WHEN TRUST MATTERS

Ocean's Future to 2050

Highlights of Aquaculture Demand and Production Modules

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Background

- System Dynamics Model of the Blue Economy
- Focus of this presentation will be on the aquaculture demand and production sectors of the model
- Global food system will need to feed 9.6 billion people in 2050 – seafood is a vital component
- Marine wild catch is stagnating, growth in seafood production will need to come from aquaculture
- Marine Aquaculture worldwide currently produces just over 30 MT (FAO)

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www.dnv.com/publications/seafood-forecast-250243

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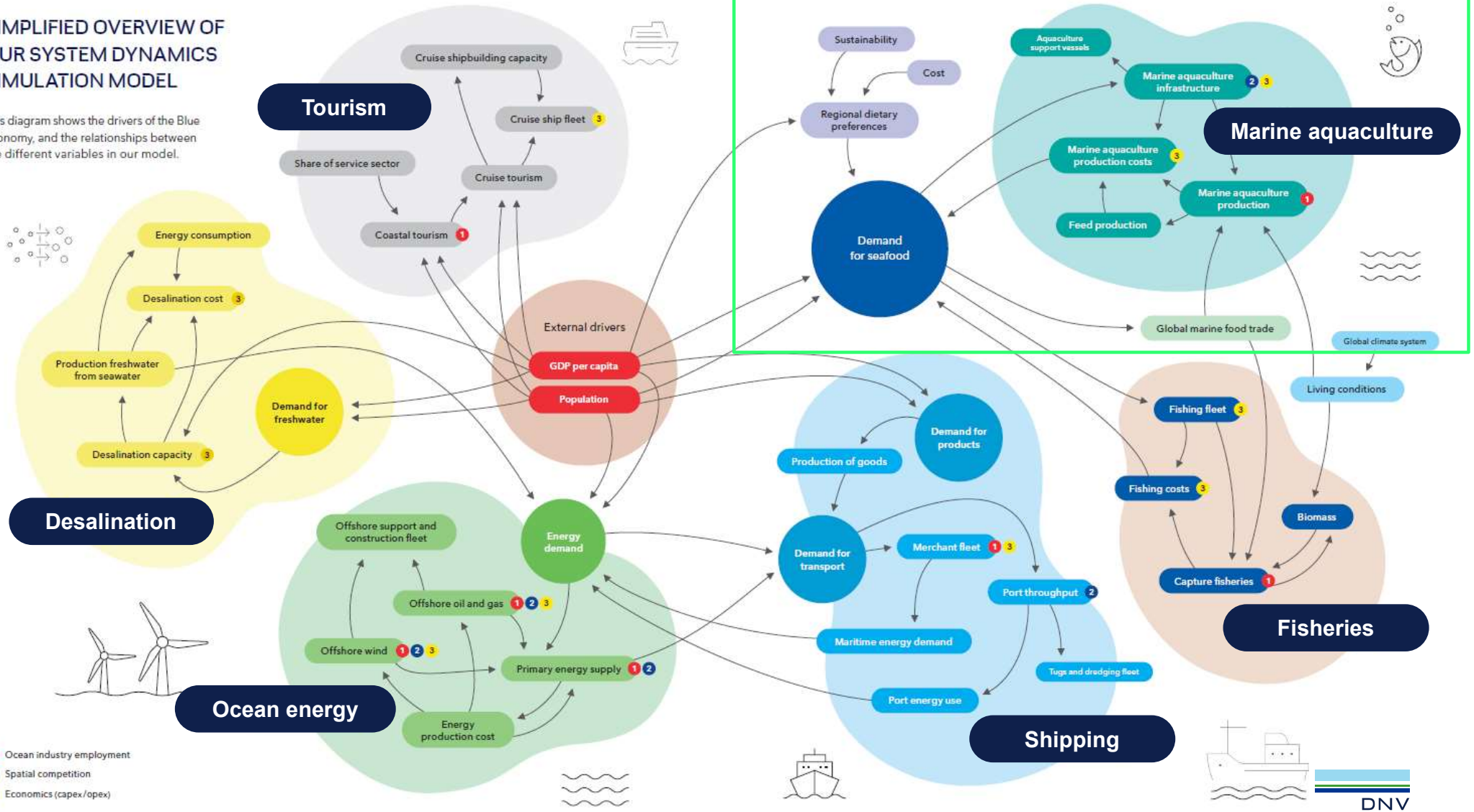
SIMPLIFIED OVERVIEW OF OUR SYSTEM DYNAMICS SIMULATION MODEL

This diagram shows the drivers of the Blue Economy, and the relationships between the different variables in our model.



