

**Aquaculture as an active contributor to reaching the UN SDGs**

# **Sustainable salmon production growth: The balancing act towards 2030**

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A scenic view of a Norwegian coastal town, likely Lofoten, with numerous red-roofed houses and buildings nestled along the water's edge. In the background, majestic, snow-capped mountains rise steeply from the town. The water is calm, and the sky is overcast. The overall atmosphere is serene and picturesque.

## Disclaimer

Elements of the Norwegian Seafood Federation's Seafood 2030 vision and strategy will be presented here.

However, the presentation will include opinions of the presenter which do not purport to reflect the opinions or views of the Norwegian Seafood Federation.

# Sustainable aquaculture growth – a balancing act



- More healthy food to the world (goal 2 and 3)
- Growth of sectors based on equal standards for environmental and climate effects (goal 13, 14 and 15)
- Equal and acceptable work conditions and distribution of incomes (goals 8 and 10)
- Growth requires sustainable economic returns (goal 8)
- Growth requires dialogue and collaboration between industry, government and other stakeholders (goal 17)

See Sjømat Norge's 2030 vision (<https://sjomatnorge.no/sjomat-2030/>) and Norsk Industri's roadmap ([https://www.norskindustri.no/siteassets/dokumenter/rapporter-og-brosjyrer/veikart-havbruksnaringen\\_f41\\_web.pdf](https://www.norskindustri.no/siteassets/dokumenter/rapporter-og-brosjyrer/veikart-havbruksnaringen_f41_web.pdf))



# Unique ocean based natural assets

Combining  
a long coastline and vast ocean area  
with  
innovative production technologies  
to  
provide healthy seafood to the world



# Vision of Norwegian Seafood Federation towards 2030

- The Norwegian seafood sector shall be a globally leading supplier of healthy food.
- Deliver world class seafood, marine ingredients, production competence and technology.
- Through sustainable production and innovations be Norway's leading contributor to UN's sustainability goals



# Contribution to environmental sustainability



- Sustainable management and efficient utilization of marine resources
- Reduce losses in production and distribution
- Continuous focus on reduction of environmental footprint



- Contribute to Paris agreement on reduction in climate gas emissions

# Contribution to environmental sustainability



- Preserve and use the ocean and marine resources in a sustainable manner
- Balanced utilization of marine resources
- Provide sufficient documentation of environmental conditions and production
- Harvest further down the food chain, avoid wastage.



- Sustainable use of land based resources, including forests
- Reduce pressure and degradation of terrestrial biodiversity and ecosystems

# Contribution to social and economic sustainability



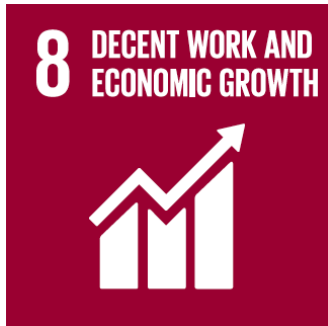
- Contribute to reducing the global seafood deficit by increasing supply
- Contribute to a circular bioeconomy by utilizing raw material more efficiently and reduce wastage
- (Current Norwegian seafood exports provide seafood covering the needs of 120 million people.)



- Providing more healthy seafood to a world with a seafood supply deficit



# Contribution to social and economic sustainability

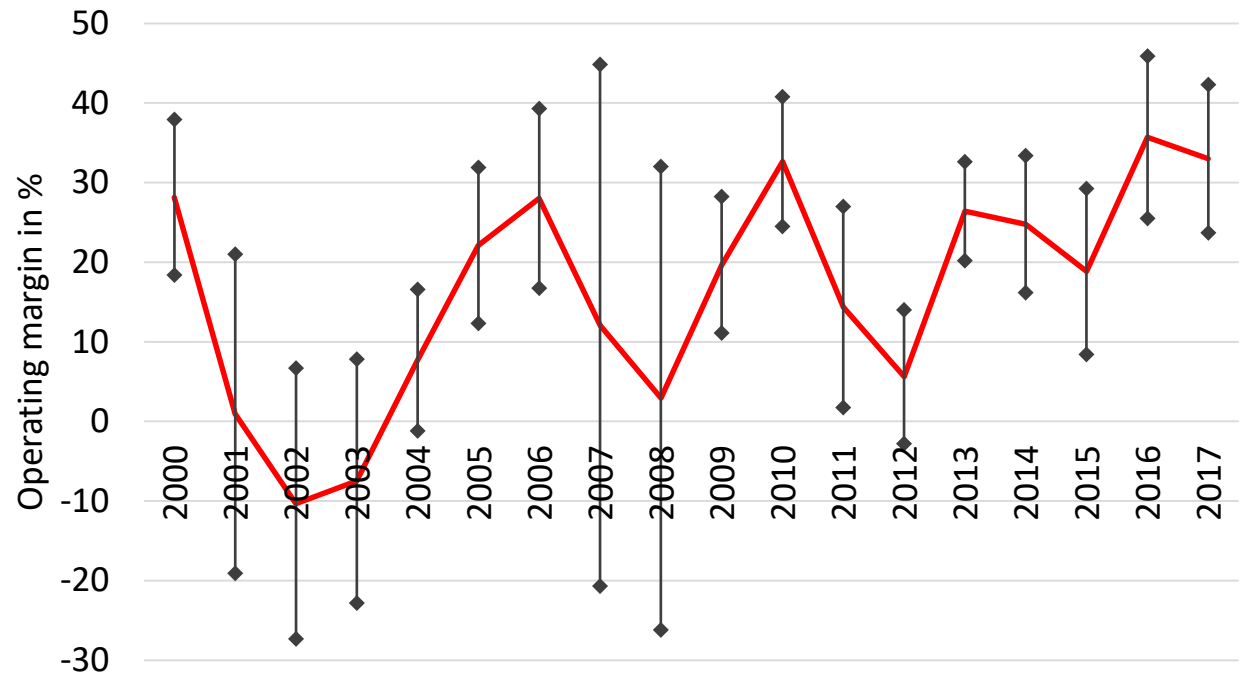


- Contribute to attractive employment opportunities, work conditions and income in all stages of value chains based on equal competitive conditions
- Increased marine production will contribute to more attractive employment opportunities
- Increase employment opportunities through increased raw material utilization and value added



- Promote sustainable and inclusive industrialization and innovation
- Promote technological innovations leading to more efficient production and distribution

