SINTEF Fisheries and Aquaculture, Trondheim August 20th 2015

Seminar: Brazil – a new super power in aquaculture

Salmon – a success story in Norway

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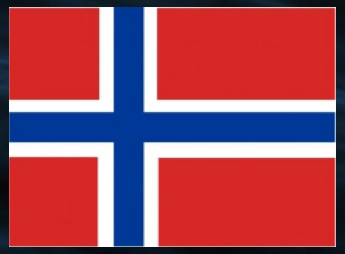
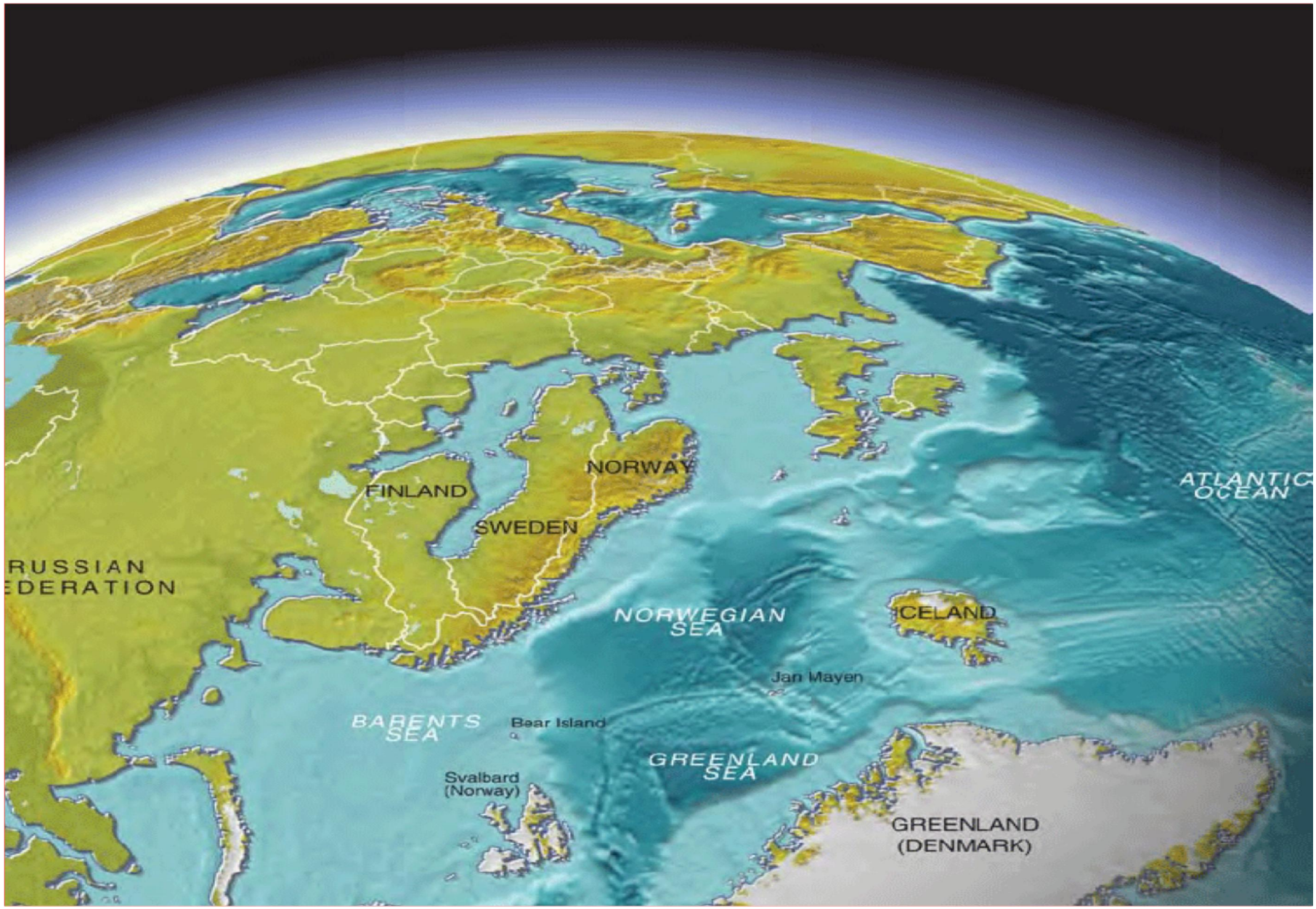
SINTEF Fisheries and Aquaculture

Norway




FINLAND
NORWAY
SWEDEN
RUSSIAN
EDERATION
NORWEGIAN
SEA
ICELAND
Jan Mayen
BARENTS
SEA
Bear Island
GREENLAND
SEA
Svalbard
(Norway)
GREENLAND
(DENMARK)
ATLANTIC
OCEAN

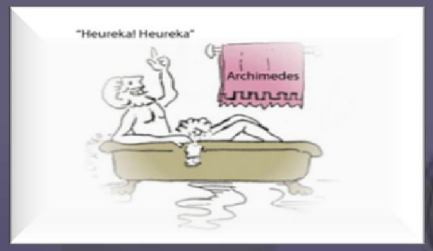
Why increase food production in the sea ?