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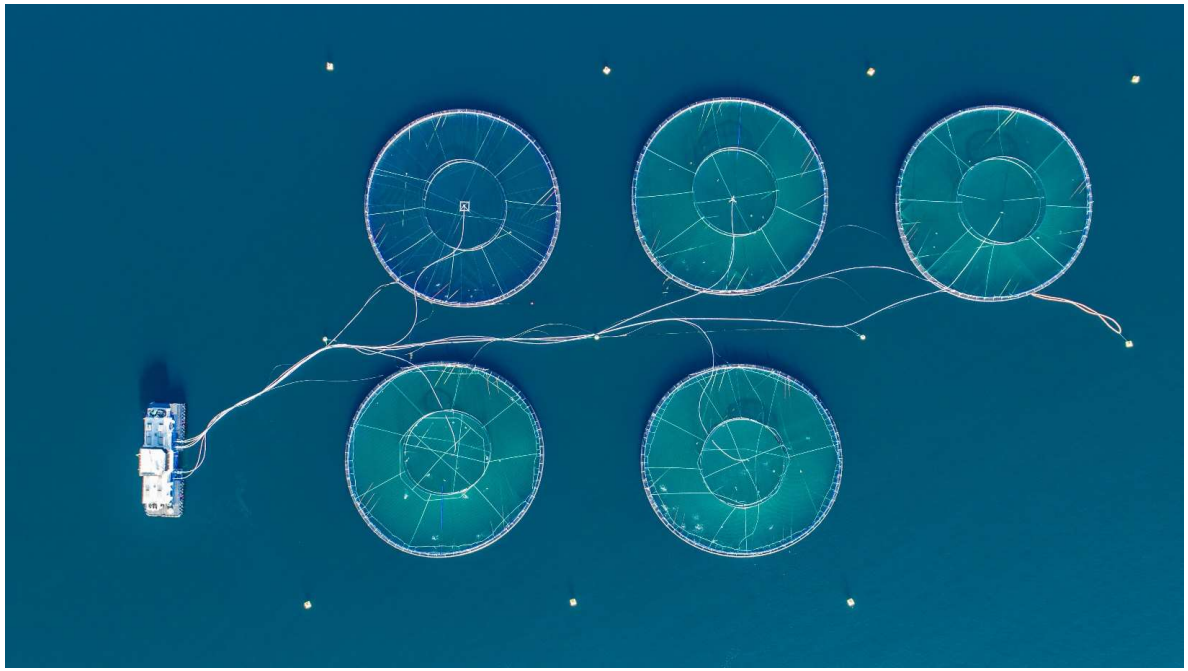
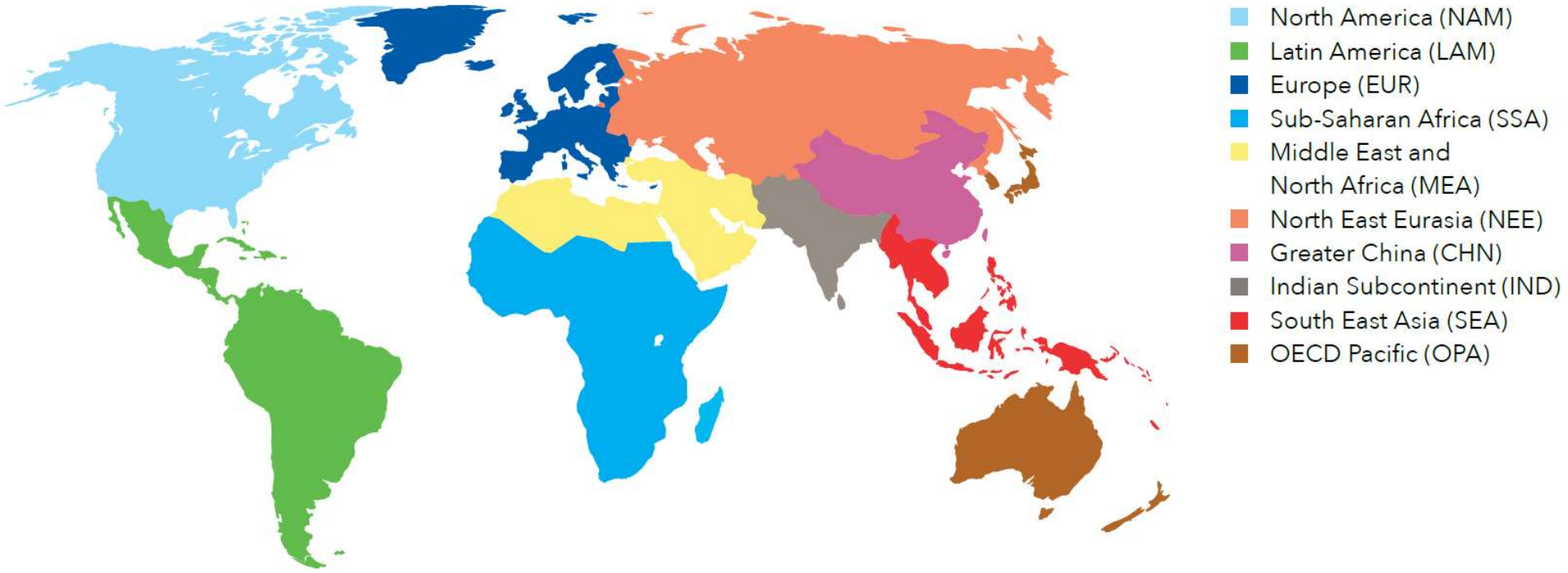
Aim

- What will be the future demand for seafood towards 2050 and how will this be met?
  - We aim to provide an objective view of the developments and challenges in the global seafood market, especially in the context of the Blue Economy and the demand for sustainable food sources.
- Approach
  - We provide one most likely forecast, not scenarios
  - We focus on long term dynamics
  - We mostly focus on already proven technologies
  - We include policy trends and consumer behaviour based on changes in cost, sustainability and preferences