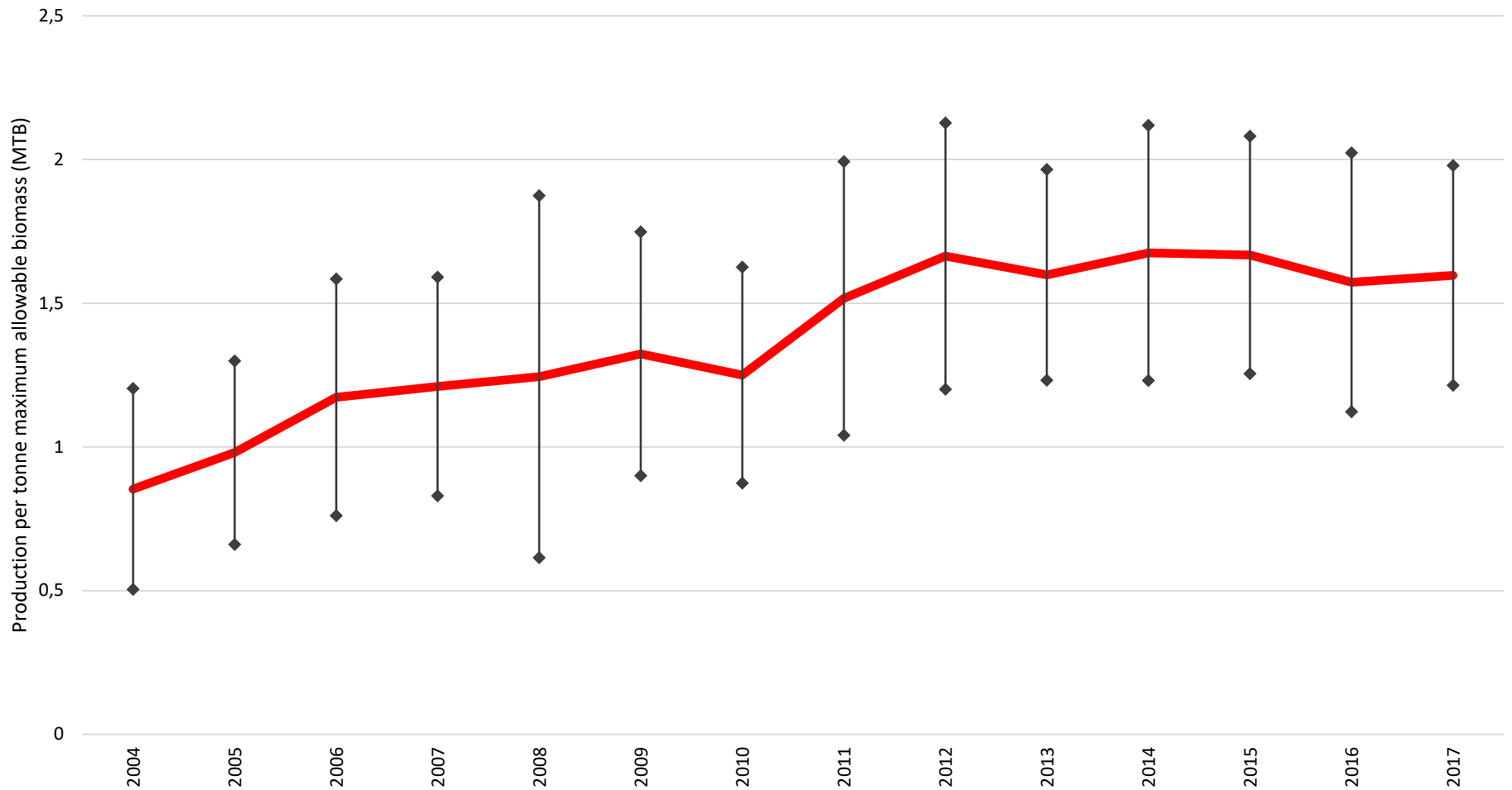
# Salmon aquaculture: a special sector



- Profitability margins as we have seen in salmon aquaculture would have led to rapid growth in other sectors
- Growth in the salmon industry restricted by:
  - 1) Governments in producer countries do not give sufficient license to grow
  - 2) Real biological challenges – externalities within the sector and to other stakeholders

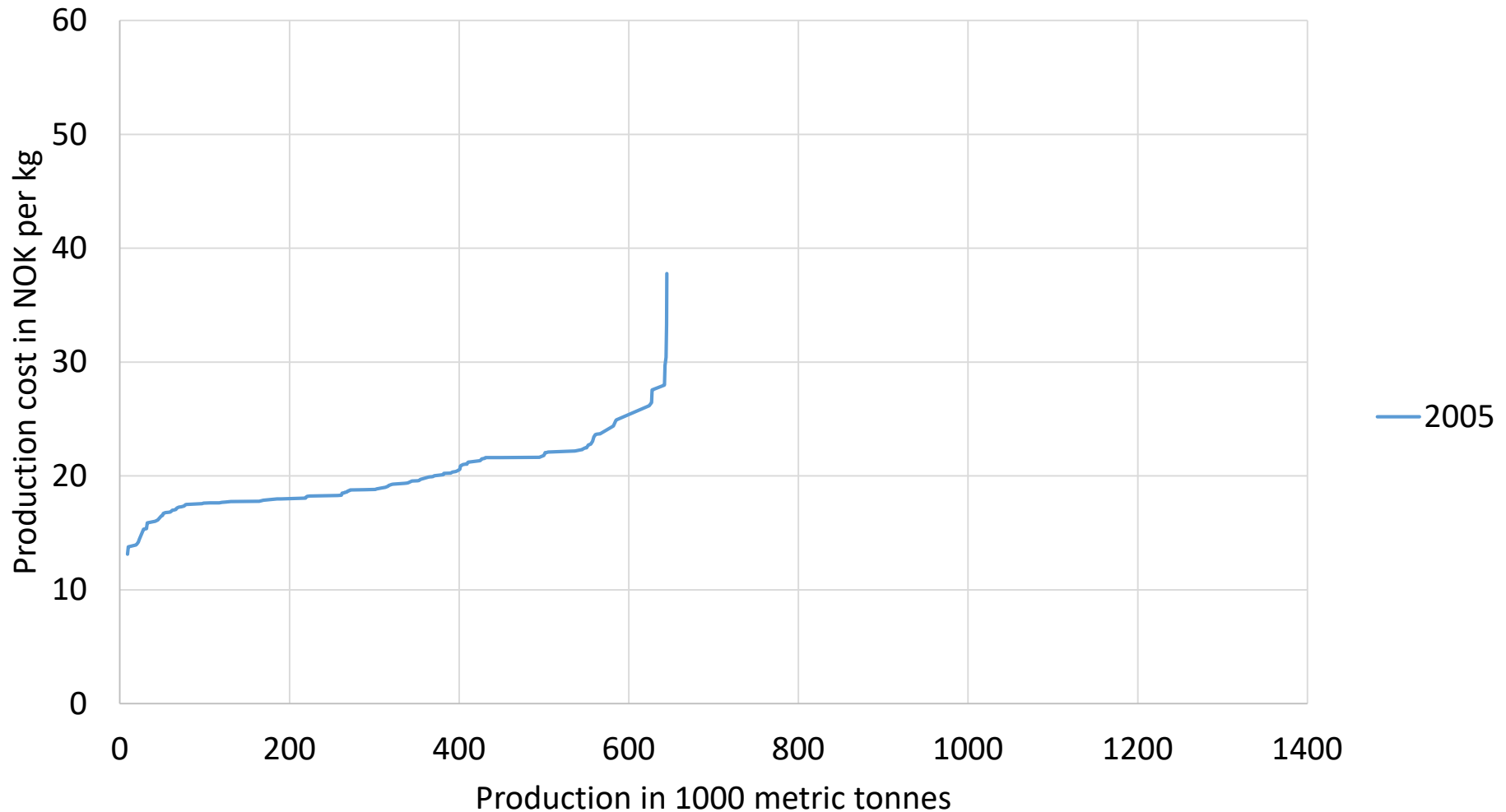
# Ratio of production to maximum allowable biomass (MTB)

