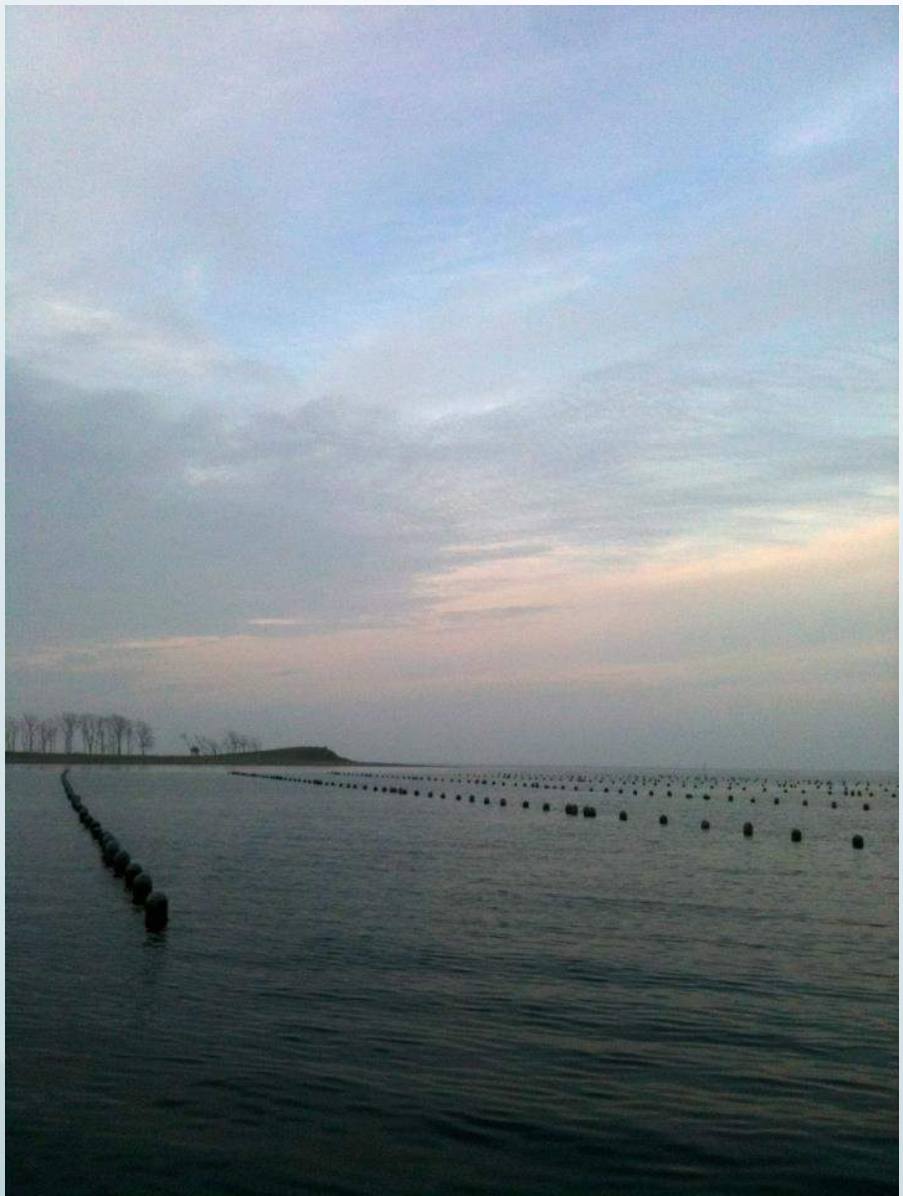
ESTONIA AQUACULTURE

NordShell
Hav og viden

- **How to develop the aqua-culture sector in Estonia**
- **Possibilities and challenges in The Baltic Region**
- **Mussels & seaweed**
- **Environment and economy**



Mads van Deurs

- 2003-2009 commercial mussel farm and processing factory in Denmark
- 2009-2012 Partner in several R/D projects
- 2012-2015 Smart Farm AS
- Projects and establishing mussel farms in Denmark, Norway, Åland, Germany, Bulgaria, Malaysia, Vietnam
- Farming techniques, biology and environment. Blue shell mussels and seaweed

