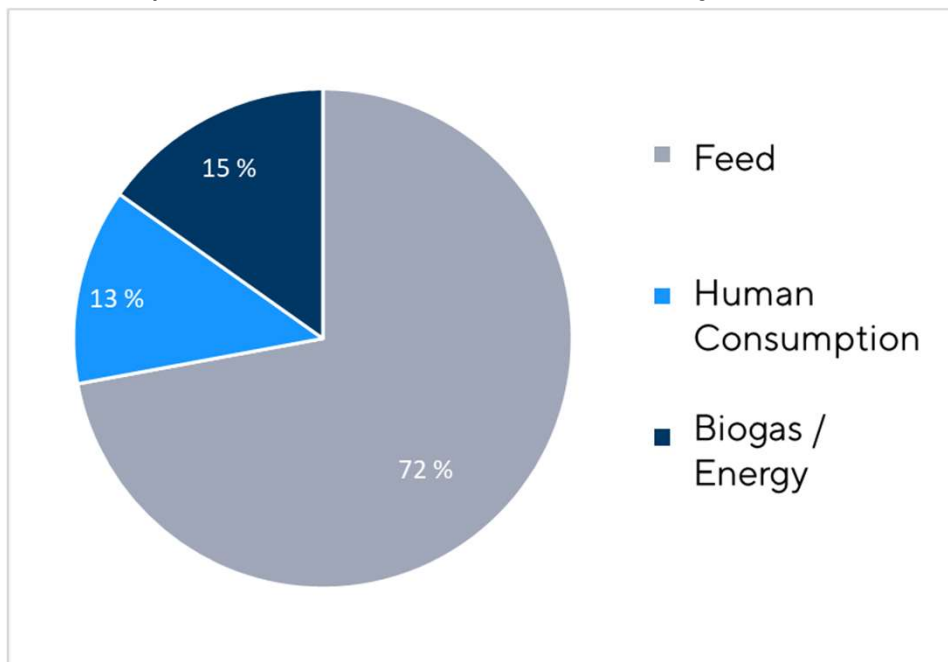


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From silage to marine oils & marine proteins

Human Consumption – Supplements & Petfood – Pet Supplements

Example – Current Situation Norway



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Fish Skins – For Direct Human Consumption

THE PRODUCT

CHIPS

Based on the enormous quantities of salmon skin thrown away each year comes the idea of salmon chips.

The concept of crispy fish skin is not new, it has been used in fine dining for a long time, but never in such a scaled-up way.

The salmon chips from Ocean Snacks is crispy, tasty and almost unbelievably healthy. A sprinkle of olive oil and a very high protein count leaves us with something of a market sensation!



"90% protein!? Its a winner!"



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Fish Skins – For Textile / Leather / Art- and Handicraft



Figure 12: Parka made of fish leather, worn by the Inuit in Kwethluk, Alaska; Gift of Elizabeth C. Butler, 1900,

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Fish Heads – For Direct Human Consumption (Overseas Market)

Salmon heads – Online sales in Vietnam



Salmon head – 700 gr

23,800 VNĐ

Price per 700 gr.
600 – 800 gr per pack.

⊖ 1 ⊕

ADD TO CART

♡ ADD TO WISHLIST

Dried Icelandic Cod heads – Bound for Nigeria



BANGKOK -- [Thai Union Group](#), the world's leading canned tuna exporter, is banking on its treasure trove of tuna heads to spur growth and lift profits.

The company makes about half of its sales from canned tuna, but is now looking to break into the market for refined fish oil and other higher-margin products made from byproducts like fish heads, skin, eyes and bones.