Average ratio (red line) and  $\pm$  one standard deviation



# Norwegian salmon supply curve

## Production costs per kg adjusted for inflation

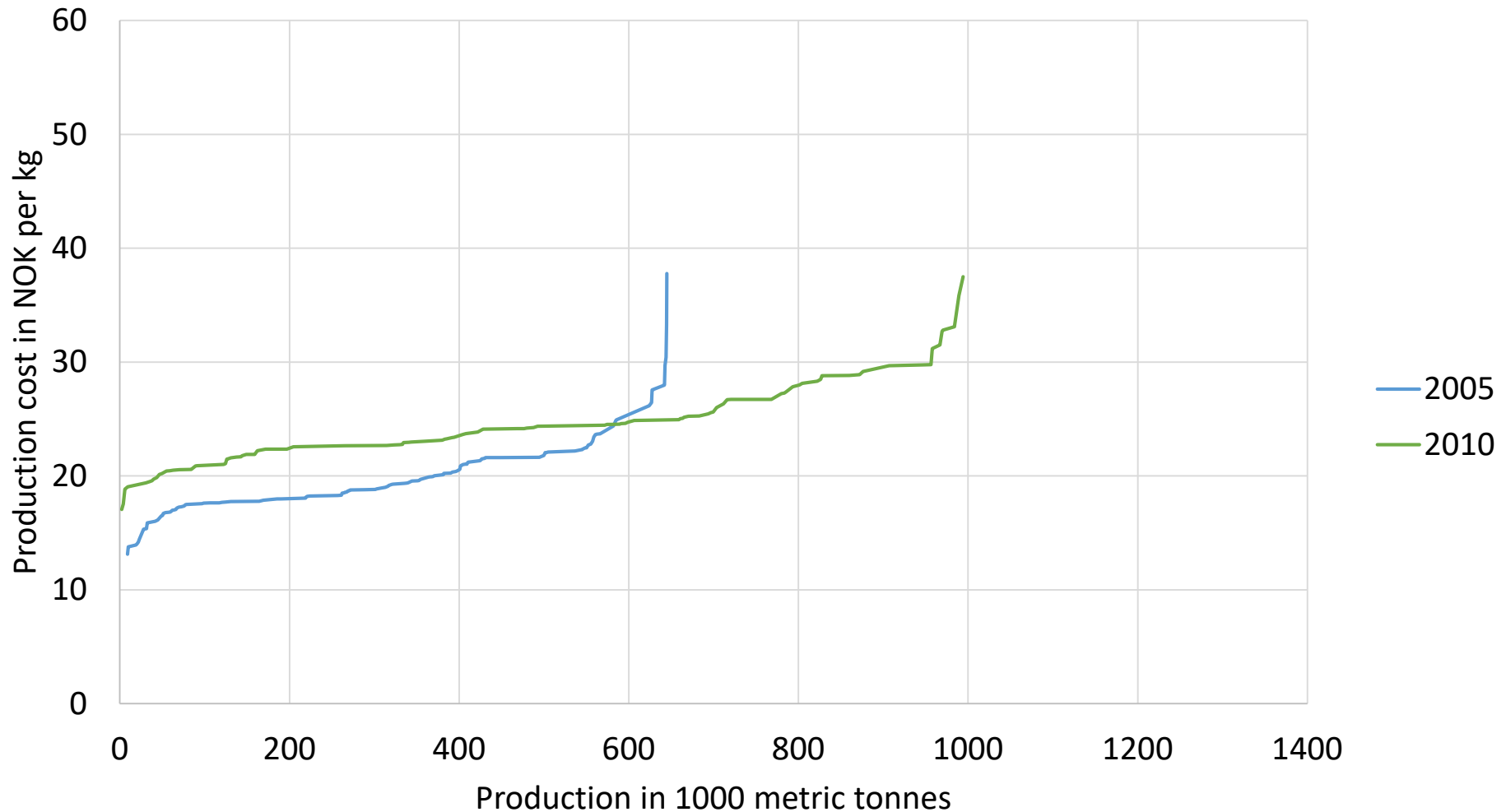


Data source: Norwegian Directorate of Fisheries