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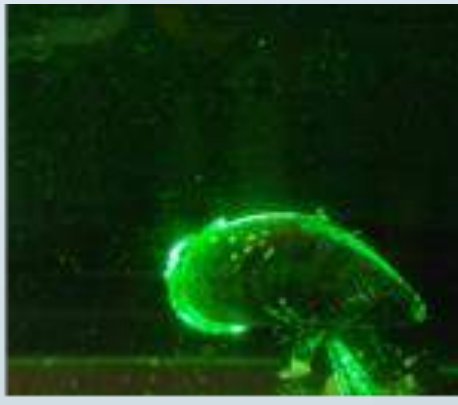
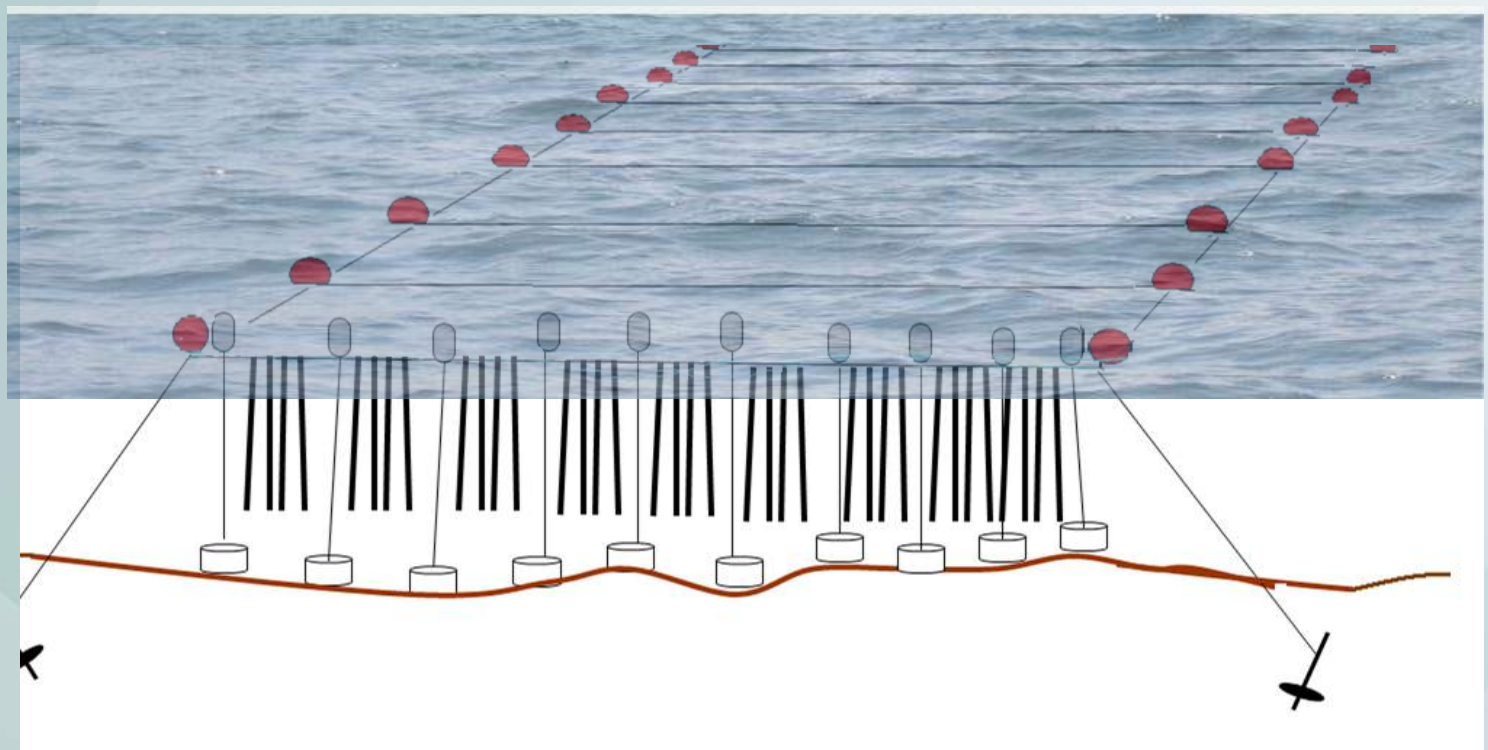


