Carbon footprint of Norwegian seafood

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Agenda

- SINTEF Fisheries and aquaculture
- The project
- Norwegian seafood export
- Method
- Results
  - Focus on diesel consumption and refrigerants use in fisheries
  - +++
- Questions

SINTEF Fisheries and aquaculture is the leading European technological research institute for the fishing and aquaculture sector - We cover the entire marine value chain

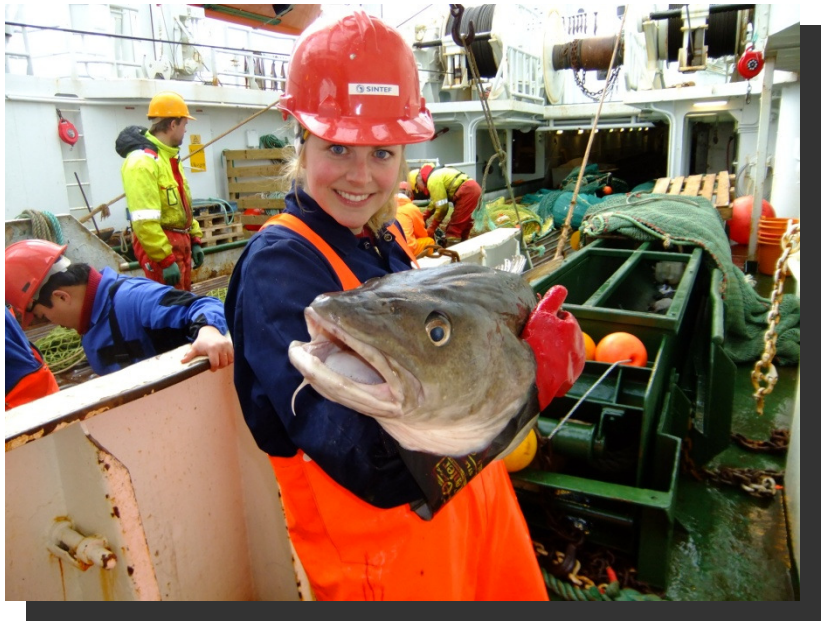
Our goal is to contribute to sustainable use of marine resources at a national and international level

The Project: Carbon footprint and energy use of Norwegian seafood

- Quantified the climate impact from 22 different Norwegian seafood products by calculating their Carbon Footprint
- Started in 2007 and was financed by the Norwegian Fisheries and Aquaculture Research Fund (FHF). It was lead by the Norwegian Seafood Federation (FHL) and The Norwegian fishermen's association (Fiskarlaget).
- Cooperation between SINTEF Fisheries and aquaculture (Trondheim, Norway) and SIK (Gothenburg, Sweden)
- Full report here: www.sintef.no/Miljo/Miljoregnskap-for-sjomatprodukter

Norwegian seafood exports (2009)