Total bio production 50/50

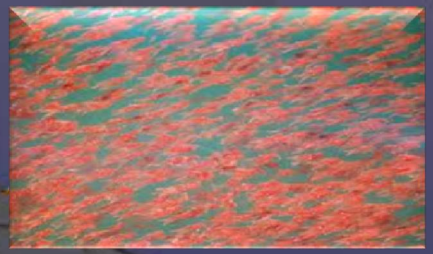
Human consumption 98/2

Water

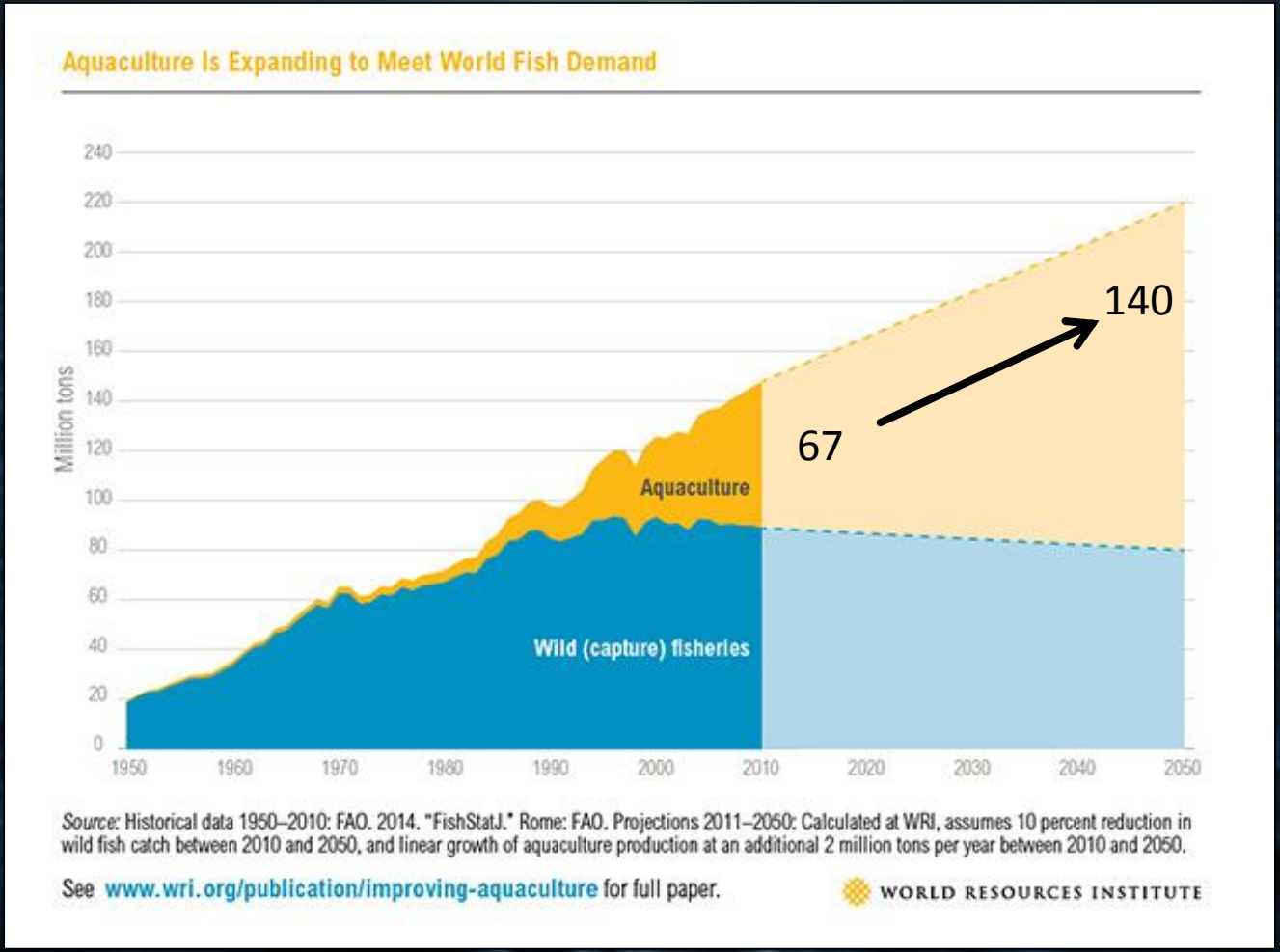
Energy



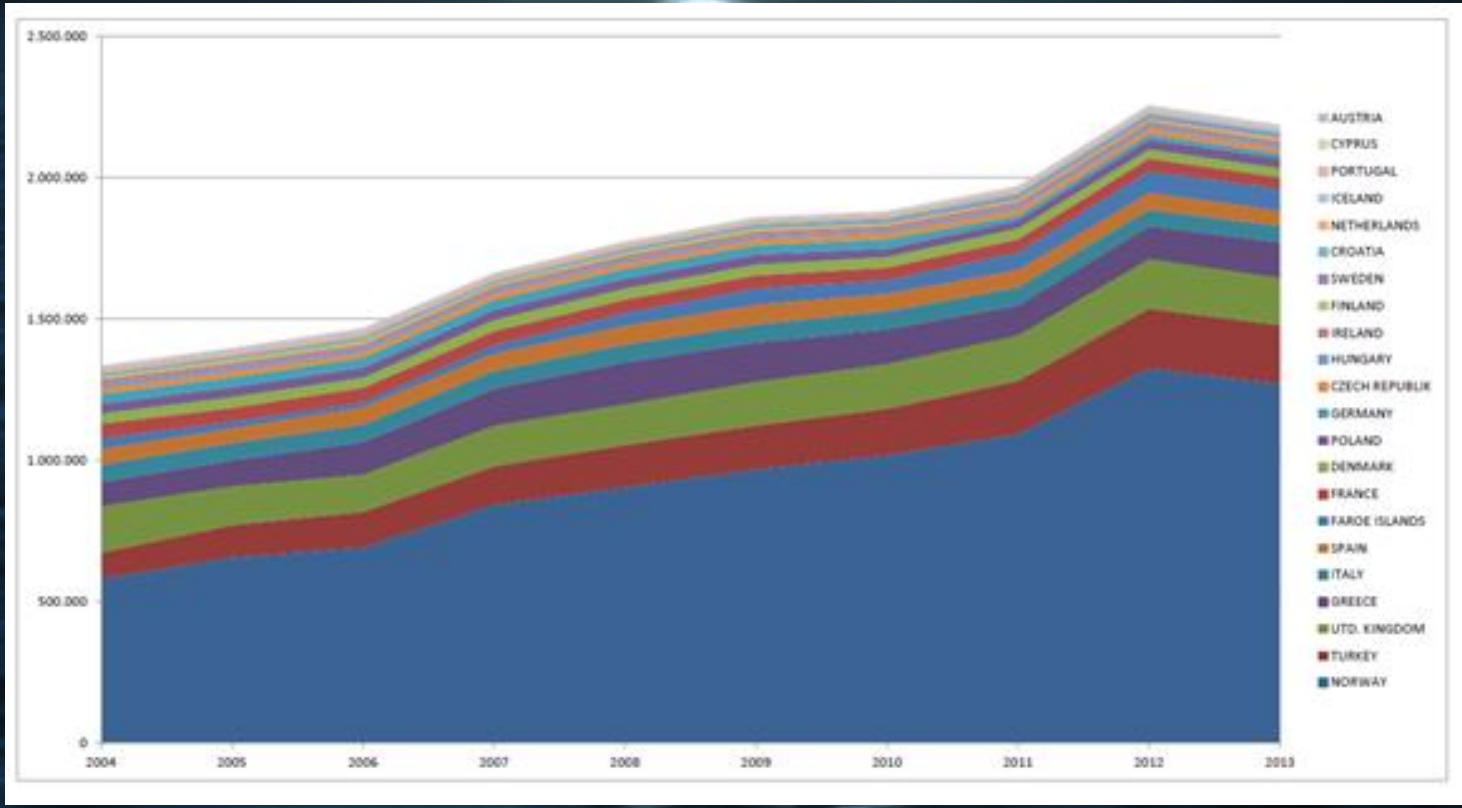
Temperature



Fish as future food resource