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FISH SKIN – COLLAGEN – FOR COSMETICS



Hydrolyzed Fish Collagen

APPLICATIONS

Cosmetics

RAW MATERIAL SOURCE

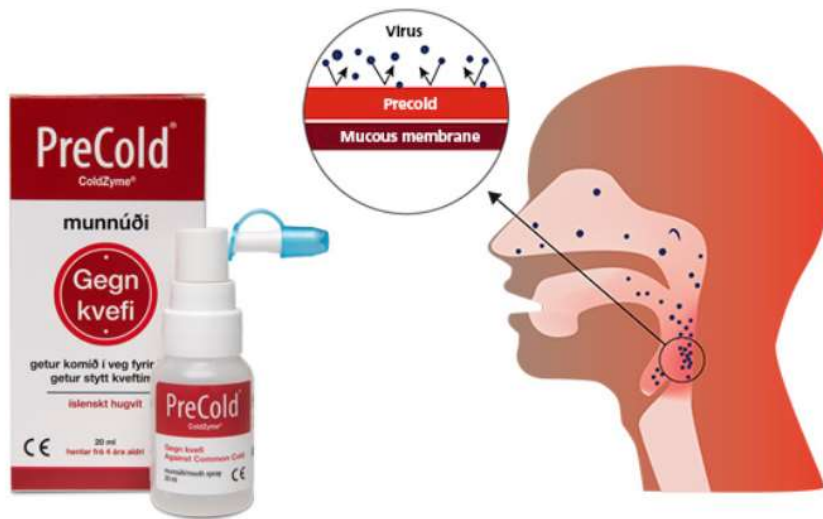
Fish



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ENZYMES AND PEPTIDES – FOR MEDICAL AND HEALTH PROTECTIVE USE



Discovery of a protecting enzyme from the Arctic Ocean

In the 1970s, Professor Jon Bragi Bjarnason, an Icelandic scientist, noticed that employees of a fish-cleaning plant had unusually soft and undamaged hands. Considering that they cleaned fish all day, it seemed more logical for their hands to be full of cracks and cuts instead. Was there something in the fish that had a protecting effect? The answer was yes. The research team was able to show that certain cold-adapted marine organisms contained an enzyme with good protecting properties. Further research and development eventually led to a global patent on the marine enzyme – cold-adapted trypsin. The enzyme is extracted as a by-product of cod processing and thus does not put a load on the marine ecosystem.

The Swedish biotech company Enzymatica was founded in 2007 and acquired global rights to develop and sell products that contain the marine enzyme.

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WHITEFISH / COD - BACKBONES (SWIMBLADDER) FOR DIRECT HUMAN CONSUMPTION RATHER THAN FOR FUR FEED