Model basics – World and Regional Forecast

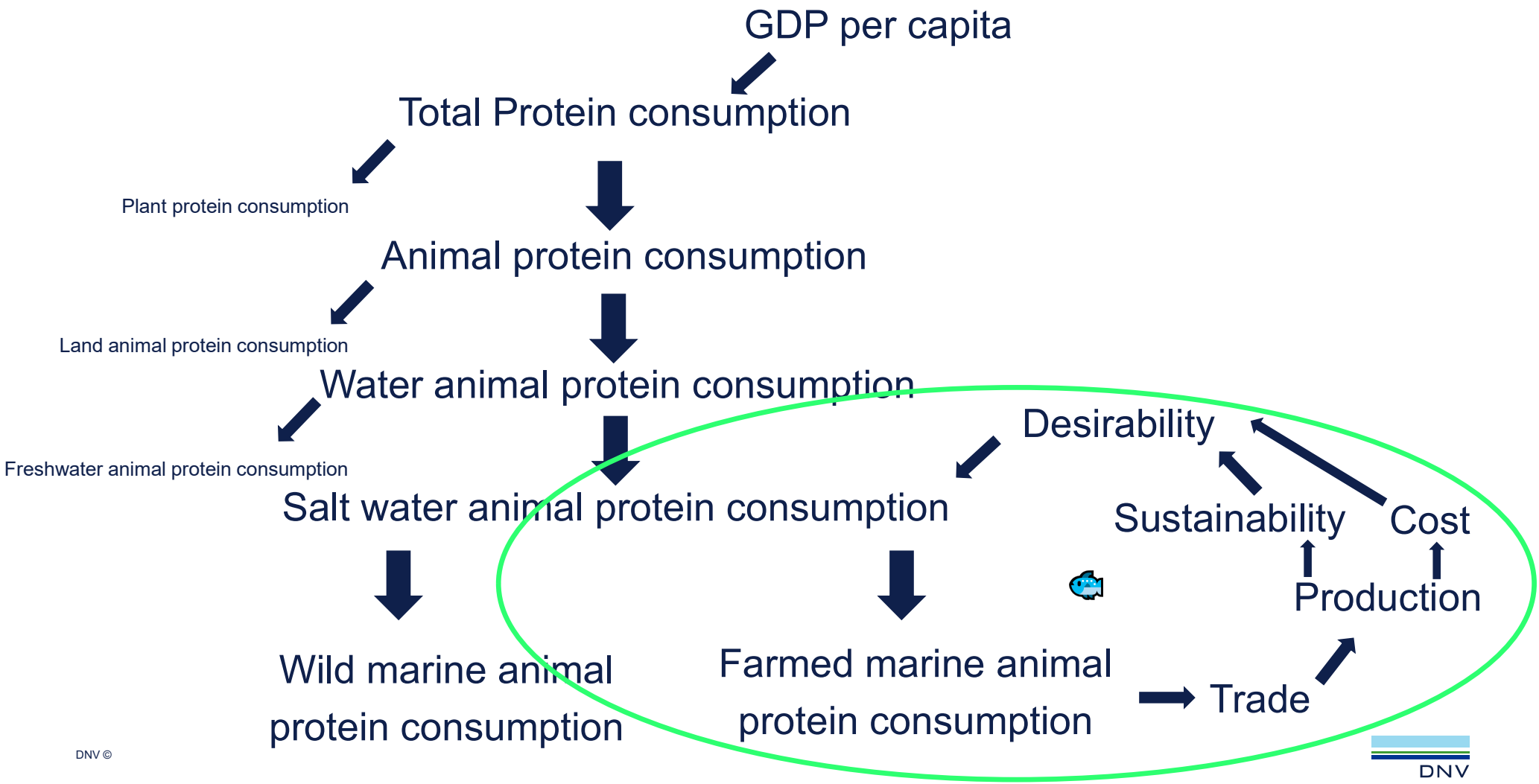


Model basics

- The model divides food from the sea into **2** areas: aquaculture and wild catch
- Only includes salt and brackish water production – freshwater fishing and aquaculture are excluded
- Images of the model have been simplified to highlight the relevant structure
- Timescale: 1990-2050