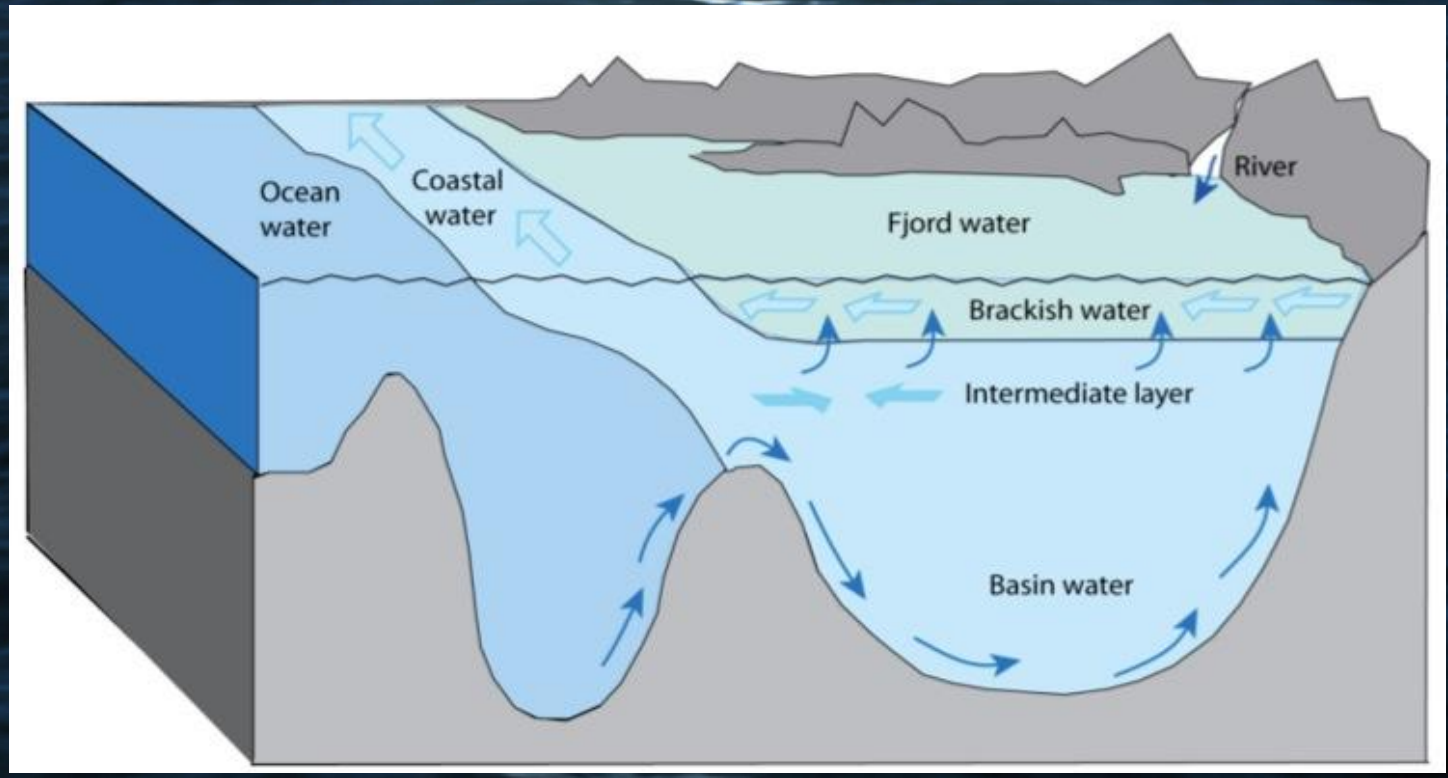


Fish farming in Europe (tons, 2004-2013)

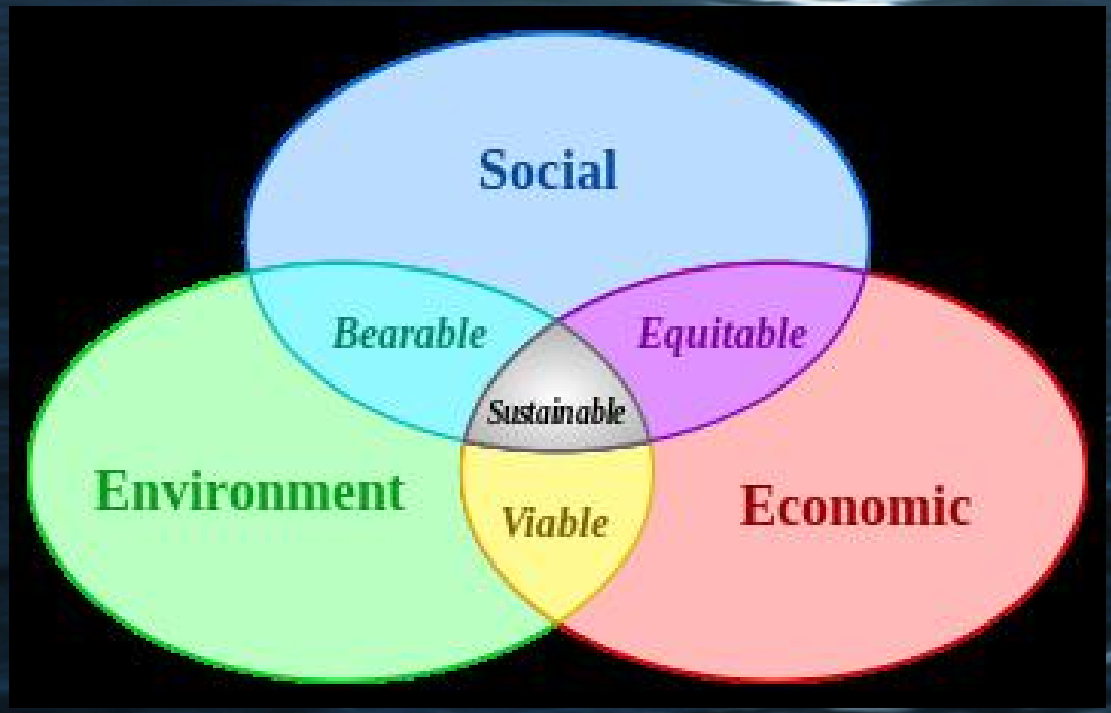


Very good natural conditions for aquaculture

The Norwegian coast: The fjord water is in open contact with the ocean current beyond