Mussel farm

- Long line system
- Well tested and developed during decades
- Can produce very fine mussels
- Can be submerged for the ice
- Low investment



Long line system

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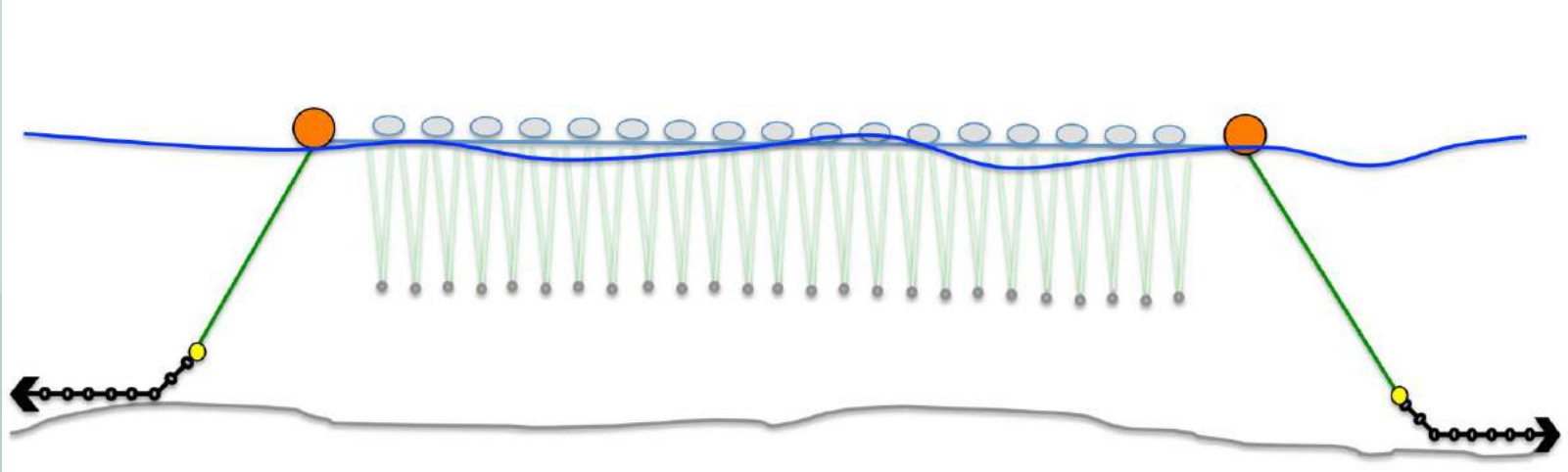