# Norwegian salmon supply curve

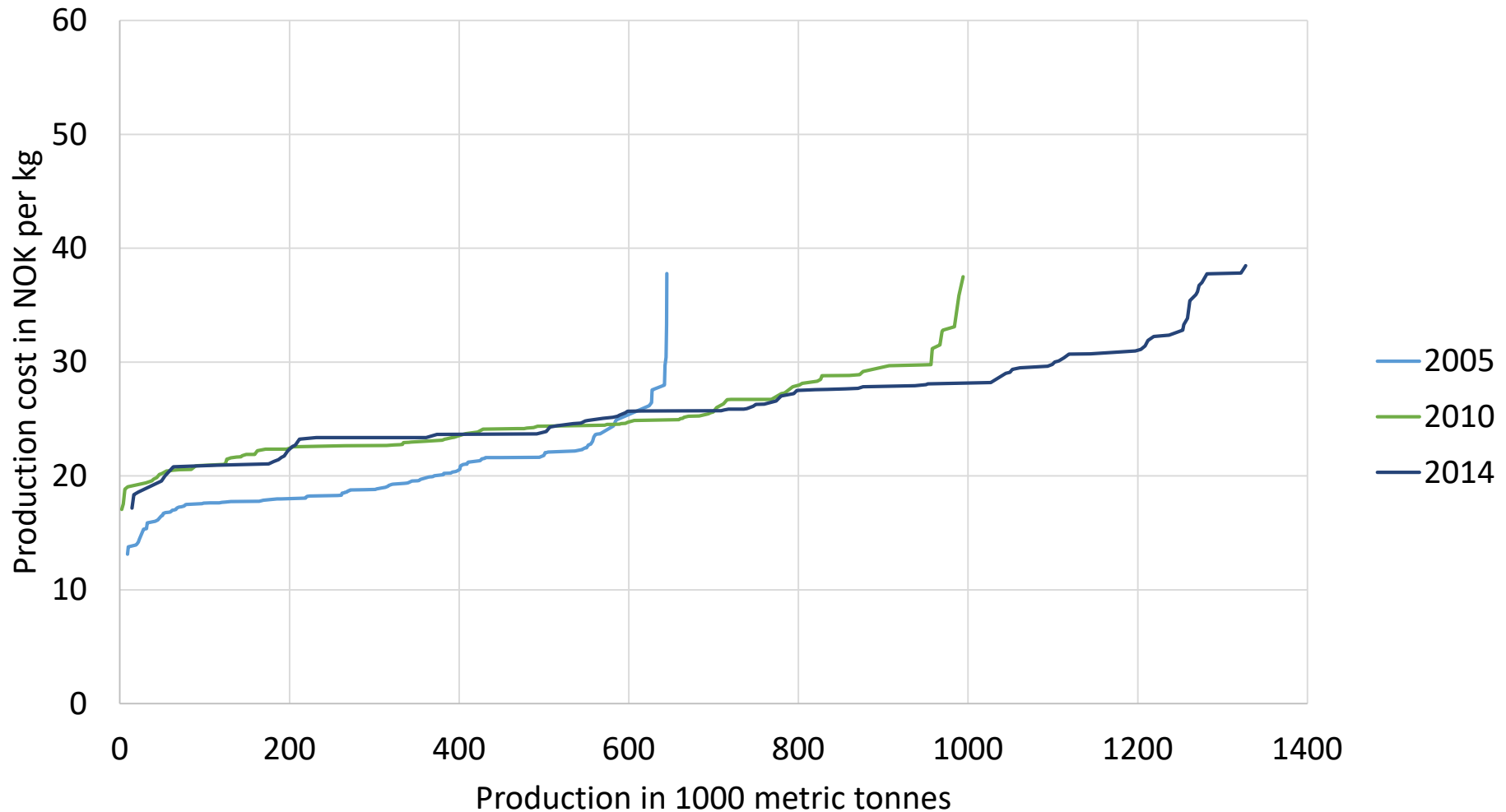
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# Norwegian salmon supply curve

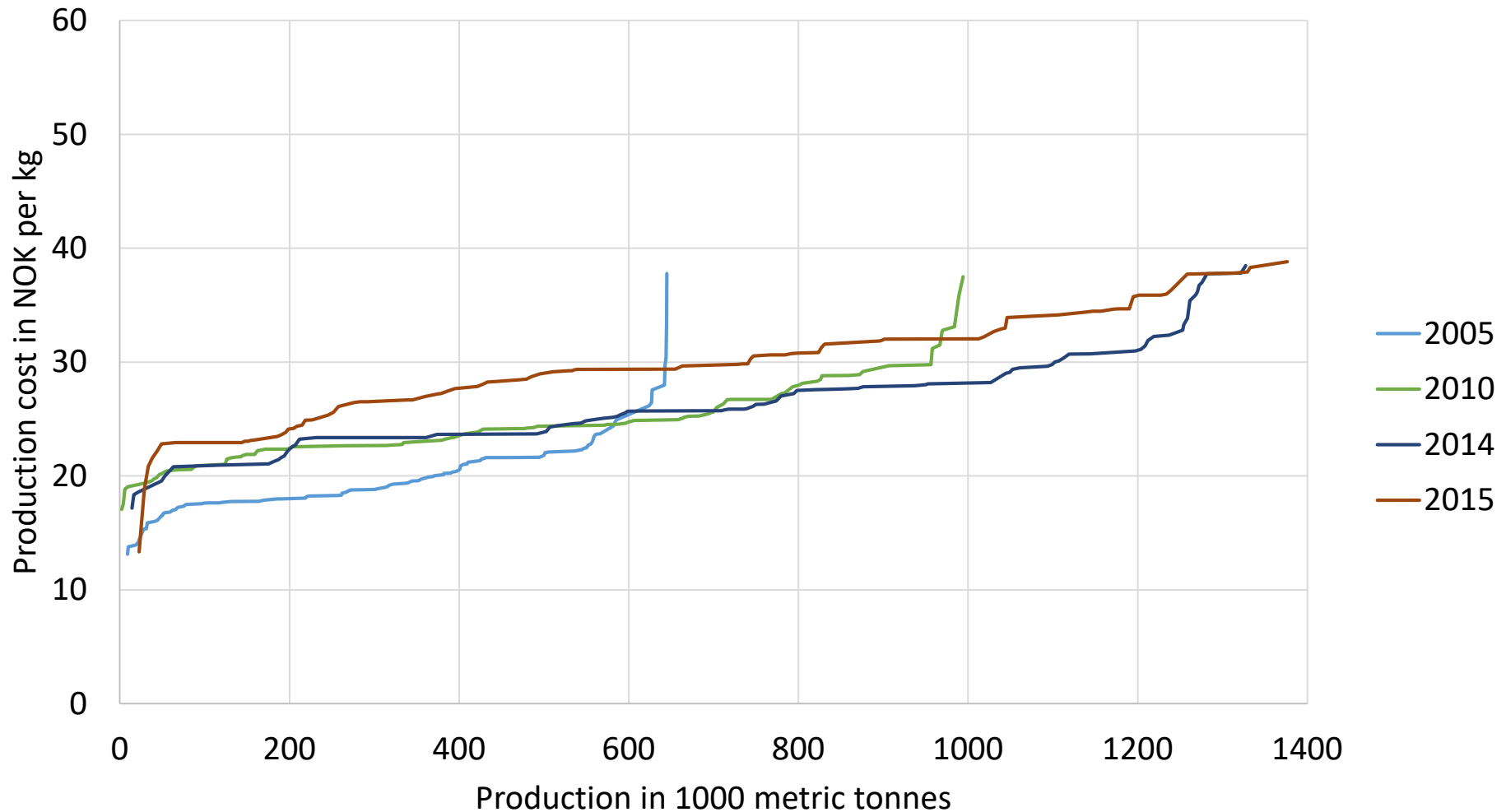
## Production costs per kg adjusted for inflation