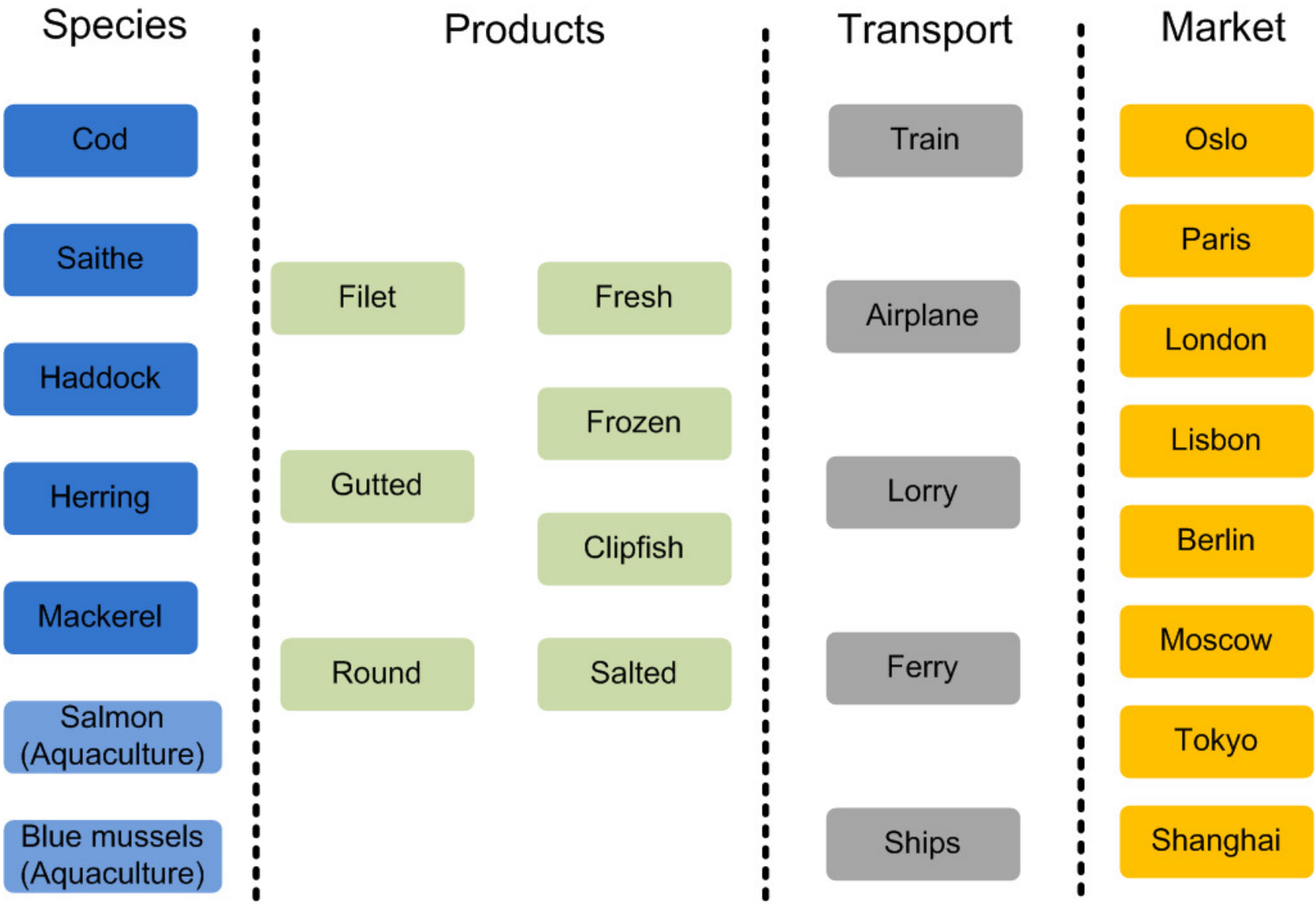
- 44,6 billion NOK = 5,6 billion EUR (<6% of Norwegian total exports)
- 2,58 millions tons
- New all time highs in 2009
- 96 different countries