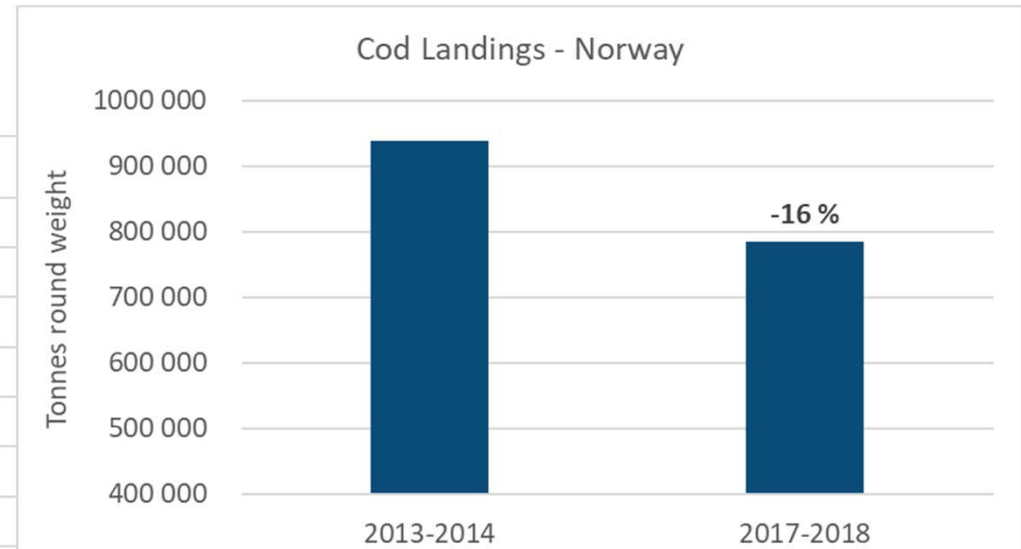
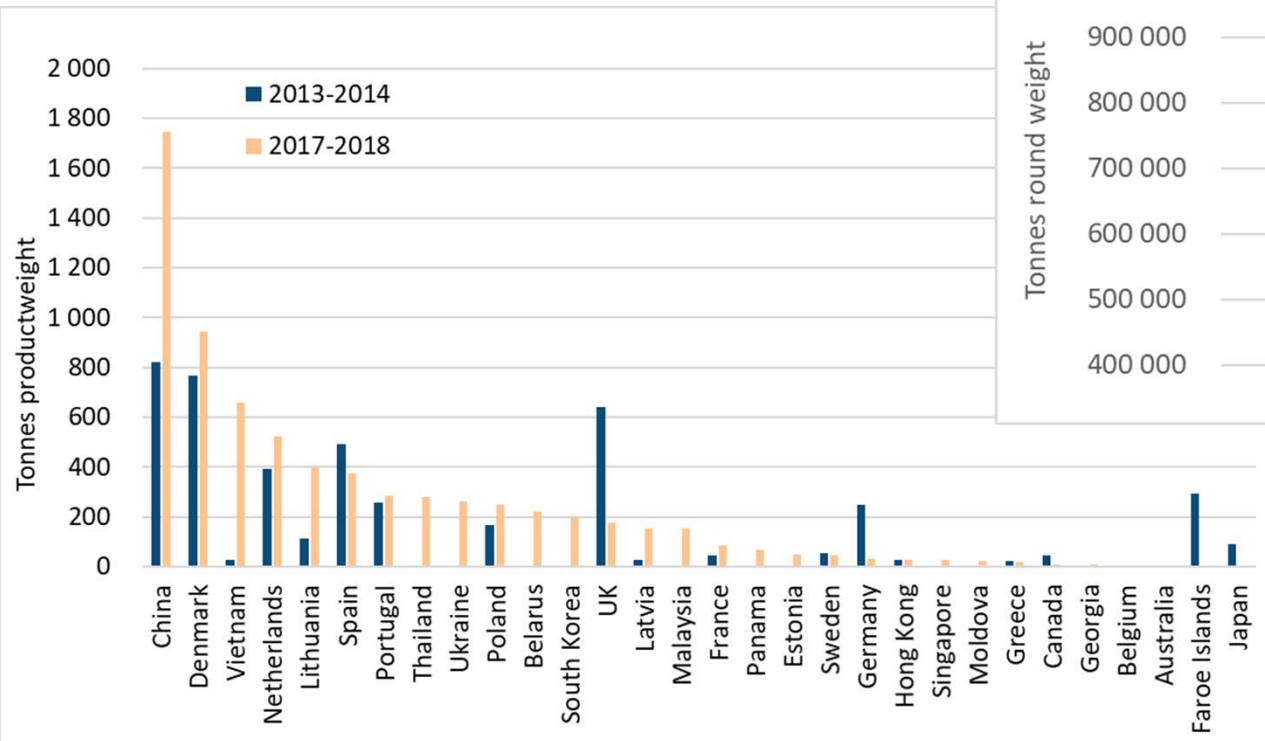
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SHIFT IN TRADE FLOWS – WHEN MARGINS / YIELDS CHANGE


NORWEGIAN EXPORTS OF EDIBLE COD BY-PRODUCTS 2013/14 vs. 2017/18

+ 55 % !



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A CASE STUDY FROM NORWAY

- An annual study on the fisheries and aquaculture sector in Norway, covering:
 - Availability of fisheries and aquaculture biomass
 - Based on primary product-forms sold, and processes undergone, total availability / potential amount of RRM (Rest-Raw material), by:
 - Sector (Salmonids, Whitefish, Pelagics, Shellfish)
 - Month / Region / Type of fraction
 - Utilized amount / Utilization rate, by:
 - Sector / Region
 - Type of process / Type of product / Type of market/usage
- Financed by Norwegian Seafood Research Fund,  FHF, produced by SINTEF OCEAN / Kontali Analyse

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Analyse marint restråstoff, 2019.