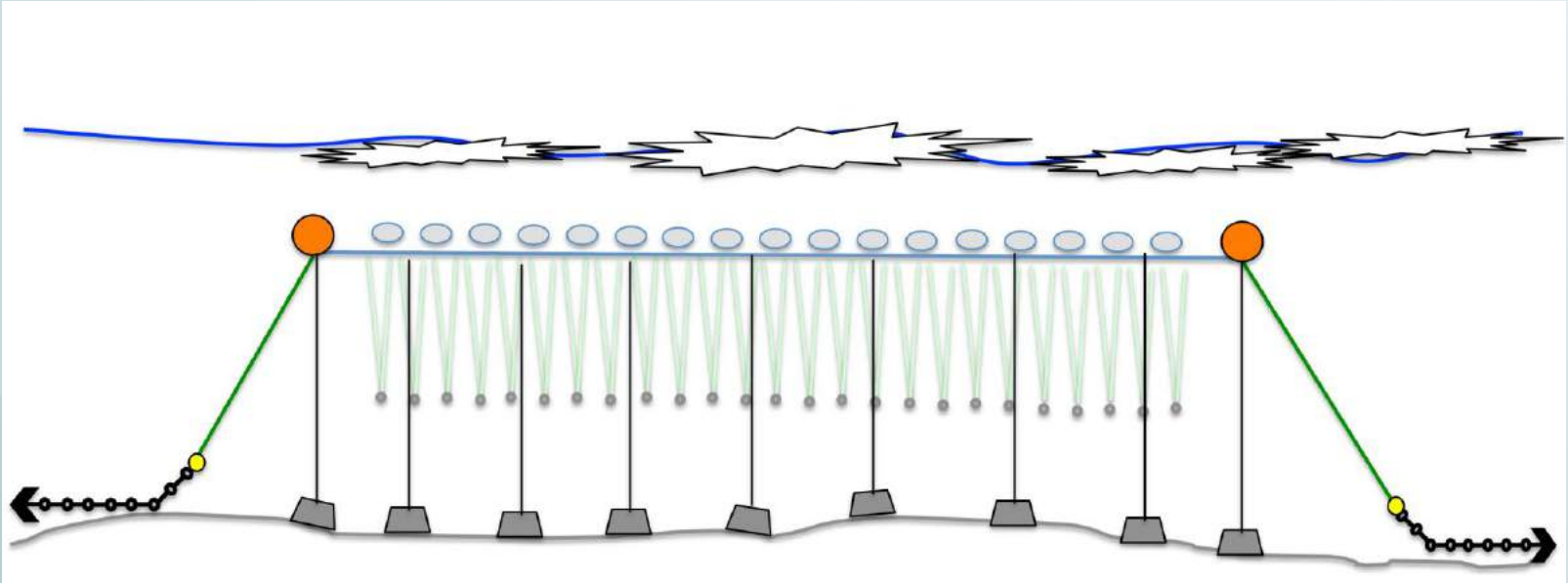

smartfarm

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- High quality – continuously improved
- Long lifetime. Protofarm from 2000 is still in the sea
- Low operating cost
- All operations done under water
- Installed in the following extremes:
  - ice covered fjords
  - in strong tidal sites (4 knots / 200 cm/sec. current)
  - Open waters with 7 meters significant high waves

Capacity

- 1 ton pr day or up to 30 tons pr hour
- Different investment
- Different production cost
- Different market

25 smartunits

- investment

25 smart-units	342 350 €
Moorings	144 600 €
Mobilization	9 500 €
Boat	400 000 €
Harvesting-machine	230 000 €
Dinghy	8 000 €
Total	**1 134 450** €

25 Long-lines

- investment

25 Long-lines	120 000 €
Moorings	70 000 €
Mobilization	9 500 €
Boat	400 000 €
Harvesting-machine	100 000 €
Dinghy	8 000 €
Total	**707 500** €

25 lines / units

xxx ton per cycle

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Sales. Volume x market price	€
Variable cost. Material, fuel etc.	?
Direct cost. Manpower, admin, insurancece, buildings, maintenance	?
Financial cost 10% x ? €	?
Result before tax and finance cost	?
Chash flow	?
Payback period	?

Basics to keep in mind

- The investment / write off has to be covered by profit from the production
- There must be a demand for the mussels
- Investigate the market volume and price
- Calculate the production price carefully
- Fixed expenses are the same for small and big farm (boat, analyses, administration etc.)
- There can be a financial compensation for the N/P removal

Challenges from nature

- Ice
- Predators
- Fouling
- Weather
- Sea
- Ships

Keep fighting...

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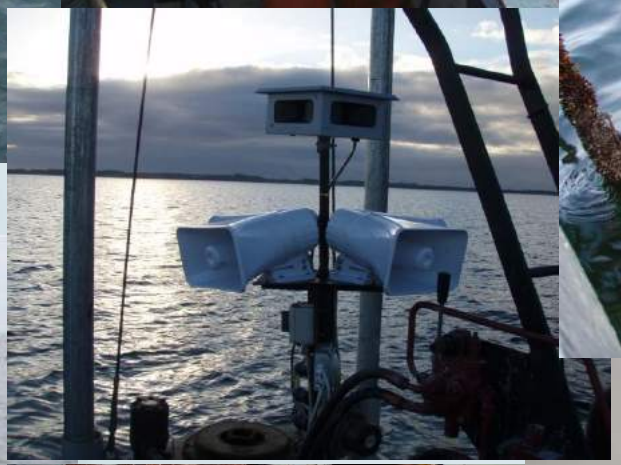