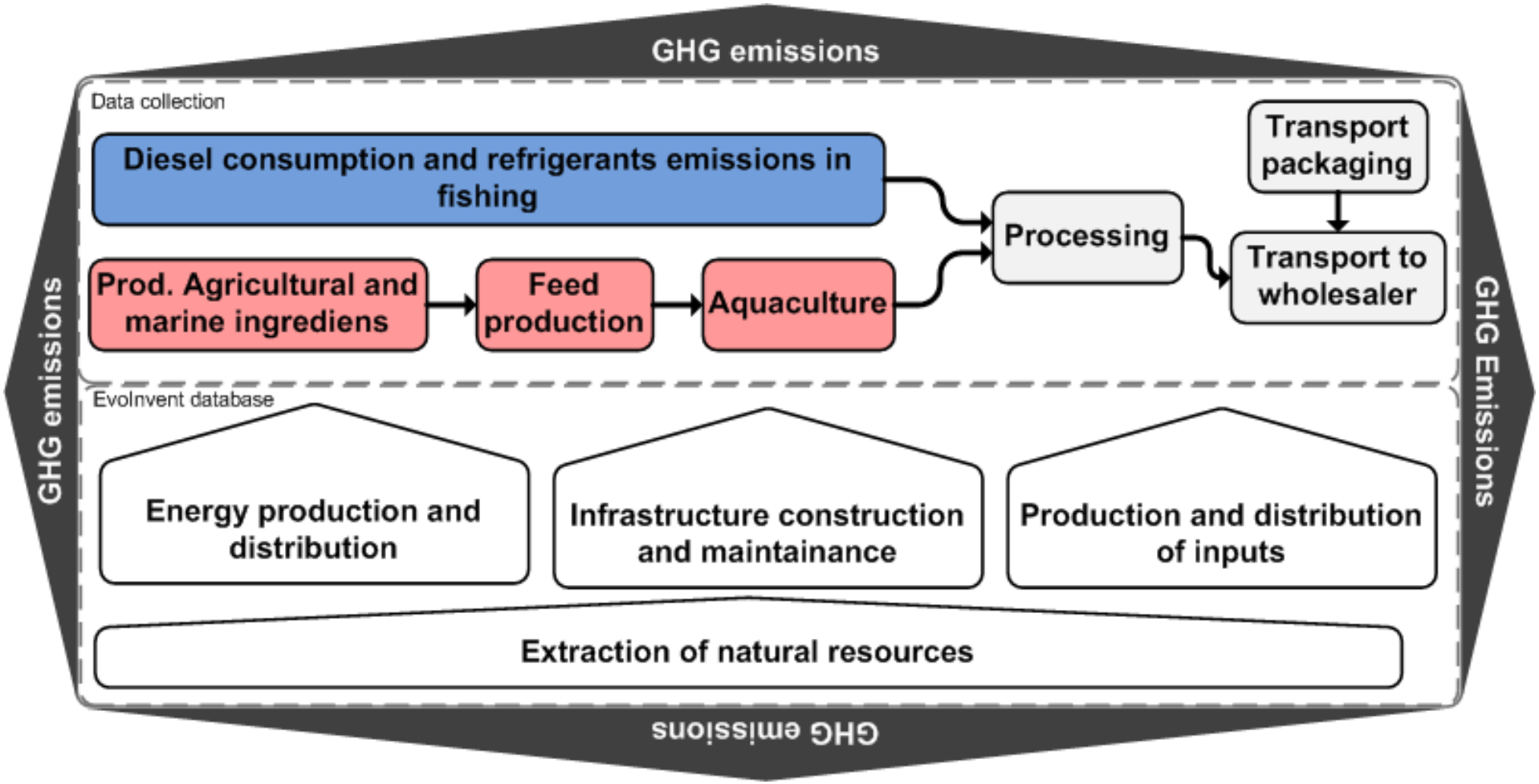
Method

- Functional unit: 1 kg edible product at wholesaler
- Mass allocation: Fishing, processing…
- The Carbon Footprints was calculated according to ISO 14040 Environmental management – Life Cycle Assessment – Principles and framework
- Capital goods in foreground system not included (construction of boat, farm site, processing plant), except where covered by EcoInvent.