Data source: Norwegian Directorate of Fisheries

# Norwegian salmon supply curve

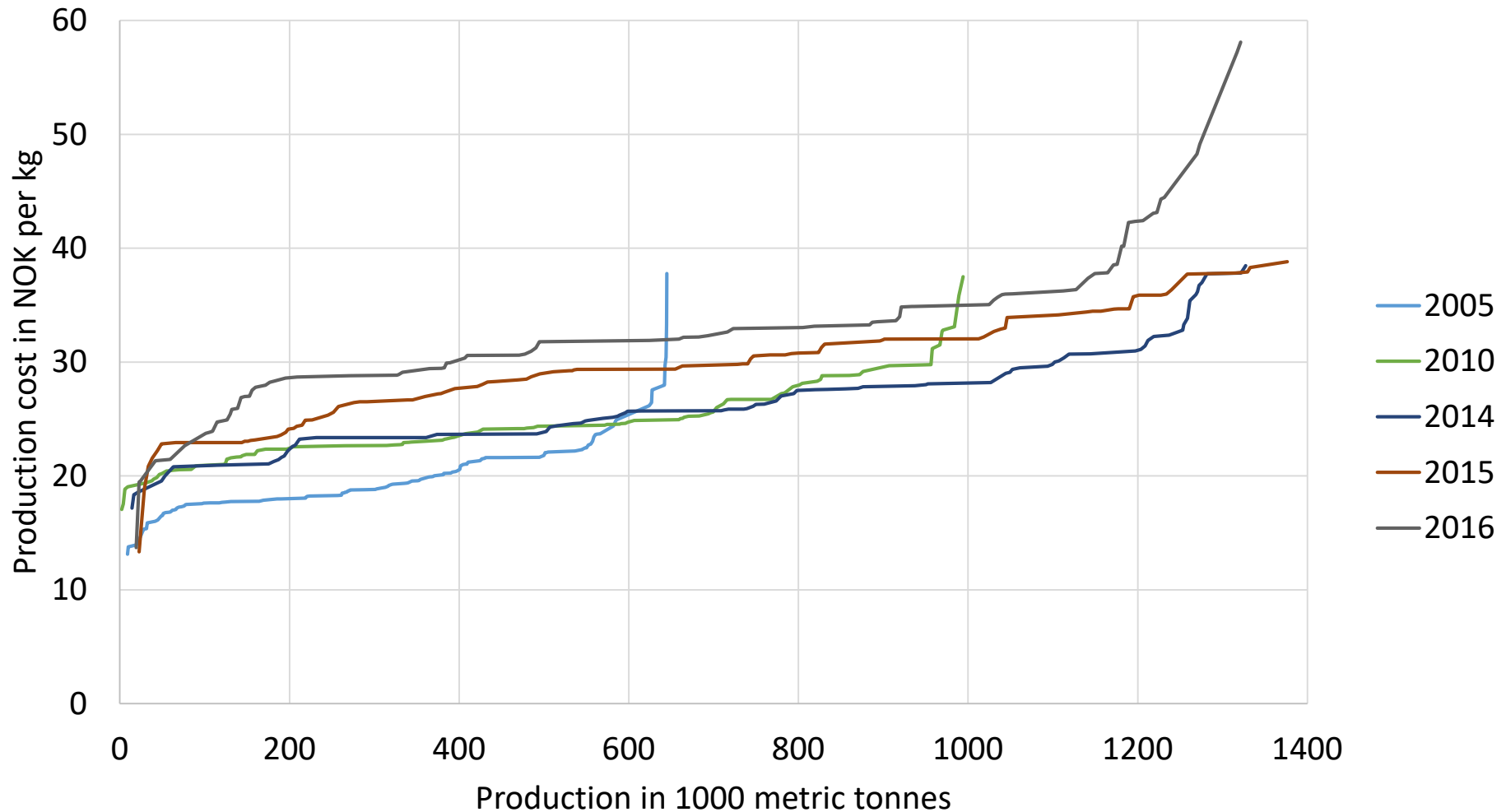
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Data source: Norwegian Directorate of Fisheries