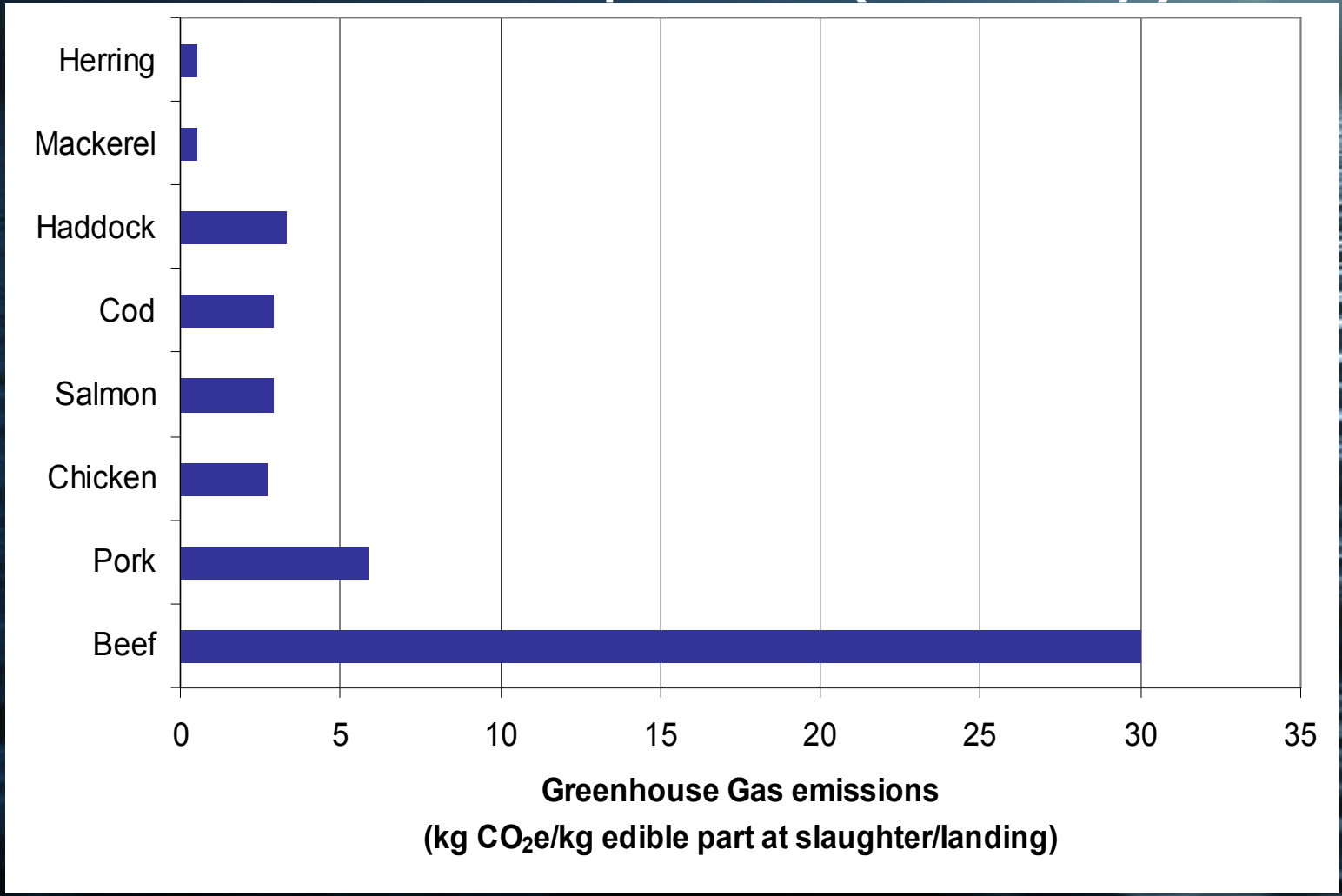
Sustainability



Environmental sustainability

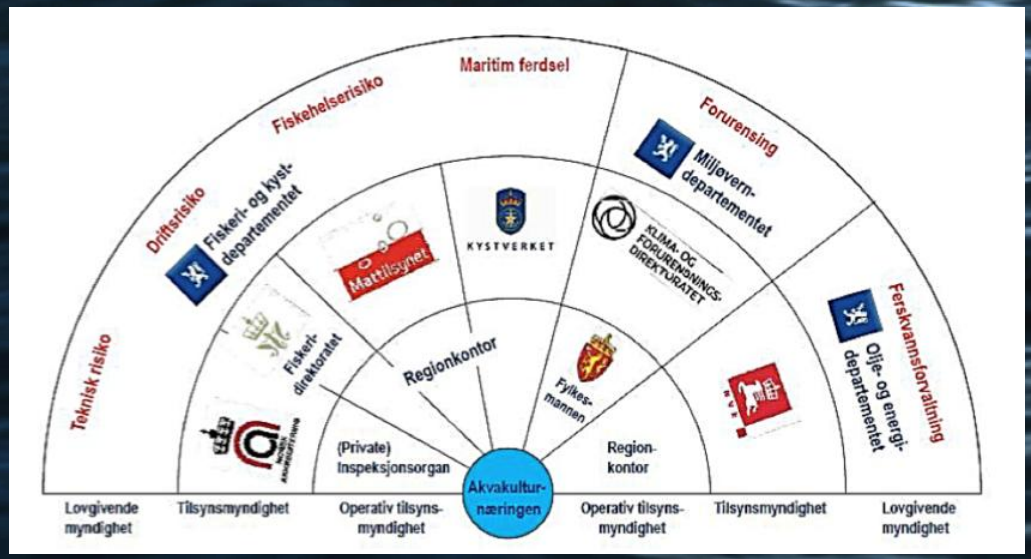
- Possible impacts on wild stocks of salmon
  - Sea lice (parasites)
  - Genetic influence from escapees
- Nutrient load

Seafood in perspective
Carbon footprints (Norway)