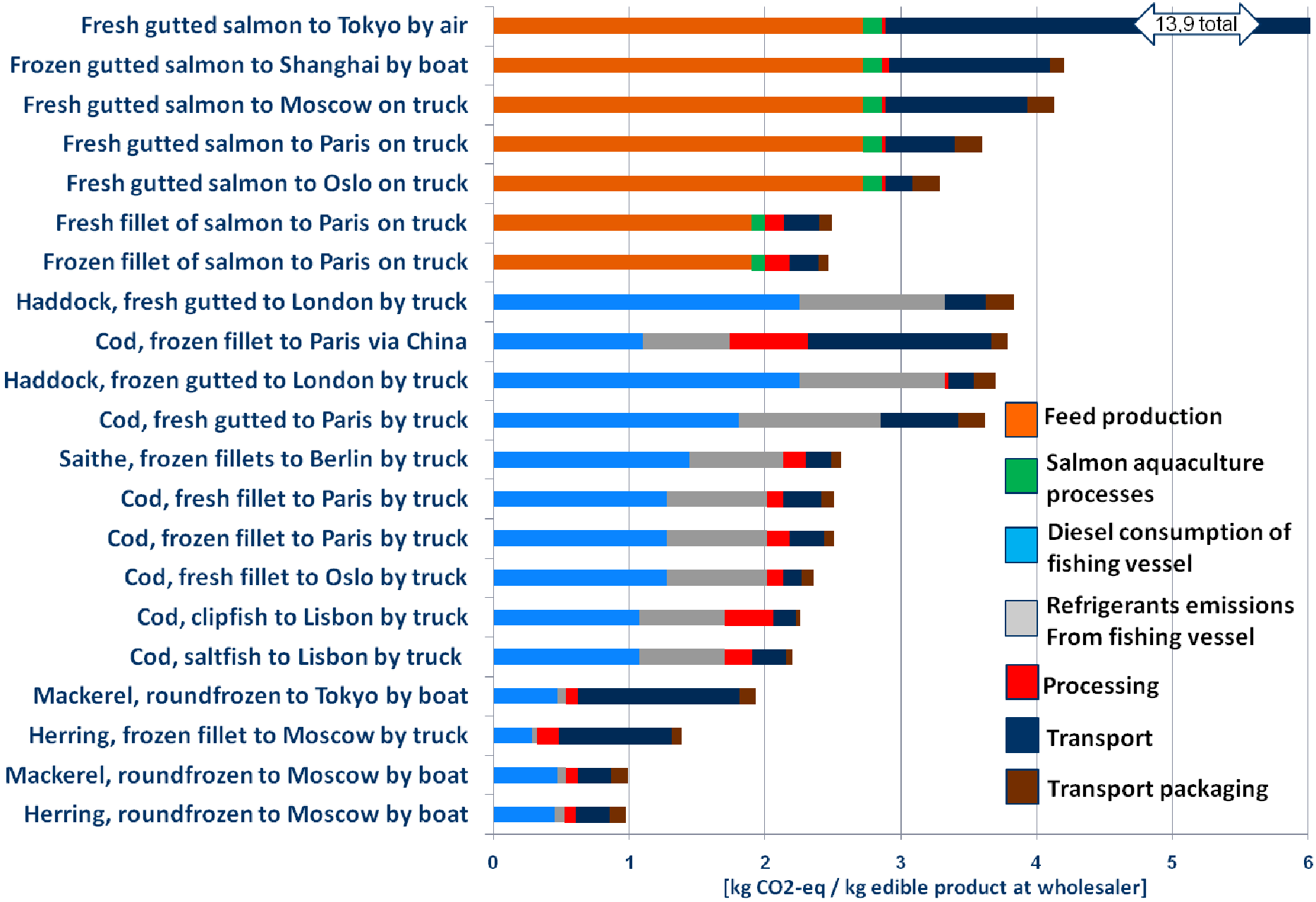
What do the report include?