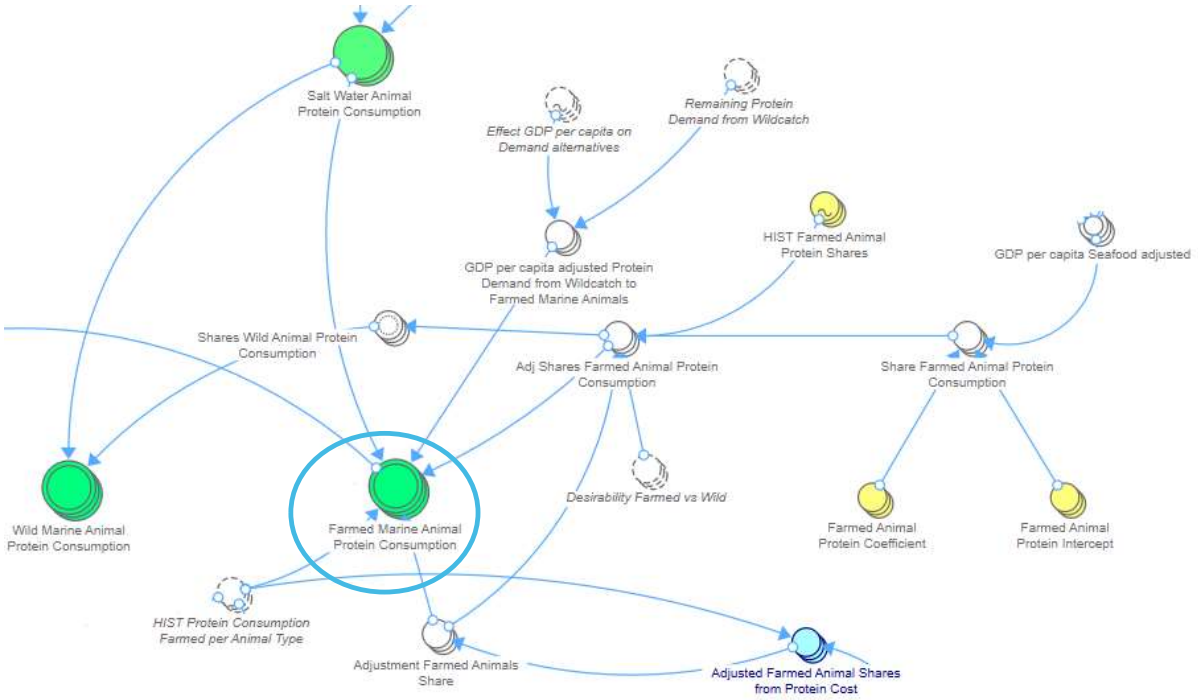
Array name	Elements
Ocean Morphology	Onshore
	Sheltered
	Offshore
Animals	Finfish
	Crustaceans
	Molluscs

Demand Model - Hierarchy



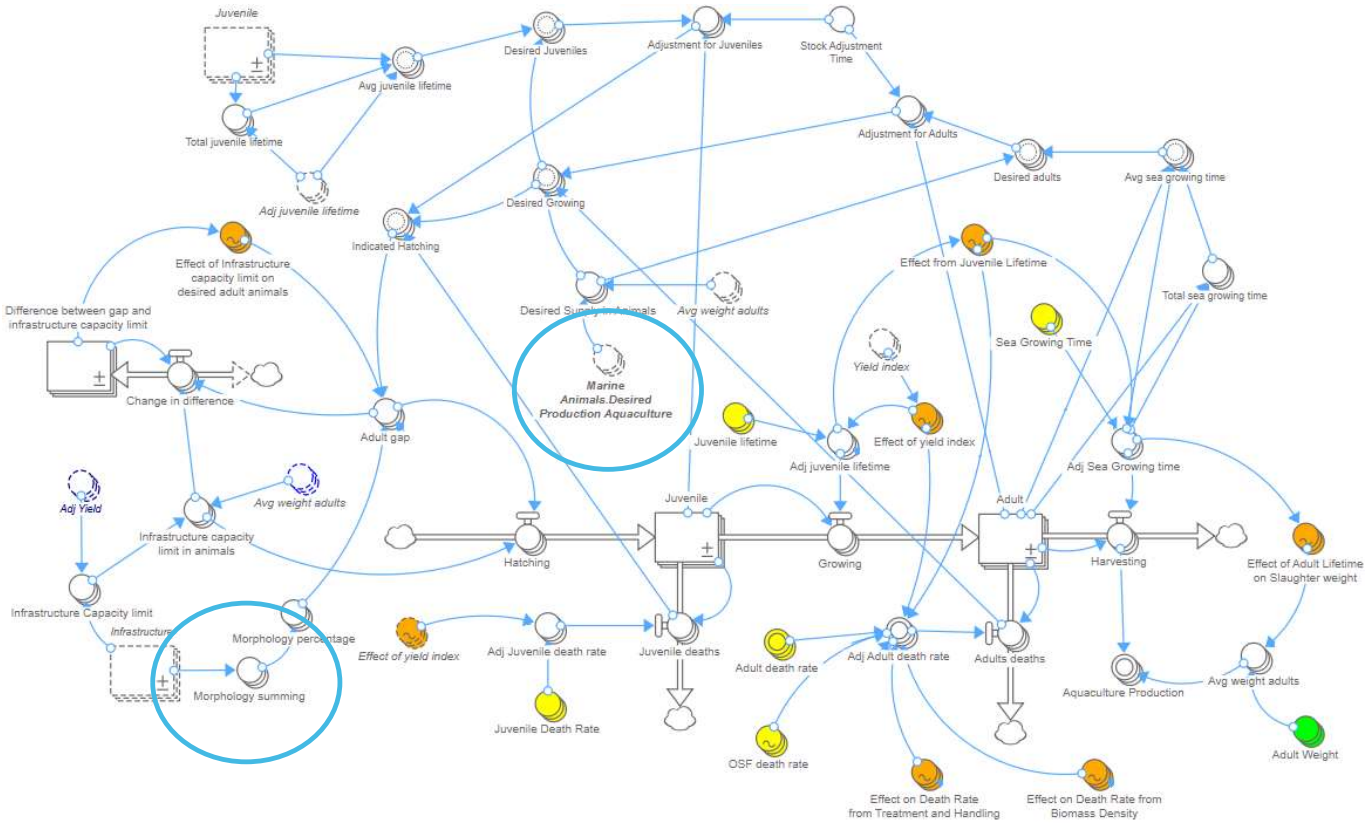
Highlights – Demand Model

- Protein demand until 2050
- Future aquaculture demand is driven by our regression analysis, adjusted based on “desirability”
- Cost and Sustainability are weighted in “Desirability”, but their effect depends on the GDP of the region
- All levels of the hierarchy are affected by desirability