Tilgang og anvendelse av marint restråstoff i Norge

Forfattere

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Foto: SINTEF's raffineringsanlegg for marine objekter

SINTEF Ocean AS
Fiskeriteknologi
2019-04-30

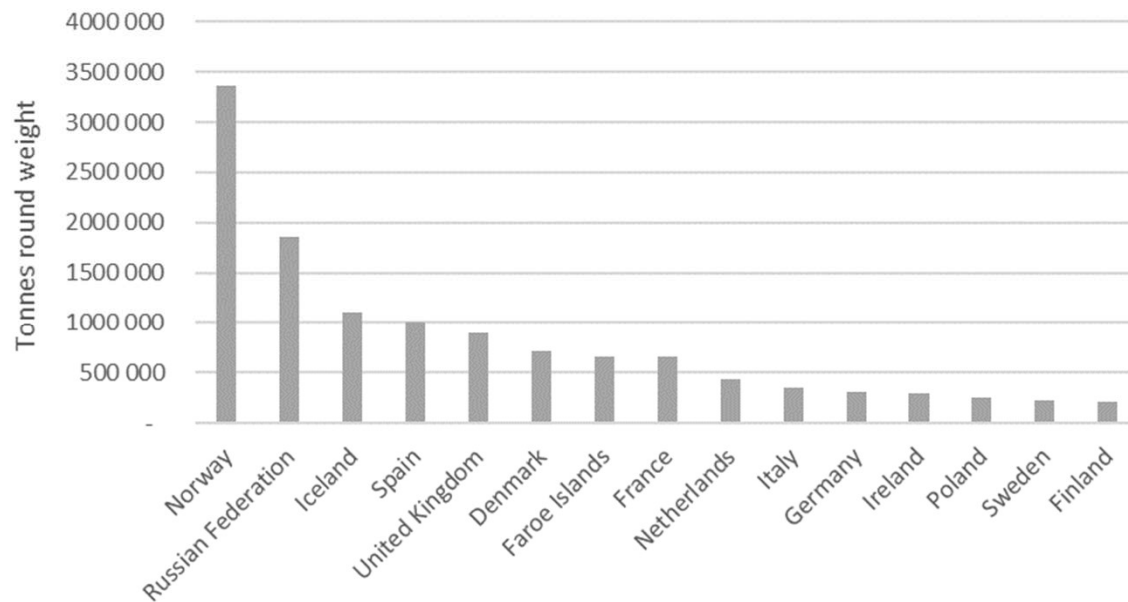
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Natural Initiative – In Europe's No.1 country of landings

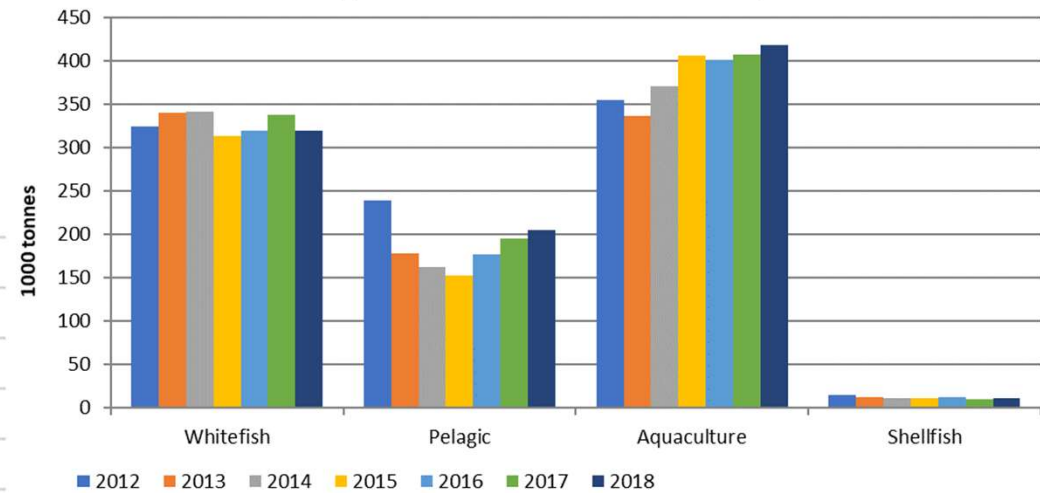
Examples of Research output / information