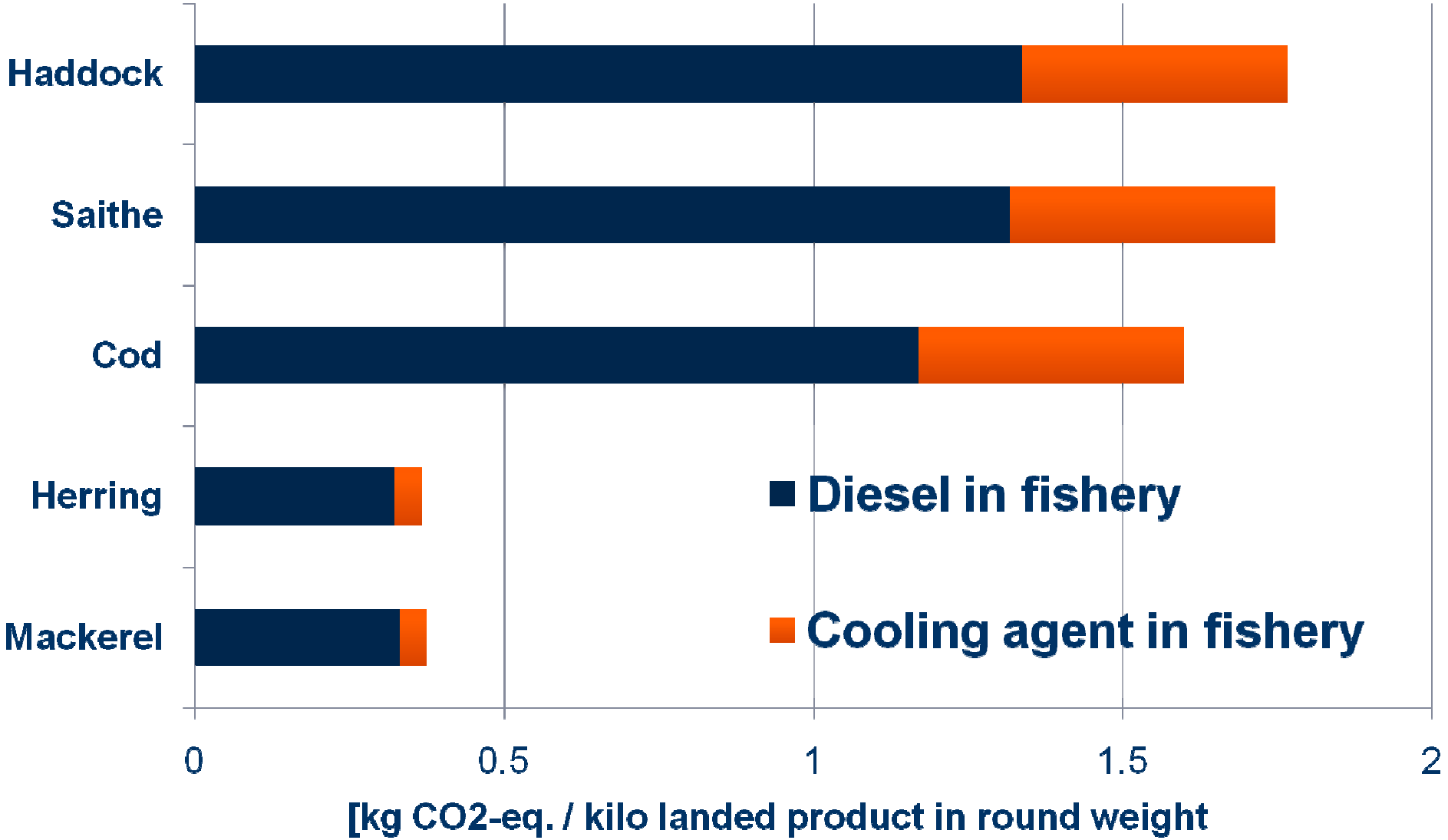
System boundaries: What is included in the carbon footprint?



Results


Fresh gutted salmon to Tokyo by air
Frozen gutted salmon to Shanghai by boat
Fresh gutted salmon to Moscow on truck
Fresh gutted salmon to Paris on truck
Fresh gutted salmon to Oslo on truck
Fresh fillet of salmon to Paris on truck
Frozen fillet of salmon to Paris on truck
Haddock, fresh gutted to London by truck
Cod, frozen fillet to Paris via China
Haddock, frozen gutted to London by truck
Cod, fresh gutted to Paris by truck
Saithe, frozen fillets to Berlin by truck
Cod, fresh fillet to Paris by truck
Cod, frozen fillet to Paris by truck
Cod, fresh fillet to Oslo by truck
Cod, clipfish to Lisbon by truck
Cod, saltfish to Lisbon by truck
Mackerel, roundfrozen to Tokyo by boat
Herring, frozen fillet to Moscow by truck
Mackerel, roundfrozen to Moscow by boat
Herring, roundfrozen to Moscow by boat
13,9 total
Feed production
Salmon aquaculture processes
Diesel consumption of fishing vessel
Refrigerants emissions From fishing vessel
Processing
Transport
Transport packaging
0
1
2
3
4
5
6
[kg CO2-eq / kg edible product at wholesaler]

Climate aspects of wild caught products



Wild caught products: Refrigerants

- Emissions of refrigerants from fishing vessels can account for up to 30% of the total CF
- R22 has been regulated since 2001 because of its ozone depletion potential. The Norwegian fishing fleet has been able to avoid these regulations and is now the biggest consumer of R22, around 200 tons annually
- R22 (HC-FC 22) has a climate factor of 1810 kg CO2-eq. / kg R22
- Our report put refrigerants high on the agenda for the Norwegian Fisherman's association.