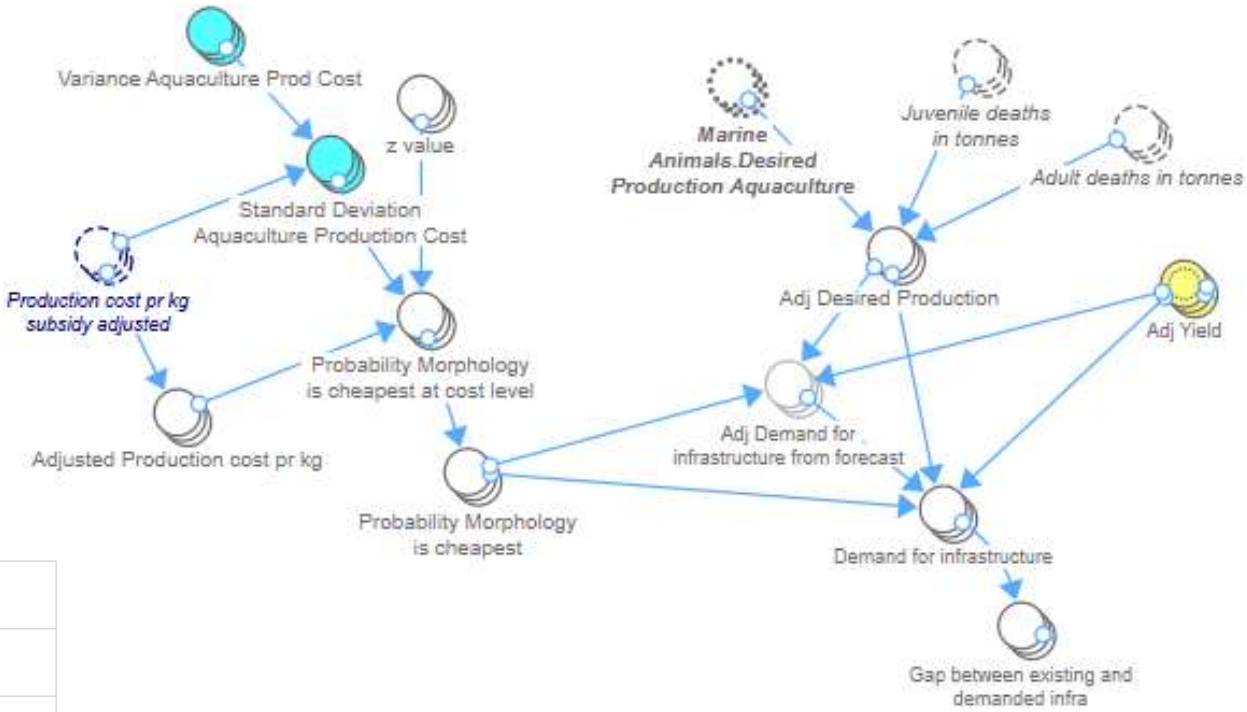
Highlights – Aquaculture Production

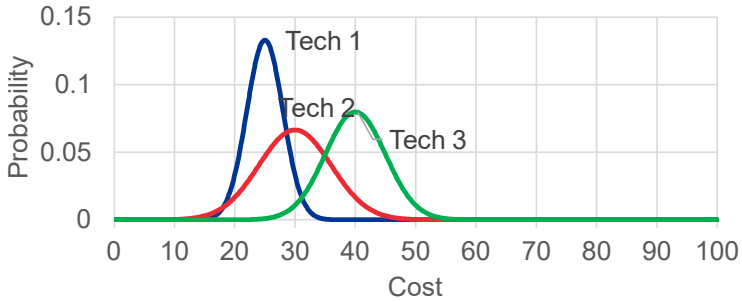
- Follows the production cycle of finfish, crustaceans and molluscs
- Hatching is based on desired production aquaculture
- The model must also select which aquaculture morphology and production must not exceed the infrastructure capacity limit
- Various effect variables in orange affect death rates, the time it takes to grow and the size of the animals