# Norwegian salmon supply curve

## Production costs per kg adjusted for inflation

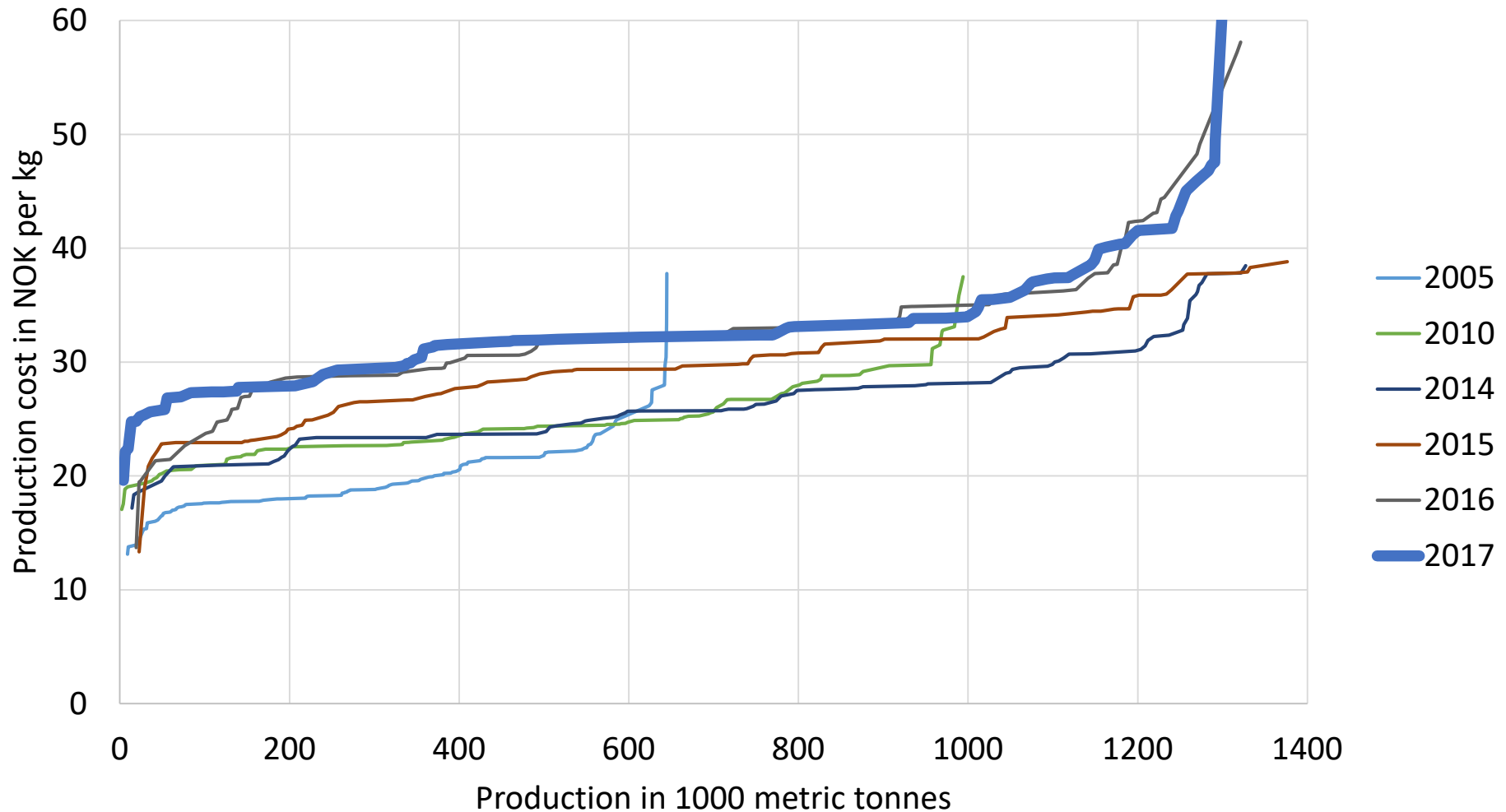


Data source: Norwegian Directorate of Fisheries



# Norwegian salmon supply curve

## Production costs per kg adjusted for inflation



Data source: Norwegian Directorate of Fisheries

# Sustainable aquaculture growth



## The great balancing act



# Environmental vs social vs economic sustainability

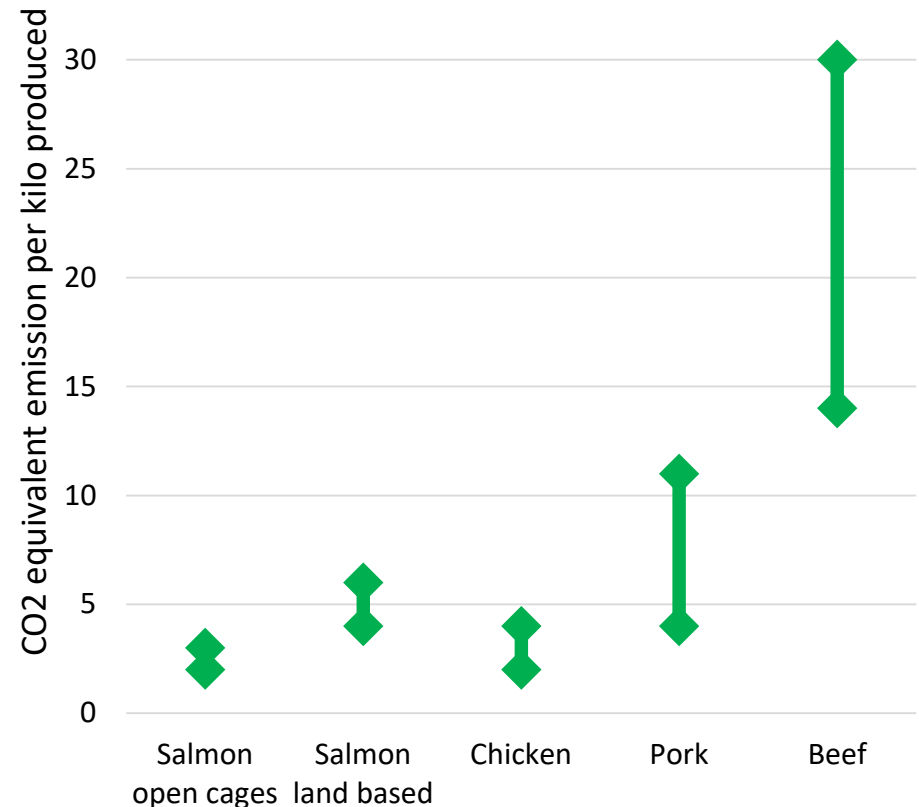


- UN's SDGs are about all of these
- Different balancing of SDGs 1, 2, 8 and 10 versus SDG 13 across rich and poor countries
- Reversible vs non-reversible environmental impacts

# Expanding food production on land vs in the sea



- Assessing local and global environmental effects
- Production costs
- Providing healthy food
- Social impacts
- Great scope for policy development!

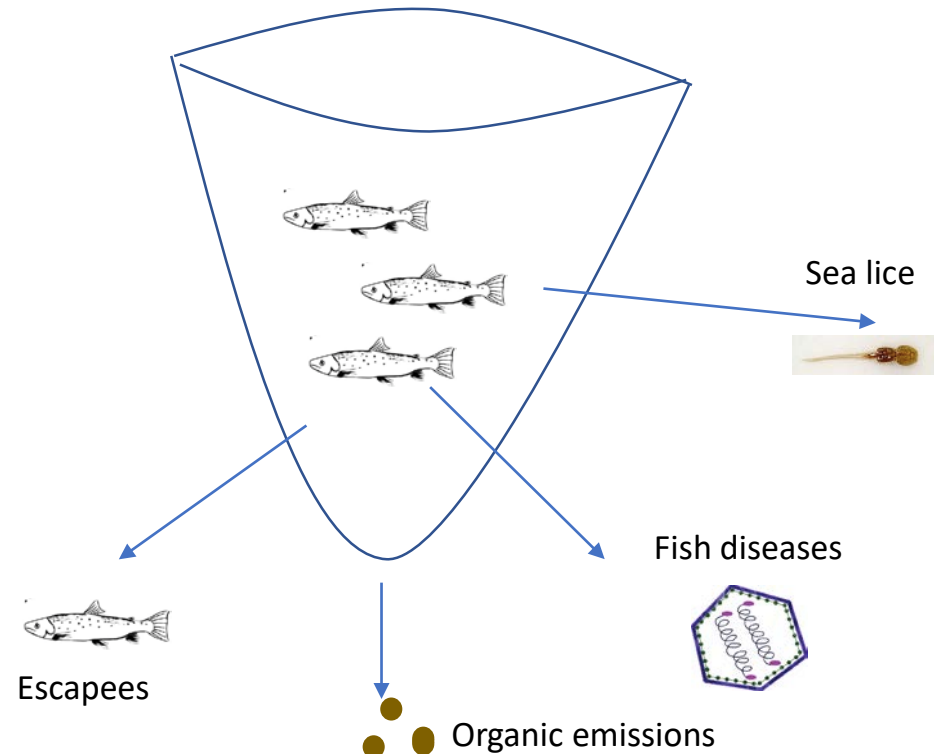




# Closed vs open cage aquaculture



- Open cage aquaculture have local environmental externalities
- But by some metrics is also the most productive food production technology the world has ever seen