Processing

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Fine mussels

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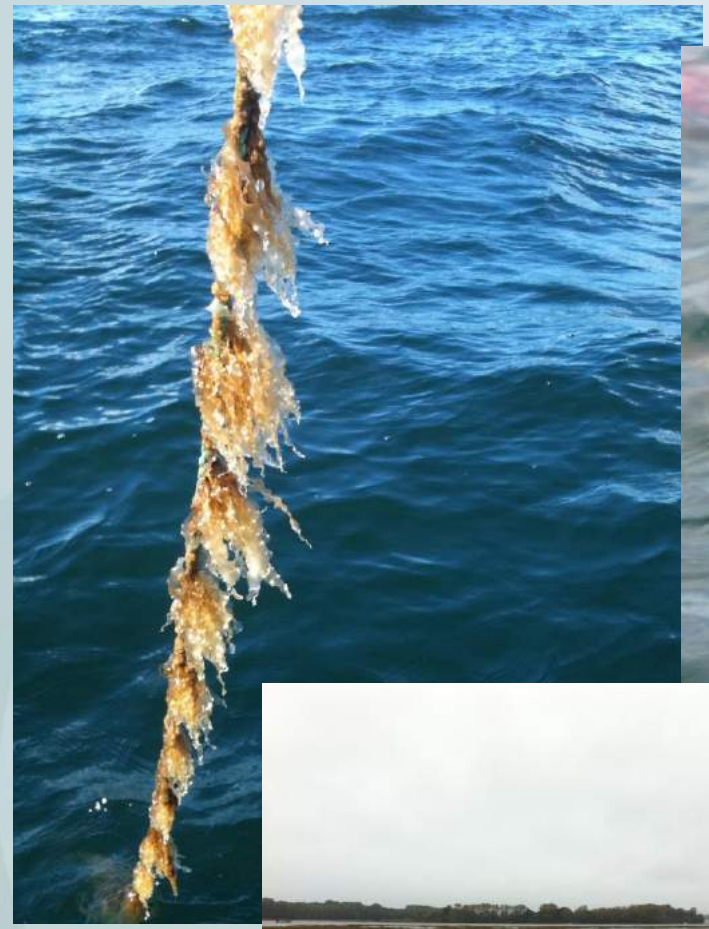
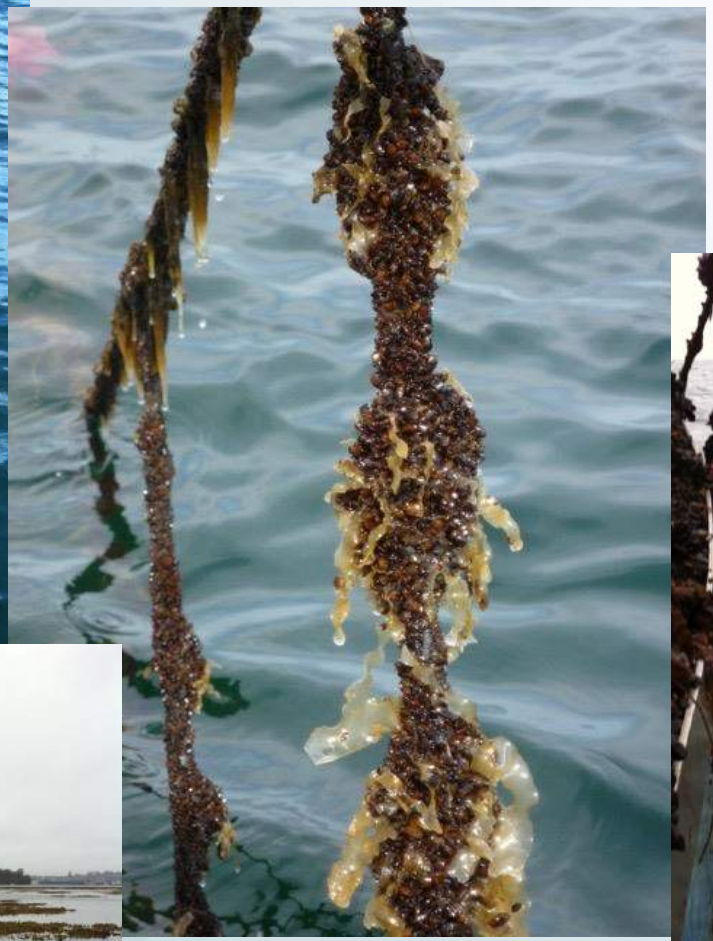
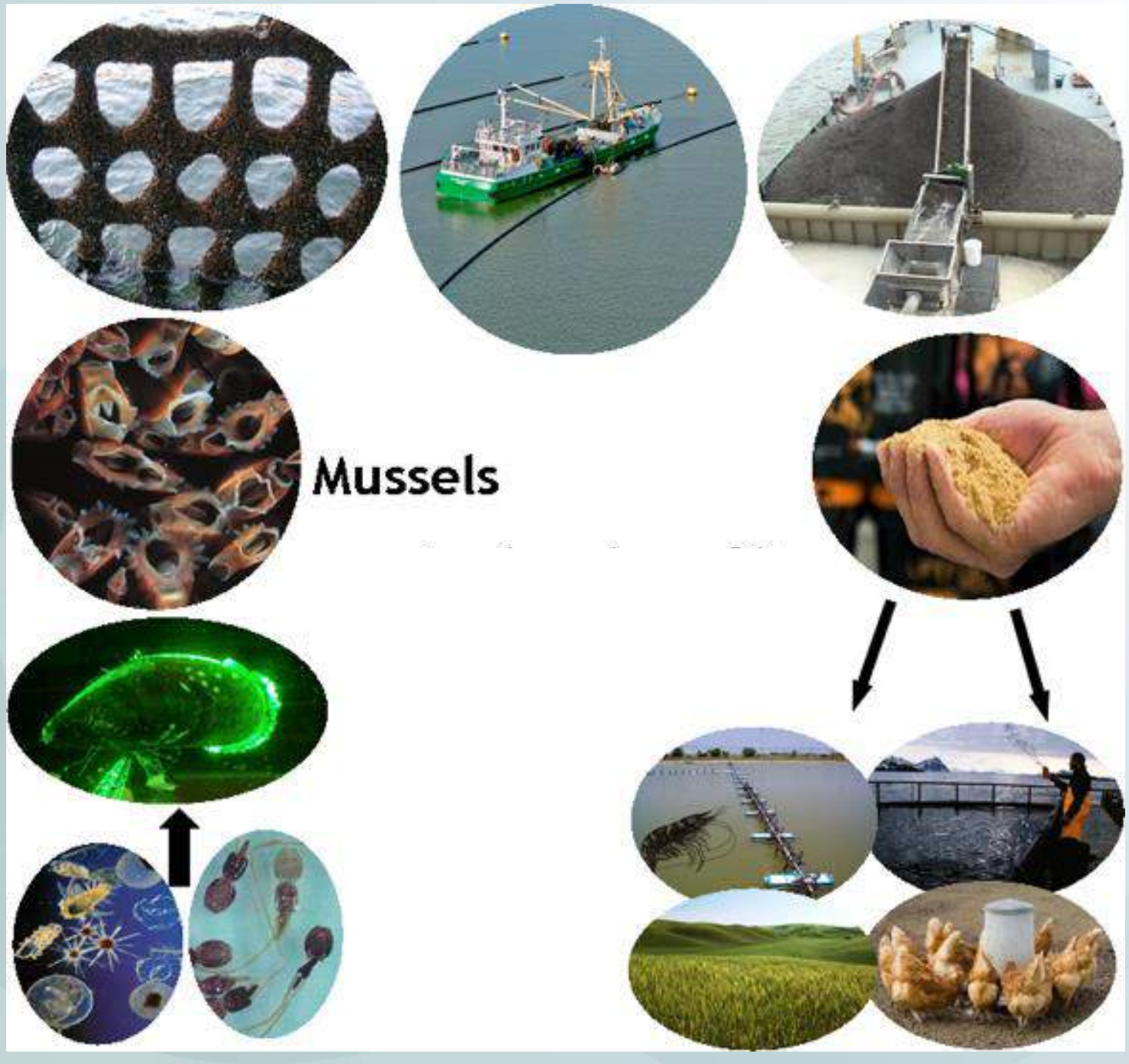
Seaweed on lines