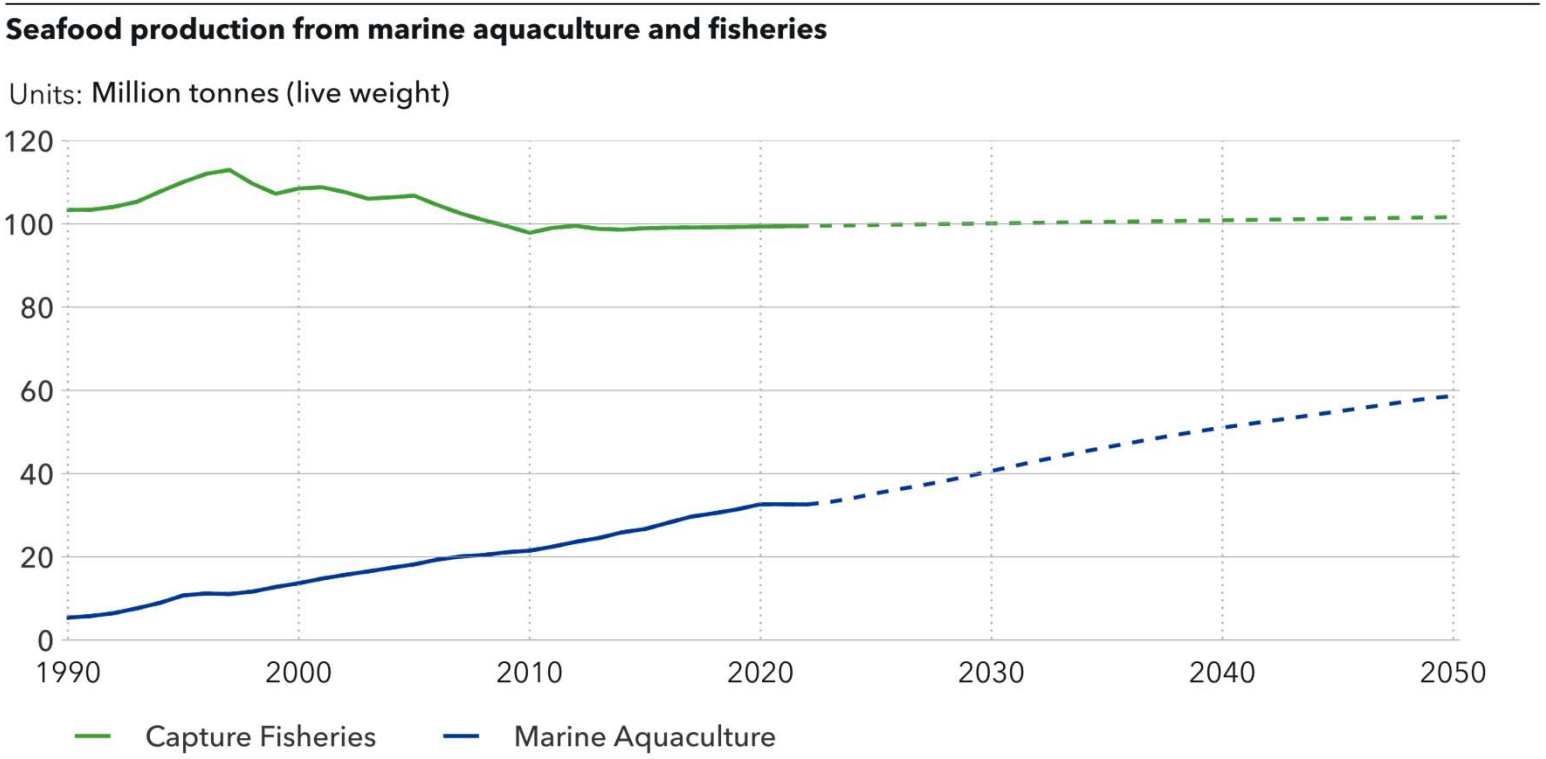
Highlights – Morphology choice

- Finds the probability of each morphology being cheapest at each cost index in “Probability morphology is cheapest at cost level”.
- Then sums the indices to find on a regional and animal level the probability of each morphology being cheapest in “Probably morphology is cheapest”