# Closed vs open cage aquaculture



- Closed aquaculture – promises of smaller emissions to the environment



# Closed vs open cage aquaculture

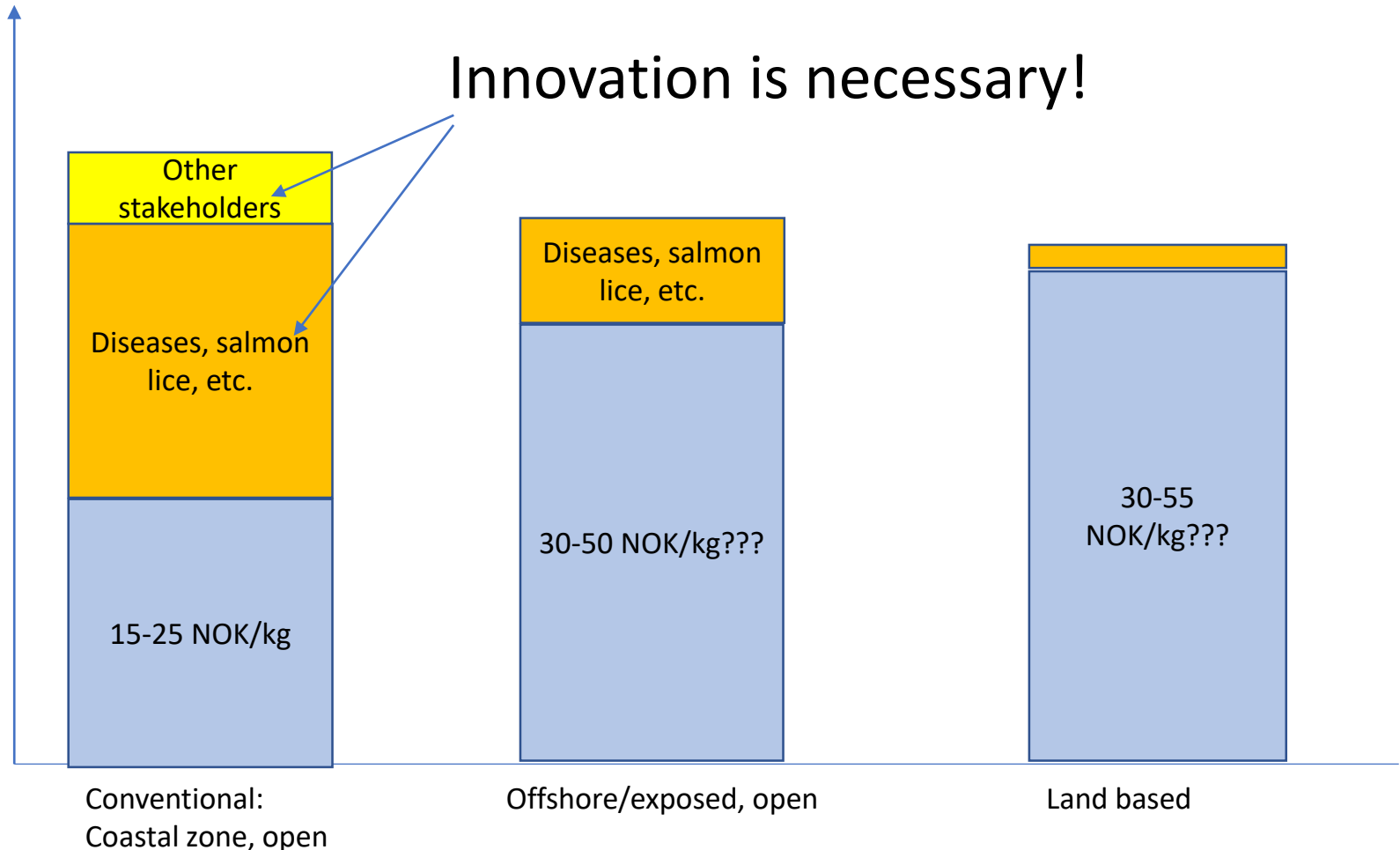


- Closed aquaculture – promises of smaller emissions to the environment
- But we will learn a lot in the future about actual environmental, technical and economic performance of closed technologies