Different use



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Other possible products

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Challenges in Baltic Sea

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- Low growth (salinity)
- Ice during winter
- High labour cost
- Market situation
- **Advantage: Nutrients for free!**

Mitigation mussels

- One mussel (5 cm) filter 6 liters or more per hour
- One farm have maybe 36 mio. mussels filtrating 24/7
- Converting dissolved nutrients via plankton to mussel biomass
- Mussels contains 1-2% N & 0,1% P

Dissolved nutrients

☟

Plankton

☟

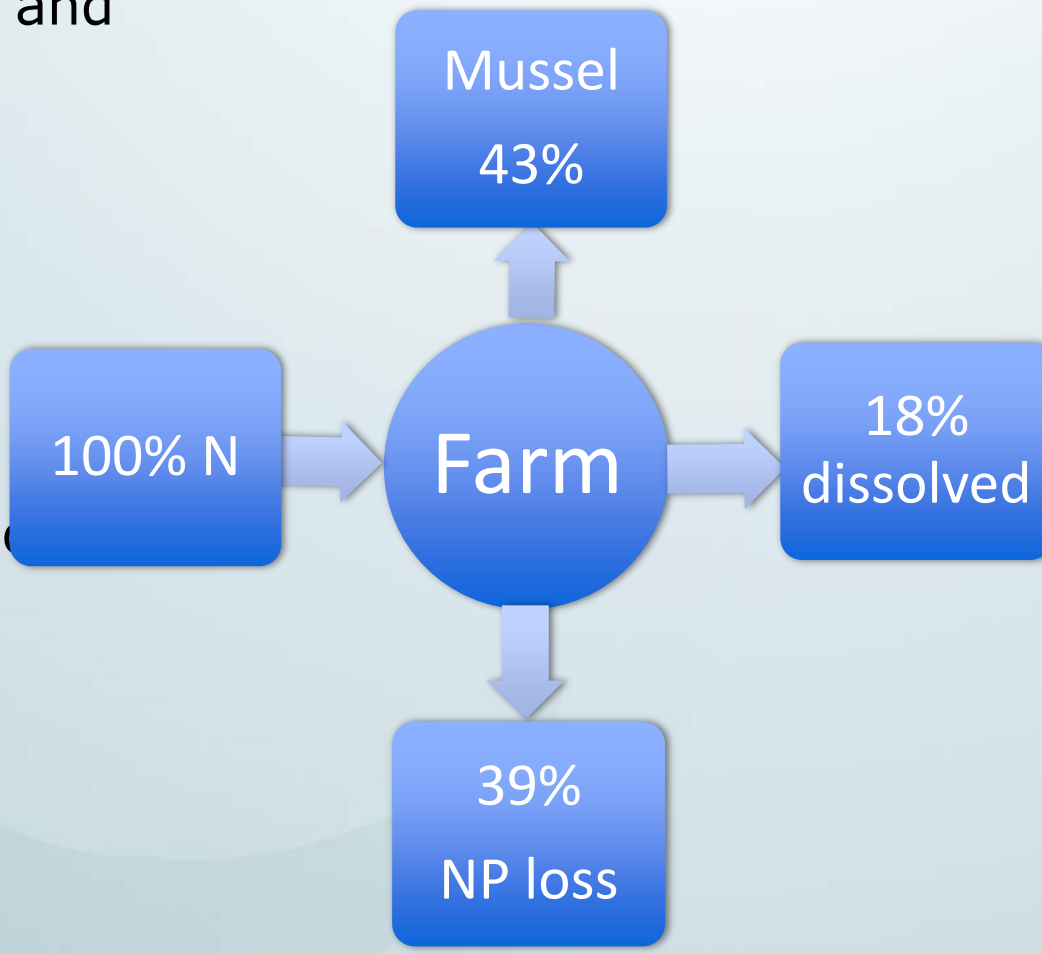
Mussels

☟

?