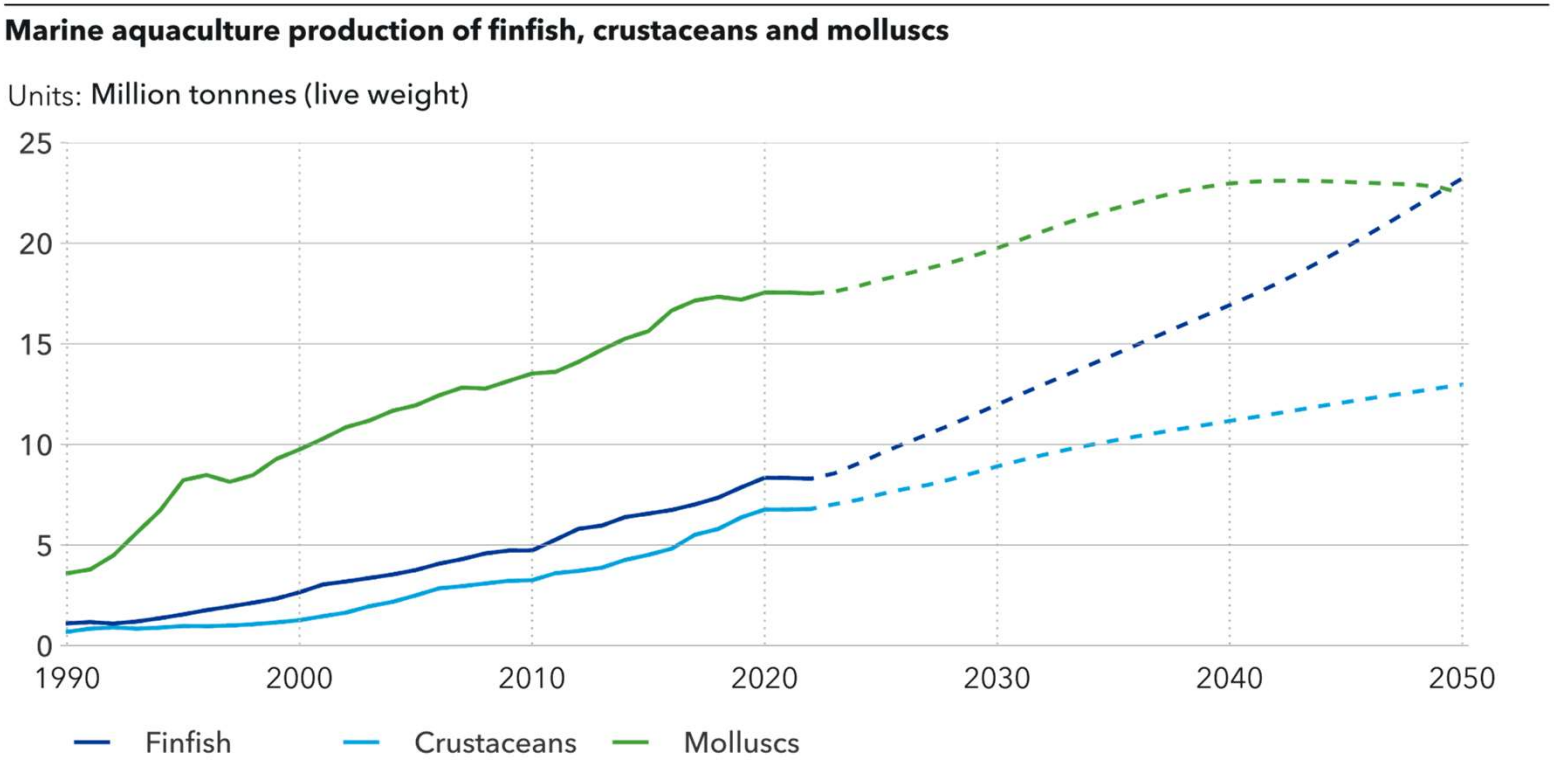




Seafood supply increasingly met by Aquaculture - as capture fisheries remain stagnant

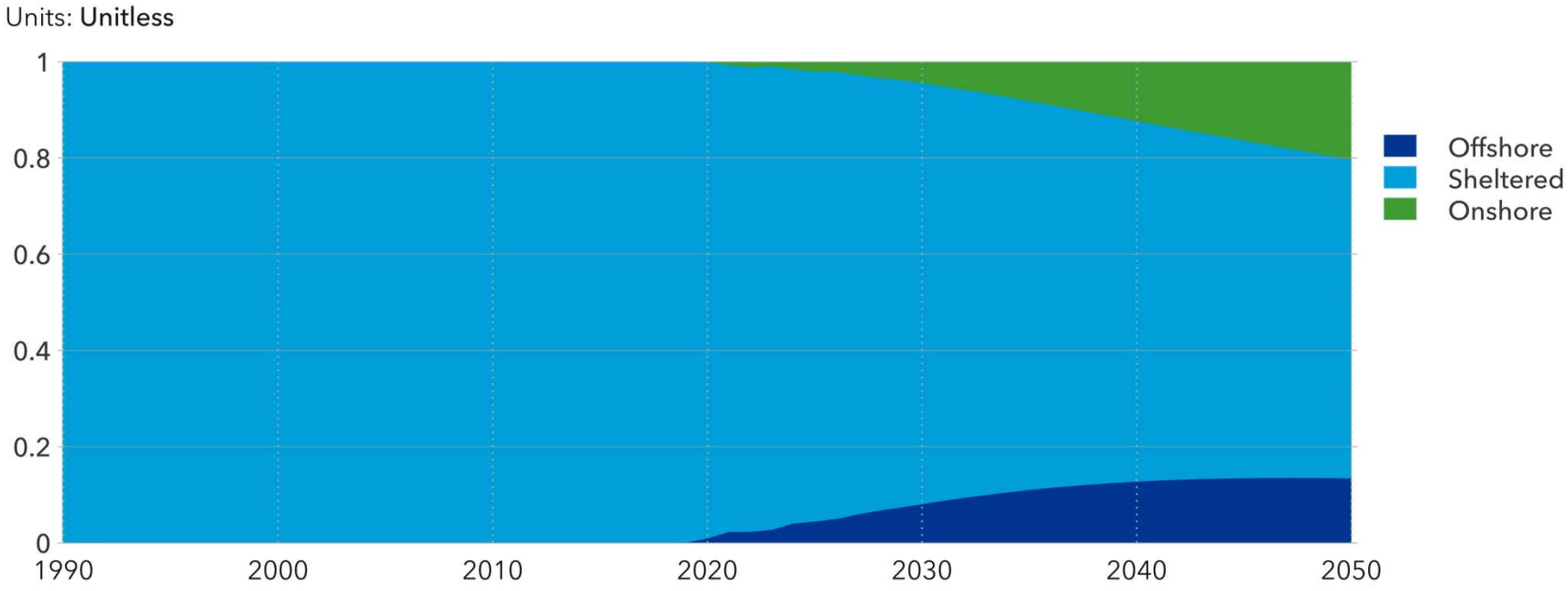


Marine aquaculture of finfish triples and overtakes molluscs as the leading farmed species type