Fisheries & Aquaculture Resources - 2016
Top 15 - Europe (Atlantic & Mediterranean)



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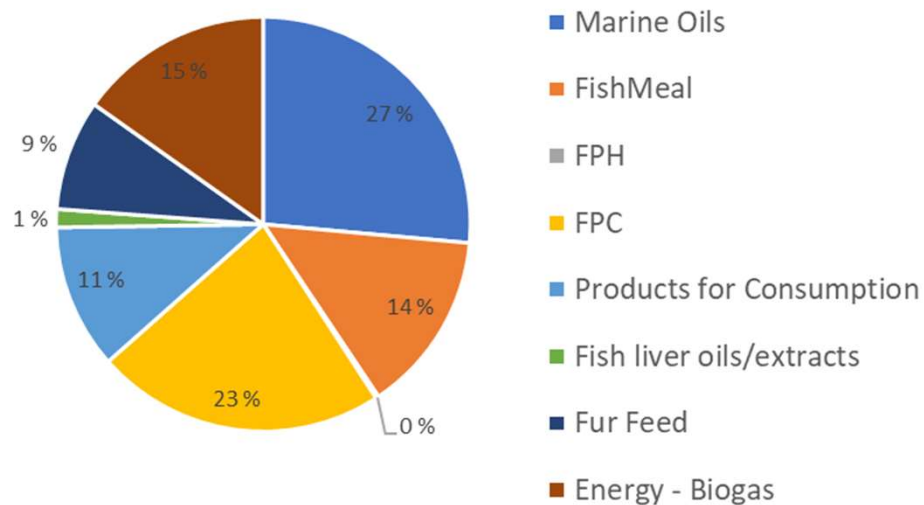
Norway; Available Rest-raw-material, By sector