Strict regulations

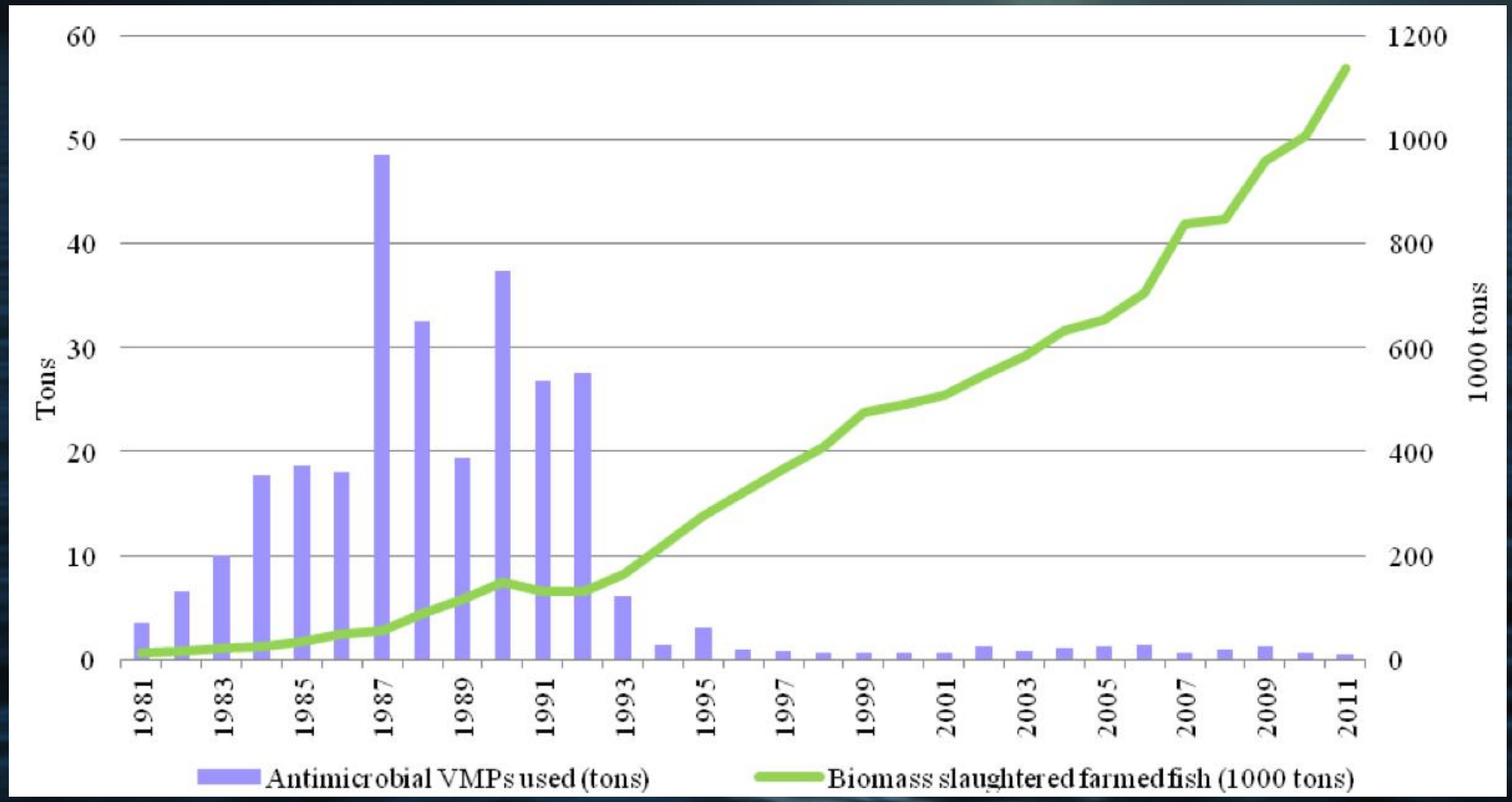
- Assessment procedures before permission is granted
- Monitoring the environment during production
- Fallowing(min 2 months) before new production



“Voluntarily” Certification

- ISO-certification
- Global-Gap and others
- ASC (Aquaculture Stewardship Council) is recently established – several companies have ambition to be certified

The medicine myth



Economic sustainability

- Technological development – less work intensive
- Fish health – reduced losses
- Feed resources

Source: DN.no

Social sustainability

- Small coastal communities are dependent on aquaculture
- Contribute to positive development
- Ensure that increased use of foreign labour has a positive impact on small communities

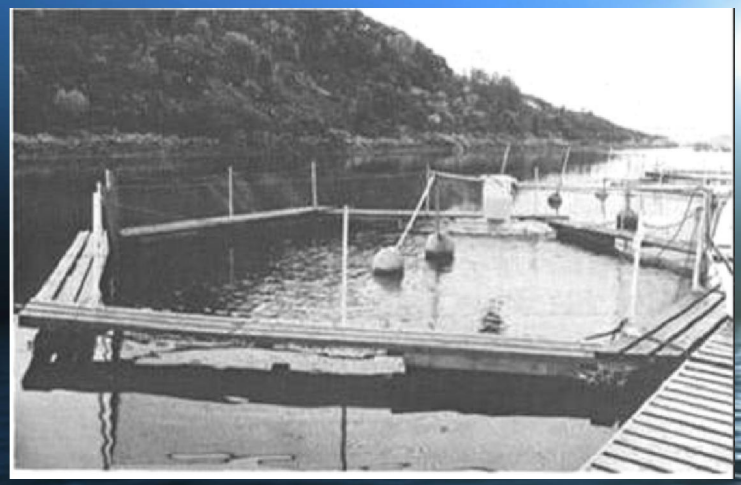
Source: forskning.no

Fishery production per fisher or fish farmer by region in 2010

Region	Production[1] per person		
	Capture	Aquaculture	Capture + aquaculture
	(Tonnes/year)		
Africa	2.0	8.6	2.3
Asia	1.5	3.3	2.1
Europe	25.1	29.6	25.7
Latin America and the Caribbean	6.8	7.8	6.9
North America	16.3	183.2	18.0
Oceania	17.0	33.3	18.2
World	2.3	3.6	2.7
Norway :	**approx. 200**	**approx. 500**	

Salmon – the most efficient food production in the world ?