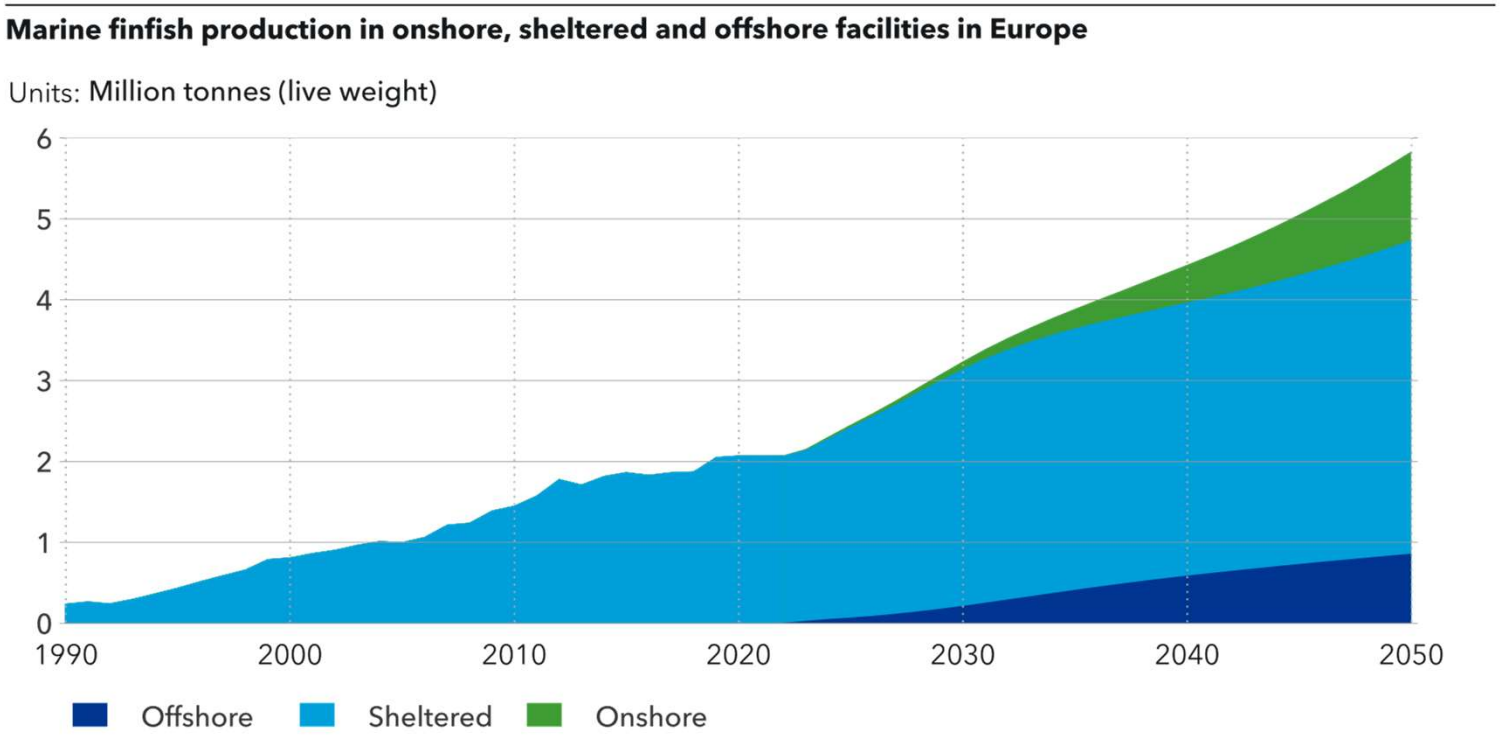


Offshore and Onshore morphologies grow to represent around 15% and 20% of production capacity in 2050 in Europe

Market shares for onshore, sheltered and offshore marine finfish farming



Offshore and Onshore morphologies in Europe grow to represent around 15% and 20% of production in 2050



Conclusion

- Seafood demand is on the rise, but there is no indication of large-scale dietary shifts towards it
- Marine aquaculture of finfish triples and is the leading farmed species type in 2050
- Capture fisheries output globally remains stagnant, while marine aquaculture production doubles
- Marine finfish production expands from sheltered waters to onshore and offshore facilities

Thank you!

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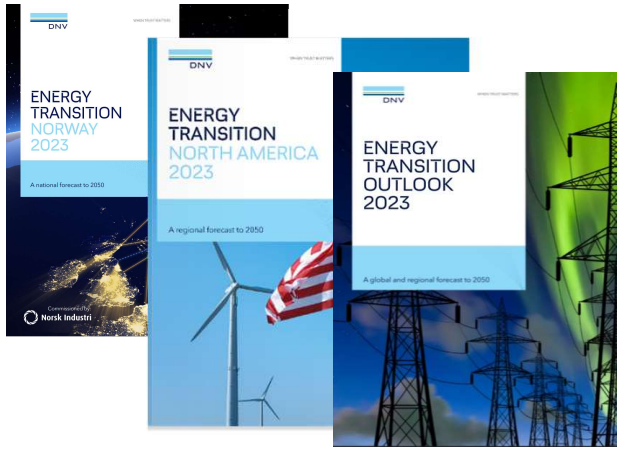

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