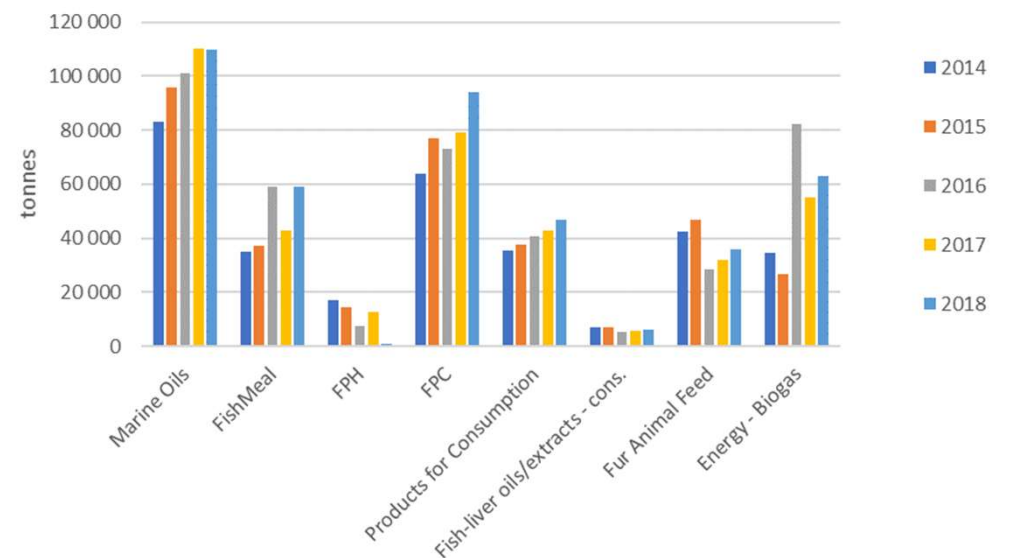
Output By-Product utilization Norway

By Product type, trends in utilization

2018 – Product split

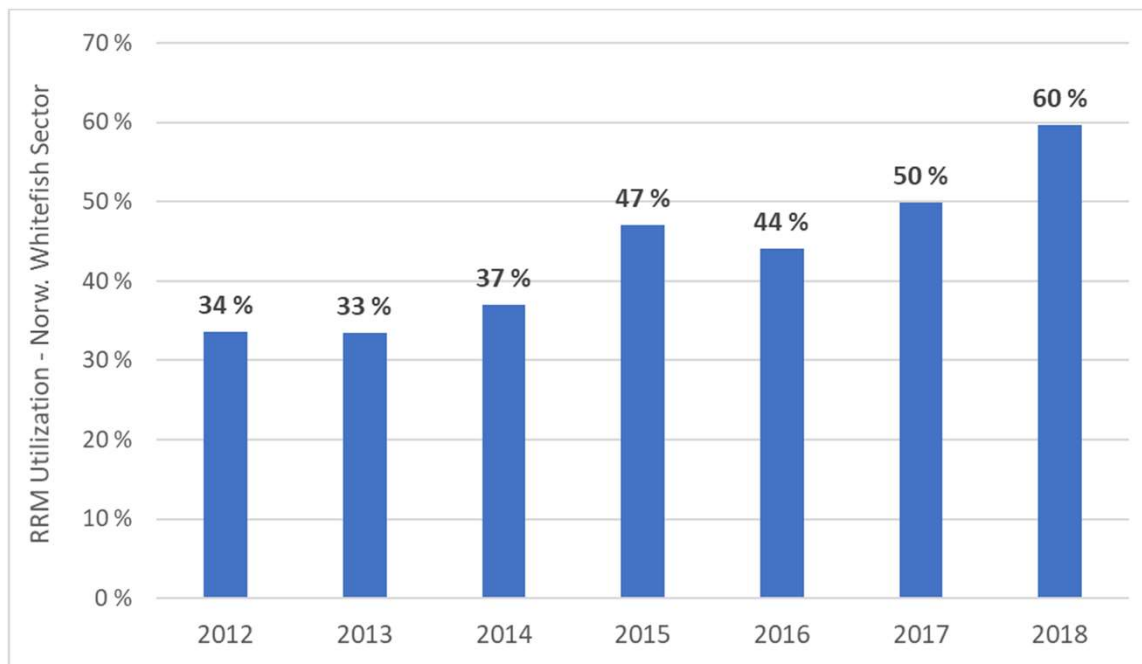


2014 – 2018 – Trend in product types



BUT MOST IMPORTANT; AVAILABILITY OF INFORMATION – DRIVES CHANGES....

Trend in Whitefish By-product Utilization



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- Utilization by **Coastal fleet**
Up from **50 % to 90 % in 5-6 years**

- Sales organisations / Authorities adapt regulations and practices
- Investments in onshore gutting machinery
- Utilization and Markets – Developed paralelly
- Focus on results of study – Every year.

- Utilization by **High-Seas fleet**
Up from **5-6 % to 20 % in 6 - 8 years**

- Not econ. viable to utilize for old vessels
- Strong pressure from Goverment / NGO's
- R&D focus by Equipment suppliers
- Utilization will increase notably in coming years, due to....:

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«ALL NEW-BUILDS» FOR HIGH-SEAS FISHERIES; LAST FEW YEARS CONSTRUCTED FOR 100 % RRM-UTILIZATION

From Discards of Heads & Guts, and unwanted by-catch

To:

- Packing for direct human consumption
- Bulk freezing for onshore / export processing
- Fishmeal / Fishoil / Fish liver oil
- Silage
- Hydrolyze



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End comments – Considerations

OVERARCHING GOALS: Limiting / Avoiding discards,
 Highest possible utilization of Rest-raw material / Waste
 Increase investments, value adding and economic impact from a given resource

PRIVATE STAKEHOLDERS: Maximizing; Profit / Margins / ROCE.....

HOW CAN ADMINISTRATIONS / POLICY MAKERS / RESEARCH CONTRIBUTE.....

«A well-informed market, is a well-functioning market-place»

REGULAR OVERVIEWS/STUDIES: *AVAILABILITY / GEOGRAPHY / SEASON*
 CURRENT UTILIZATION & TRENDS
 UNDERUTILIZATION – WHERE ?



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