Wild caught products: Energy use in fisheries

- Gear specific fuel factors by data from more than 458 vessels. Annual fuel consumption combined with their annual catch.
- Species specific fuel factors by combining the gear specific fuel factors with how each species are caught
- Herring and mackerel is very energy efficient fisheries. Species can be found in big sculls and often close to land.
- Also high variations between vessels that use same type of gear and that operate within the same regulatory frames. This indicates a high improvement potential for technological optimization and vessel operation

Fishing gear	Fuel use [l / kg]*	Standard deviation	Coefficient of variation**
Other long lines (Andre liner)	0.15	0.069	0.5
Long-line (Autoline)	0.31	0.12	0.4
Bottom trawl (Bunntrål)	0.43	0.24	0.6
Trolling line (Dorg/harp/snik)	0.14	0.14	1.0
Pelagic line (Flyteline)	0.10	0.051	0.5
Pelagic trawl (Flytetrål)	0.098	0.12	1.2
Pelagic pair trawl (Flytetrål par)	0.093	0.022	0.2
Hand line/ jig (Juksa/pilk)	0.15	0.19	1.3
Gillnet (Settegarn)	0.15	0.18	1.2
Purse seine (Snurpenot/ringnot)	0.089	0.03	0.3
Danish seine (Snurrevad/Rundfisktrål/Flyndretrål)	0.12	0.20	1.7
Undefined gillnet (Udefinert garn)	0.25	0.26	1.0
Undefined seine (Udefinert not)	0.083	0.16	1.9

*liters fuel per kilo landed catch in round weight
** coefficient of variation= standard deviation / average value

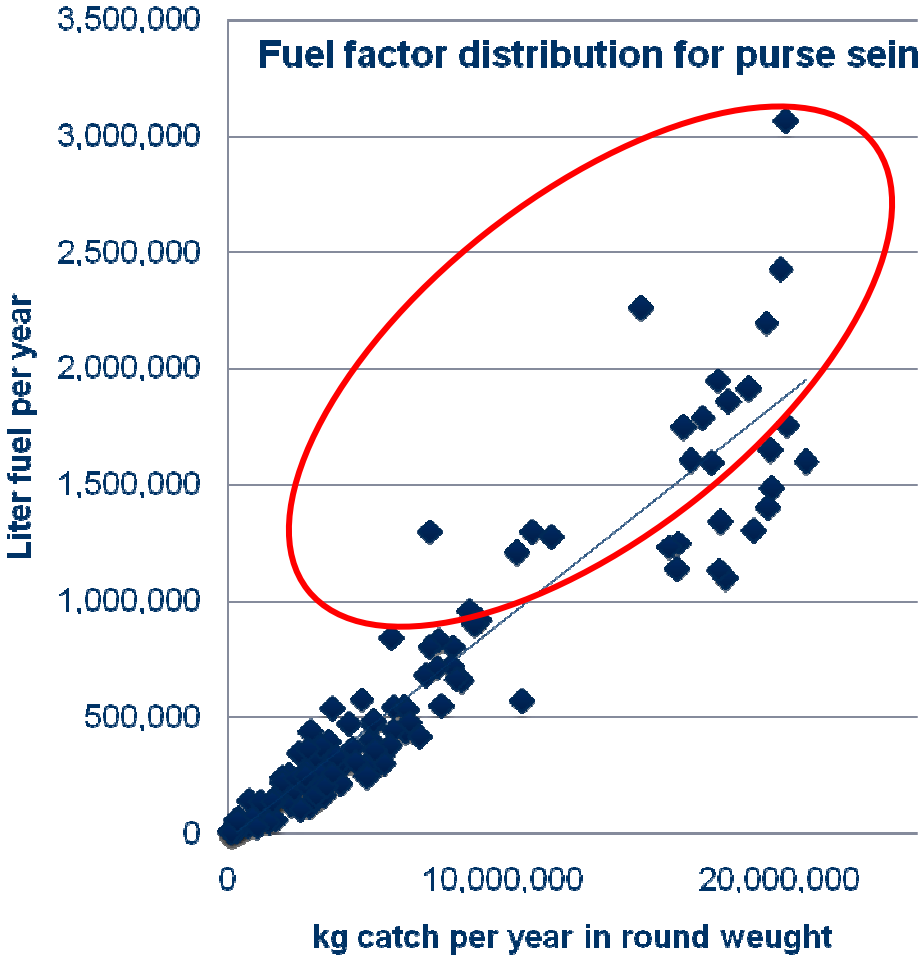
	Fuel factors [litre fuel / kg landed round weight]	Standard deviation
Cod	0.24	0.096
Haddock	0.29	0.11
Saithe	0.29	0.13
Herring	0.091	0.029
Mackerel	0.094	0.031