Salmar, Frøya

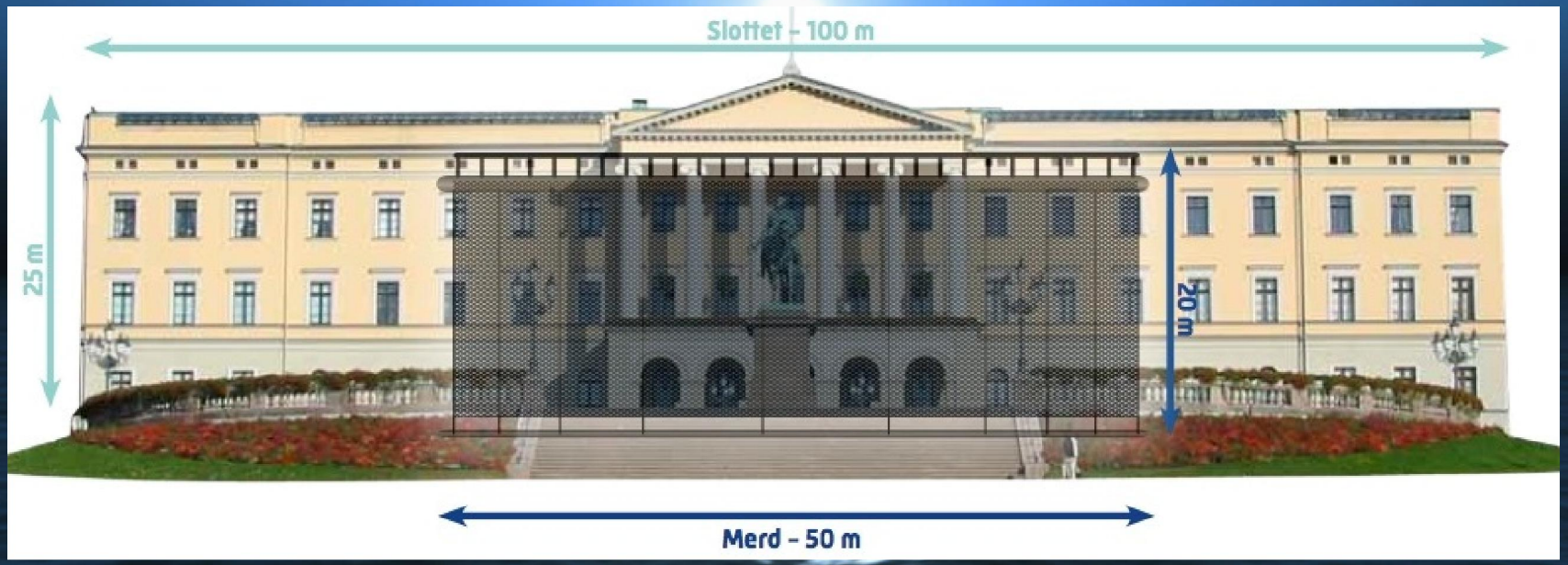


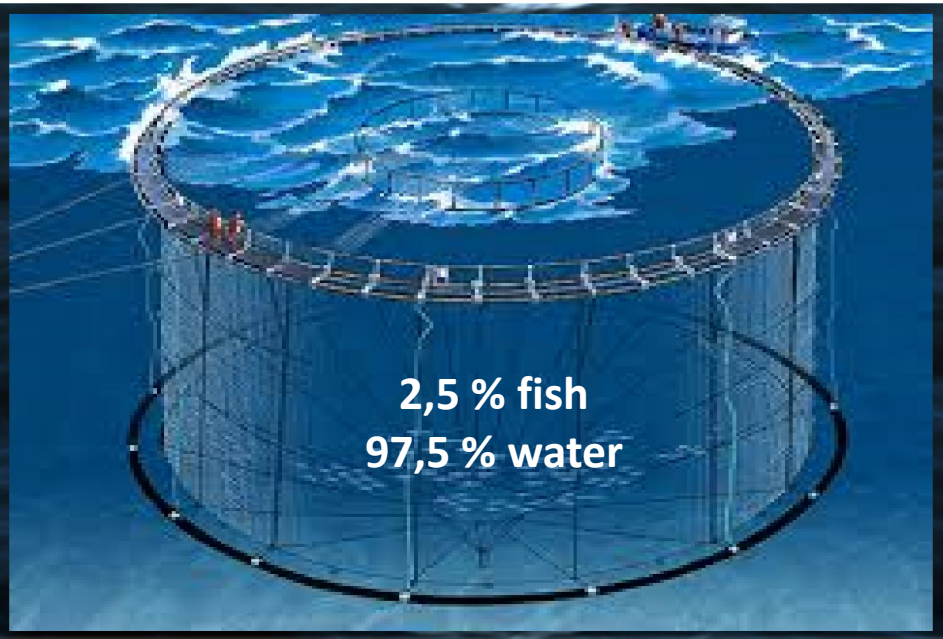
1970:

- Rainbow trout
- Production: 500 tons
- Inland market
- 55 fish farms

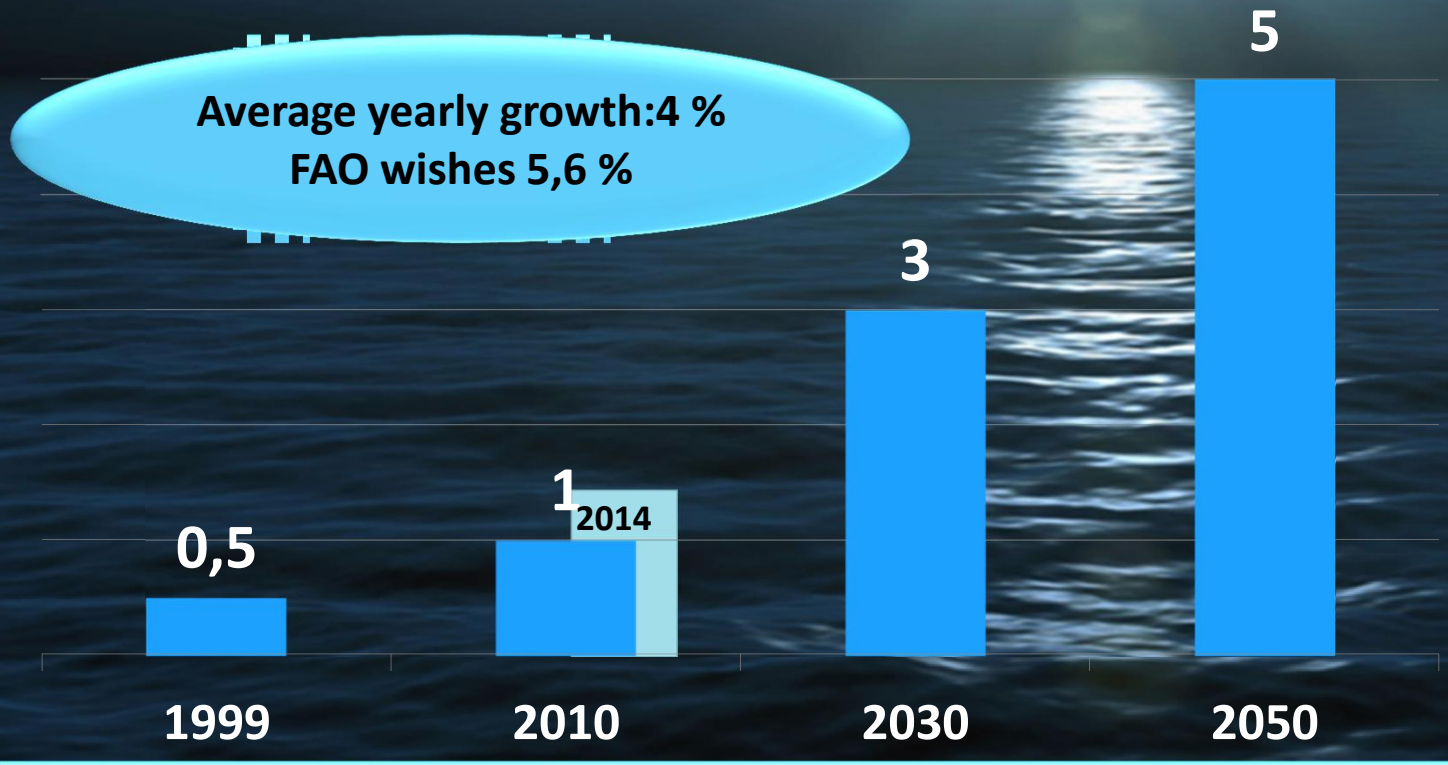
2014

- Atlantic salmon + rainbow trout
- Harvested 1 400 000 tons
- World market (>100 countries)
- 700 on-growing farms
- Export value: 46 billion NOK
- About 4.000 employees (indirectly 21.000)