# Production costs alternative technologies: Negative externalities in aquaculture

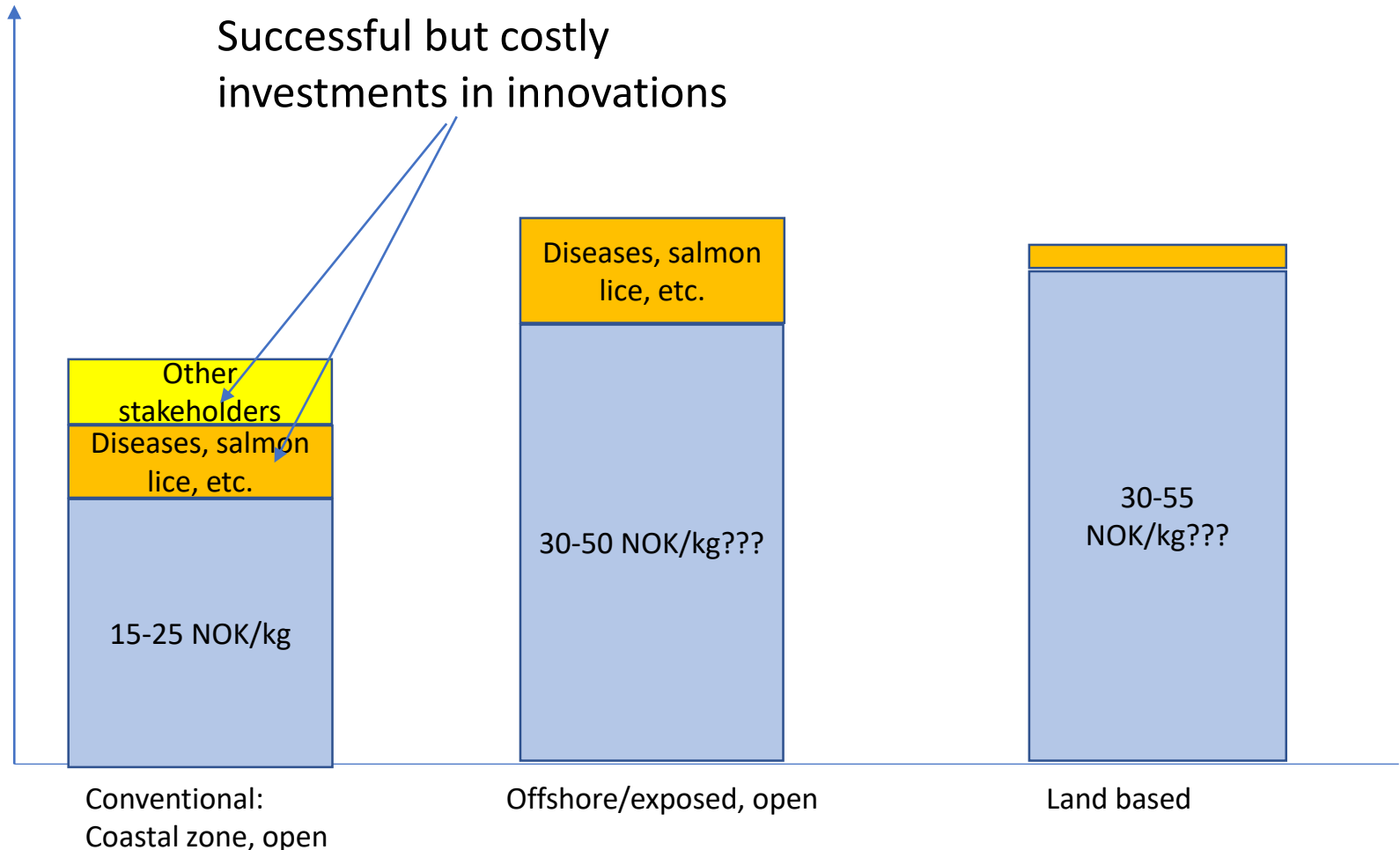
NOK per kg





# Production costs alternative technologies: Negative externalities in aquaculture

NOK per kg



# We need to work with the government!



How are aquaculture sectors'  
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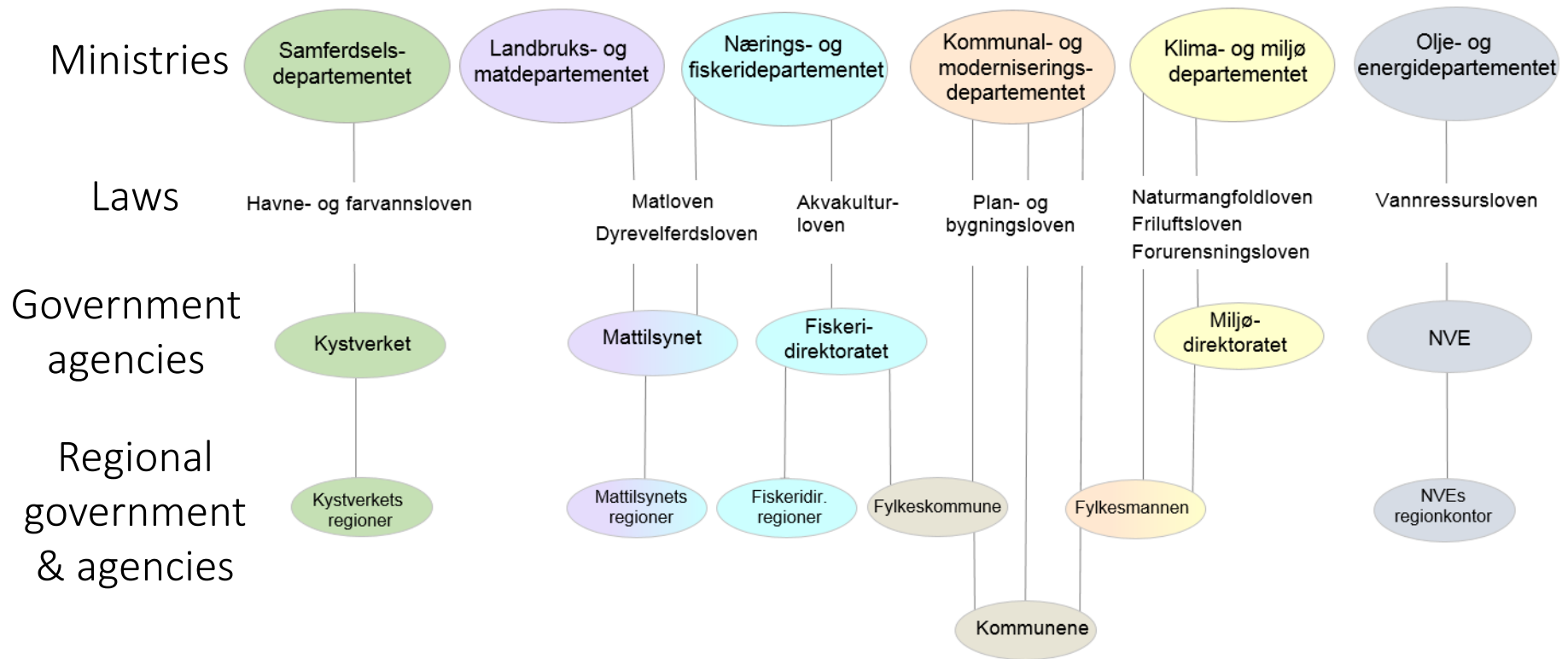


# Government policies key to sustainable growth

- Balancing food sector policies – regulations and taxes – between aquaculture and agriculture
- Balancing aquaculture policies – costal open cage vs land based vs offshore
- Research and innovation policies to mitigate market failures
- A new organization of aquaculture regulation authorities

# Candidate for innovation

## The aquaculture regulation complex in Norway



# Challenges with the Norwegian aquaculture regulation complex

- Veto power of several agencies
- Complex and resource demanding regulations
- Coordination between government agencies
- Coordination between municipalities
- Slow and costly processes
- Knowledge base of regulations

# Government policies matter

- Governments' licenses in conventional farming will determine total growth and volume space for alternatives
  - Volume and price of new license capacity
- A new rent tax in Norway can be a game changer
  - Design: Surplus tax, revenue tax...
  - Tax rates and deductables
- High relative taxation on Norwegian coastal zone will shift production in several dimensions
  - To other countries
  - On land



A sustainably growing industry is one that finds the productive division of responsibilities, labour and risks between itself and government



...and is able to educate government and nudge it in the right directions when that is appropriate