High variations in energy use

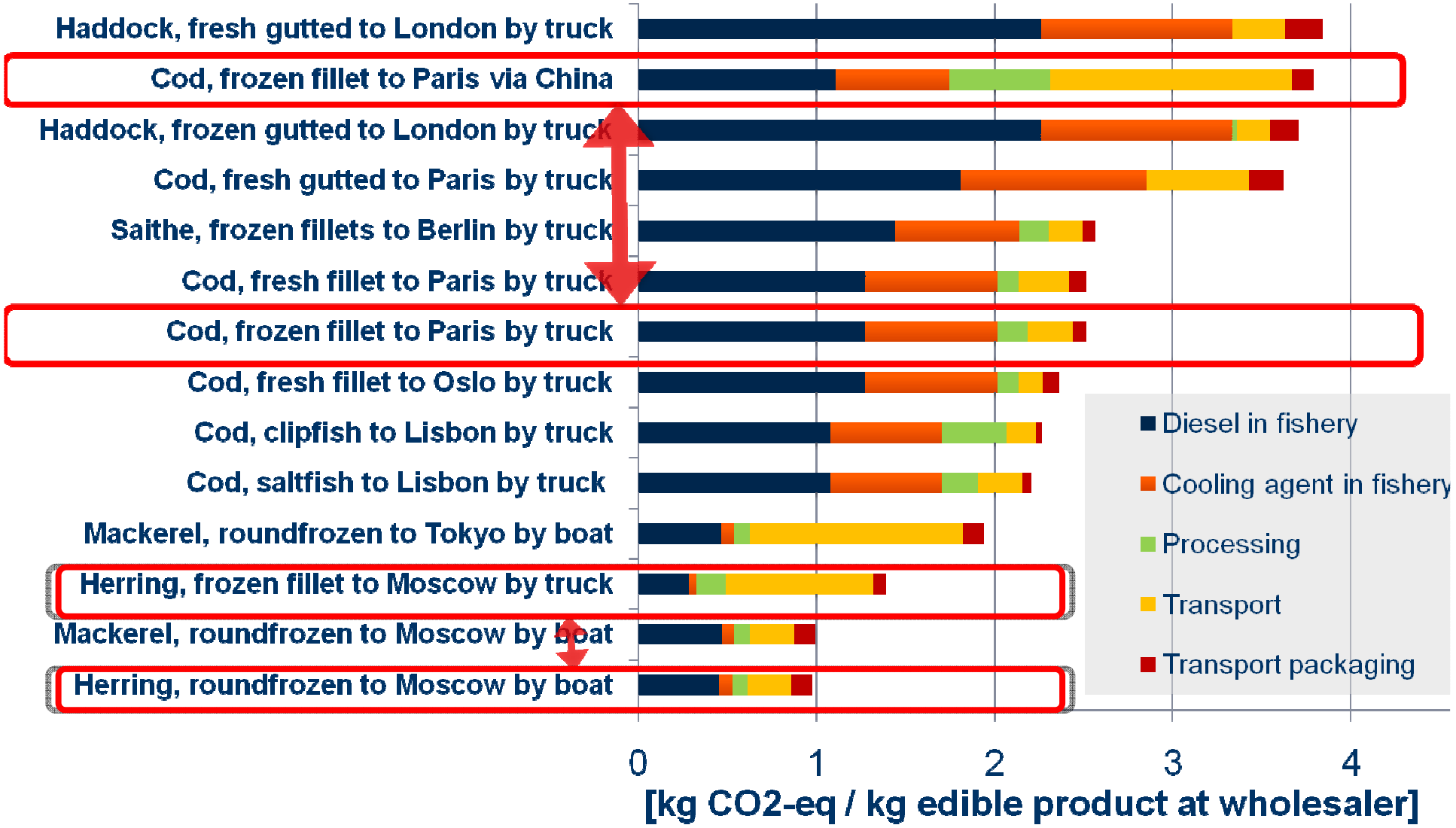
Pelagic fisheries are energy efficient compared to many other fisheries, but the degree of variation show that big parts of the fleet can still improve.

Optimize your engine system.

Less can be more!