Slottet – 100 m
25 m
20 m
Merd – 50 m


2,5 % fish
97,5 % water

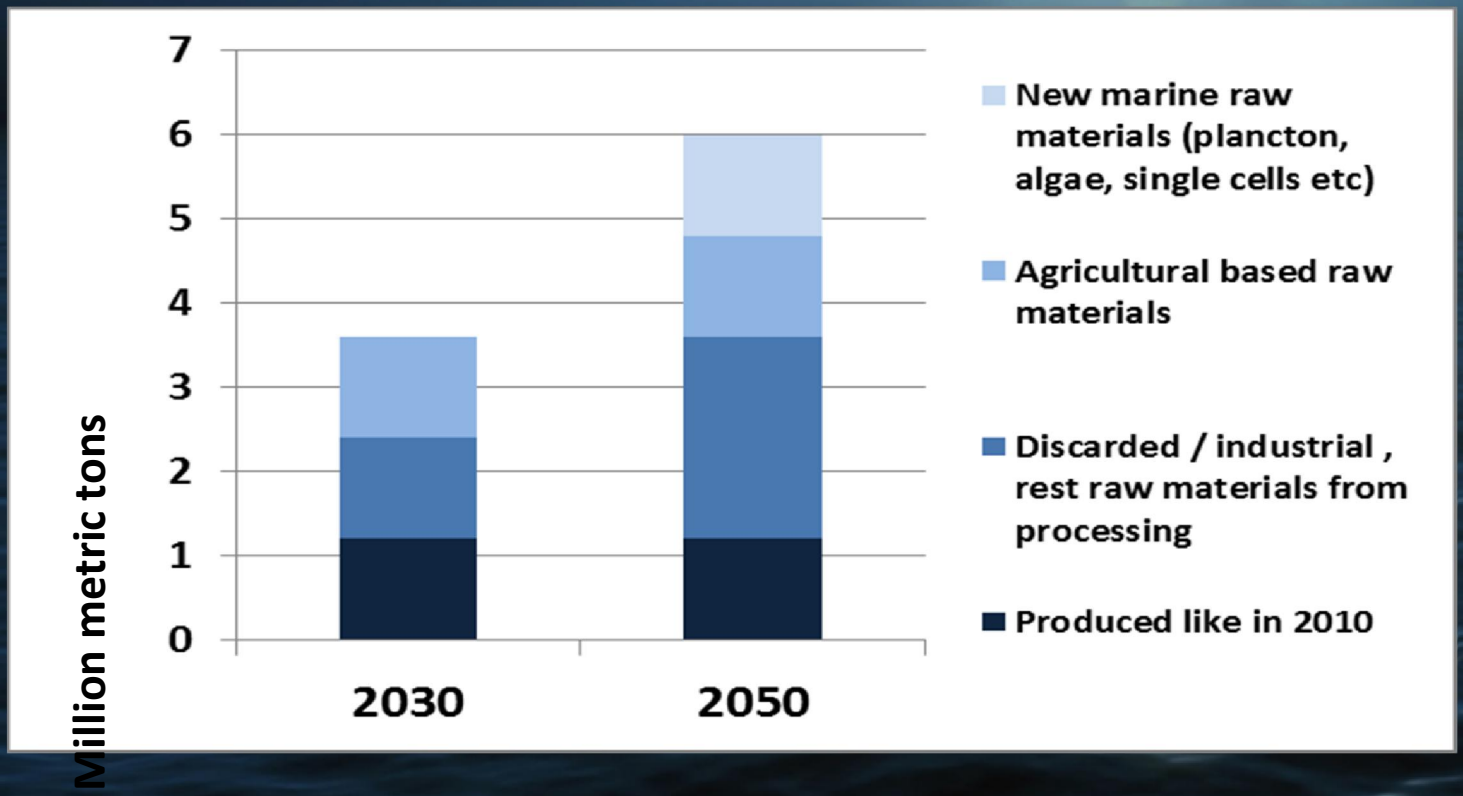
Aquaculture , salmon and trout Volume , mill. Tons, 2010-2050



Volume 2050:

- Environmental problems solved
- New regulation regime
- Predictable industrial regulations
- Salmon demand from the markets
- New innovations in feed, health and technology
- Strong political will.