Transport matters!



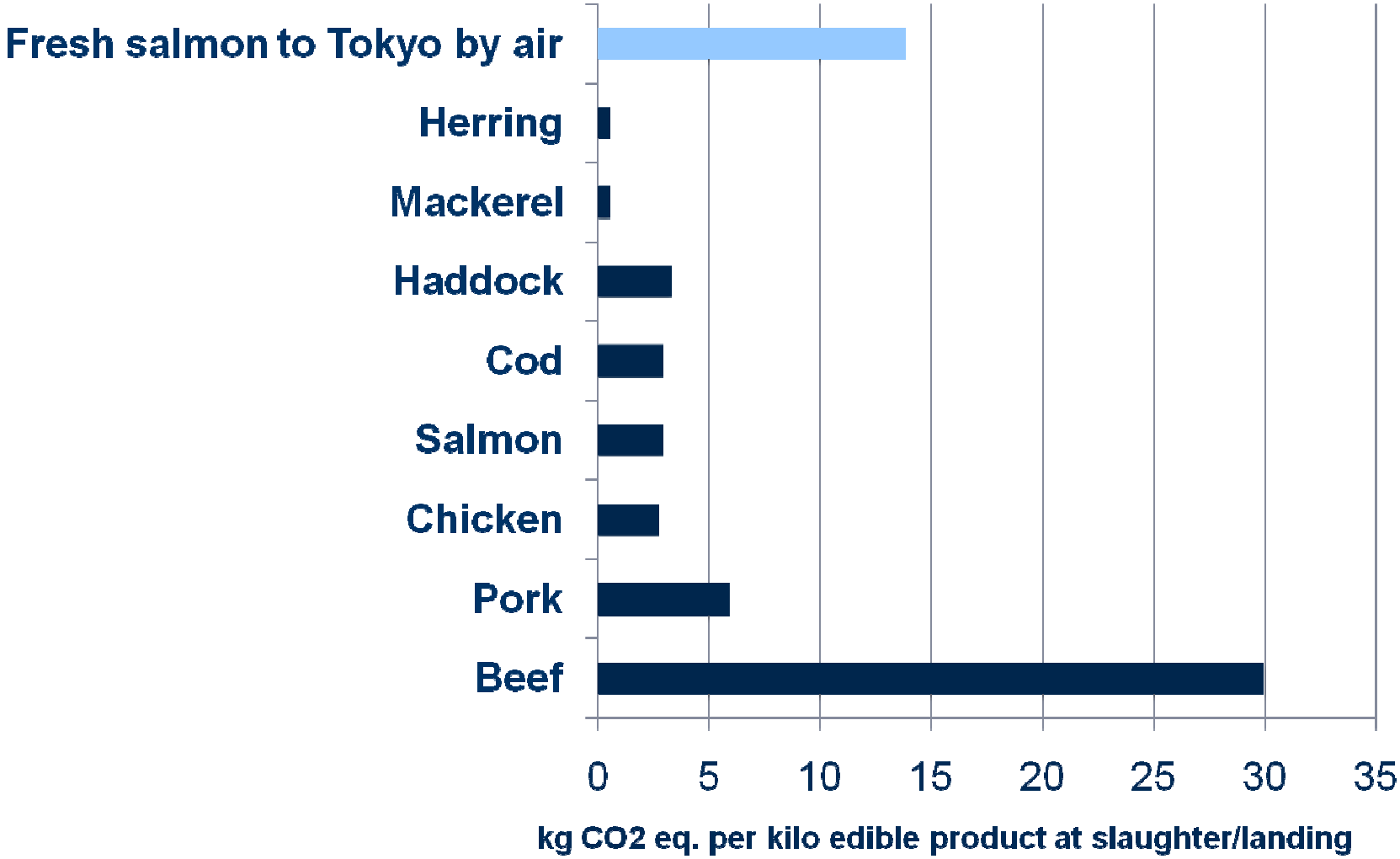
Export method is important

- Process before export, easier to optimize the use of byproducts and transport means capacity

- Export more as frozen products, easier to optimize the transport and lets you choose better transport alternatives: Train instead of truck, ship instead of airplane.

- Frozen products can also extend the shelf life and increase the share that is actually eaten.

Seafood in perspective



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