Feed demand in 2050

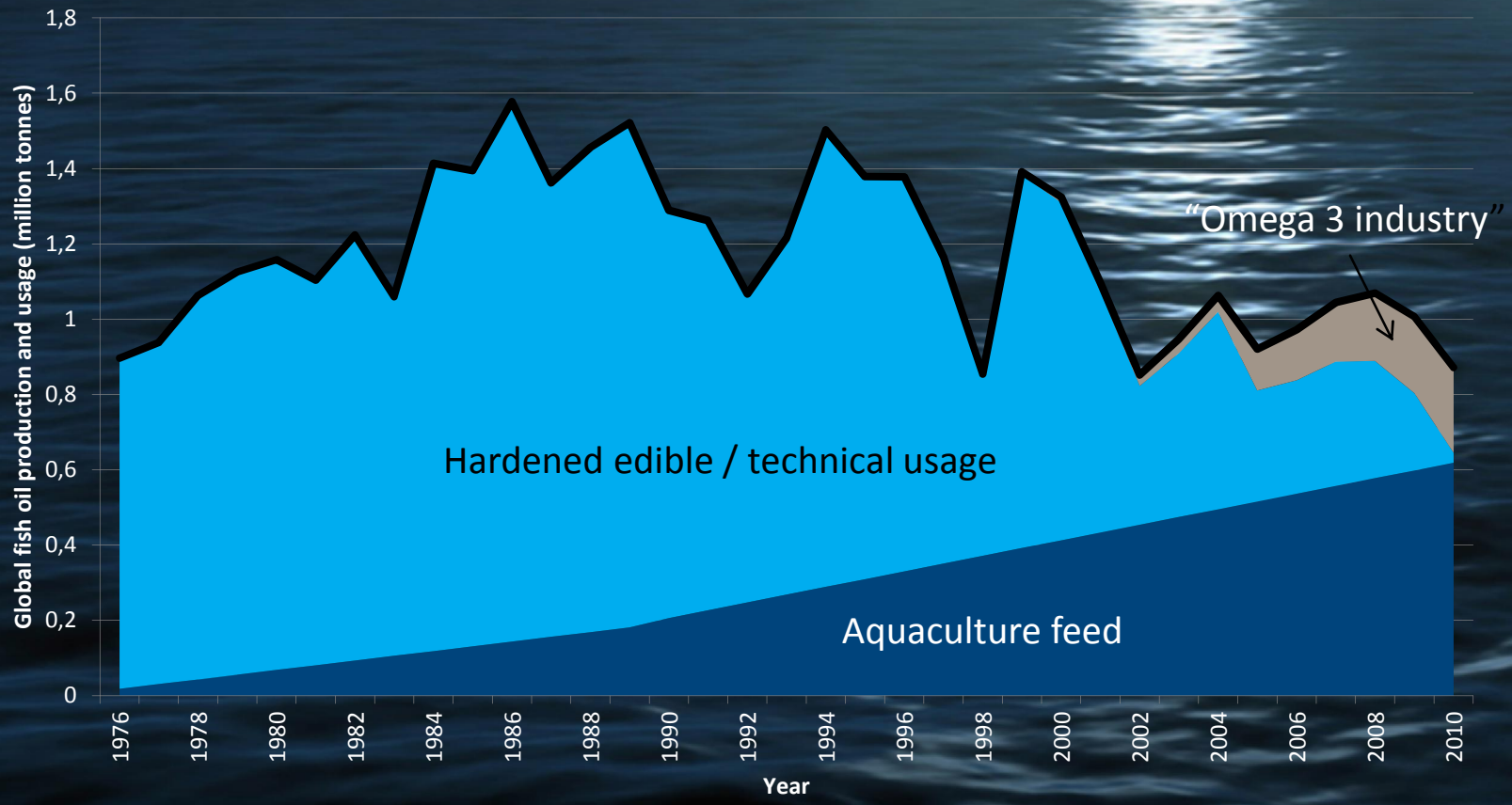


If new marine feed sources are not available the global production of organisms that not feed (mollusks and seaweed) will increase

One main limitation for growth in salmon aquac

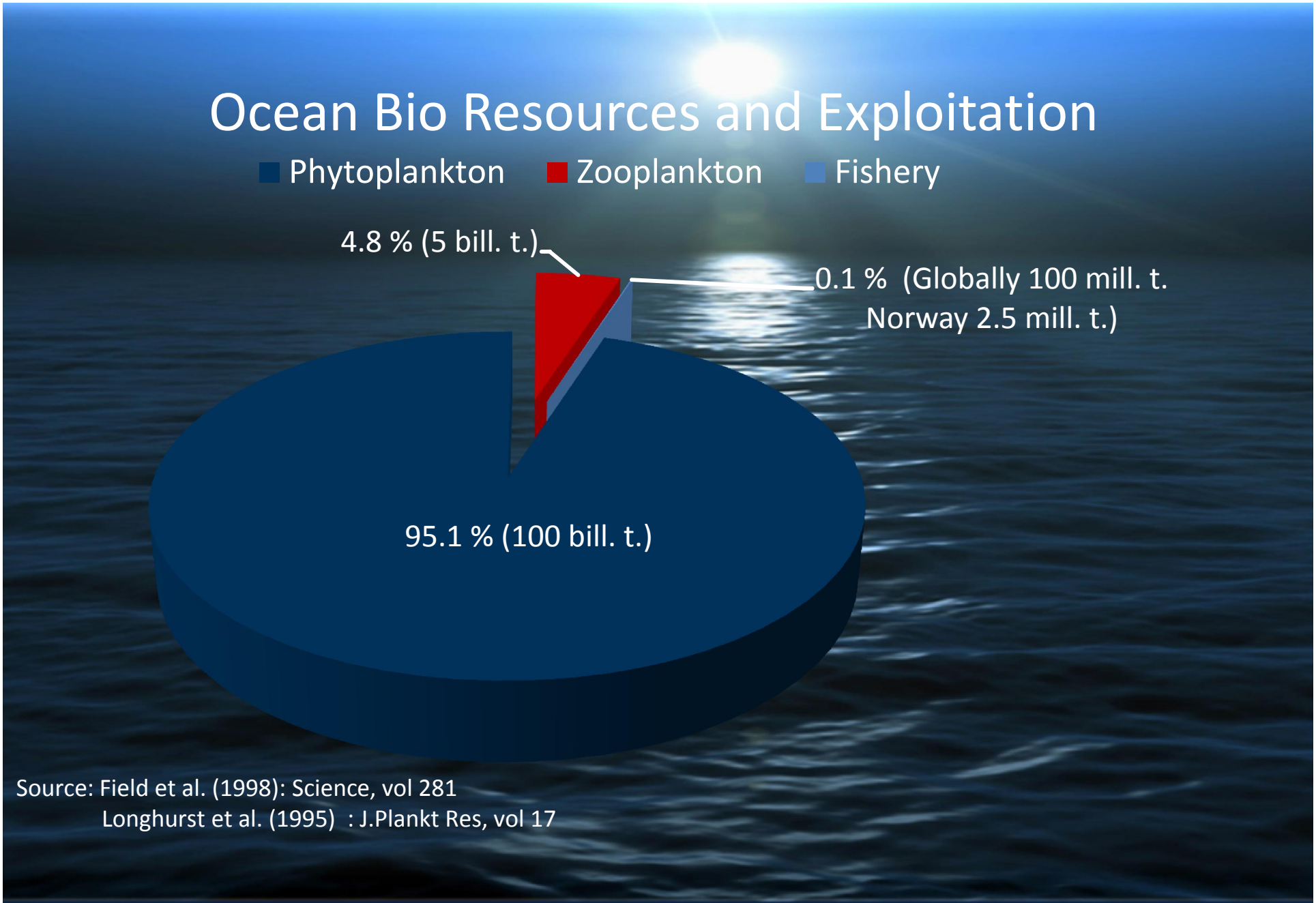
Marine oils (fish oils) are needed in feed for marine fish aquaculture

Lack of resources for feed production



Source: FAO FishstatJ and IFFO statistics (interpolated)

Ocean Bio Resources and Exploitation



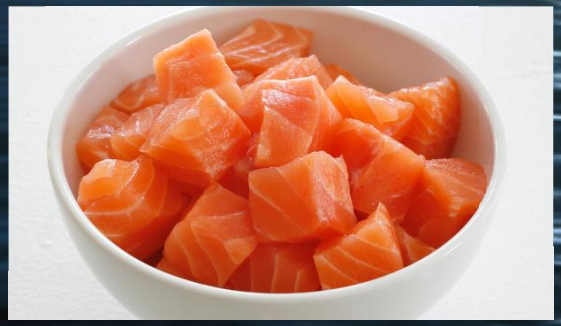
Source: Field et al. (1998): Science, vol 281
Longhurst et al. (1995) : J.Plankt Res, vol 17

Ocean Fish Farming

Illustration: Ocean Farming/Salmar

Innovation model

Industry



Authorities

Research and development

SINTEF

Technology for a better society