Balance new activities

- Fish farming will add nutrients to the sea
- This can be balanced with mussel and seaweed production
- Area for the nitrogen balance
- Political decission how to support the mitigation
- Equal price as land based mitigati (14,8 € / kg N)



Vormsi Agar

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Estonia - Mussels

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Estonia - construction

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Seaweed as resource

- Fishing & cultivation

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Production of seaweed will remove nutrients

Culture methods are not tested in full scale

Valuable compounds from the sea

The use of seaweed

- Narturel food additive (E407-E418)
- Human consumption
- Fertilizer and feed
- Cosmetic and medical
- Biofuel

Carrageenan E407

As feed

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Fish feed

Better growth

Better meat color

Better taste

Less fish meal

Farm animals

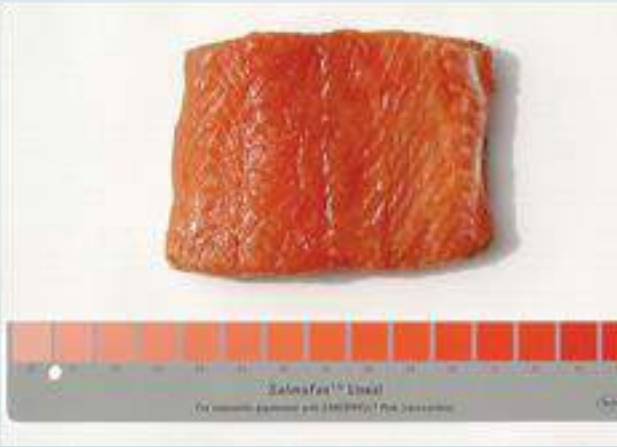
Less infection (piglets)

Higher birth weight (sheep)

Better wool (sheep)

Higher milk yield (cows)

Less space on land for cultivating feed



World production
Seaweed culture

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World production around 30 mio. tons per year (FAO 2012)

EU only 0,03% of this

Collecting, fishing and aquaculture

Experience from Åland

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Poly culture & future

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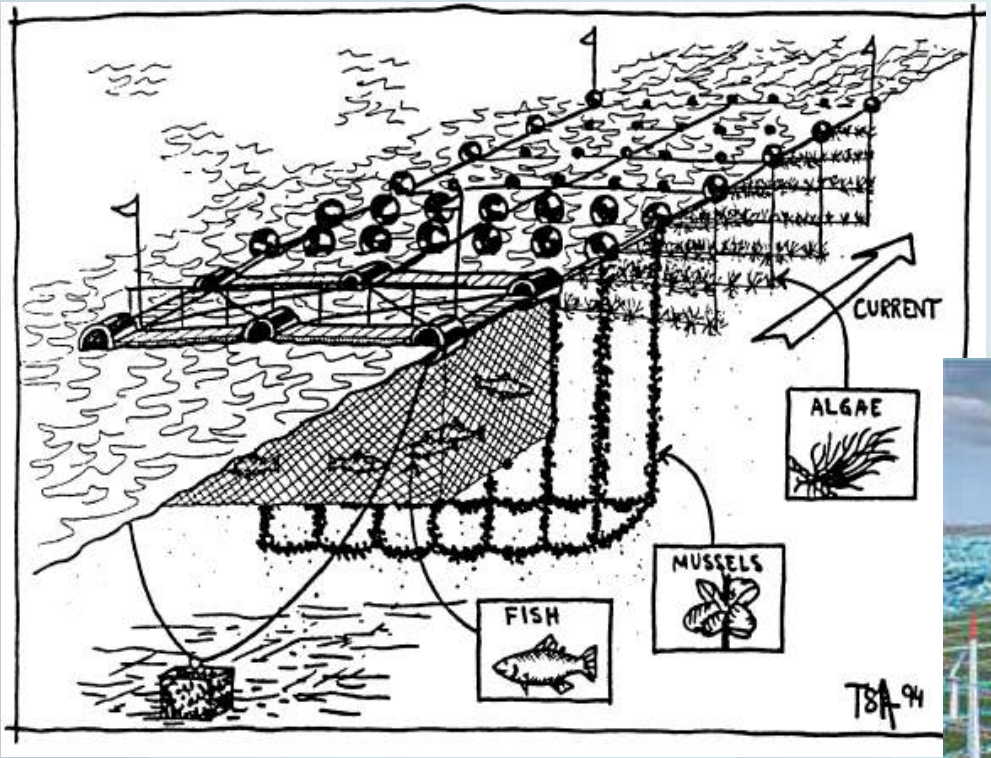
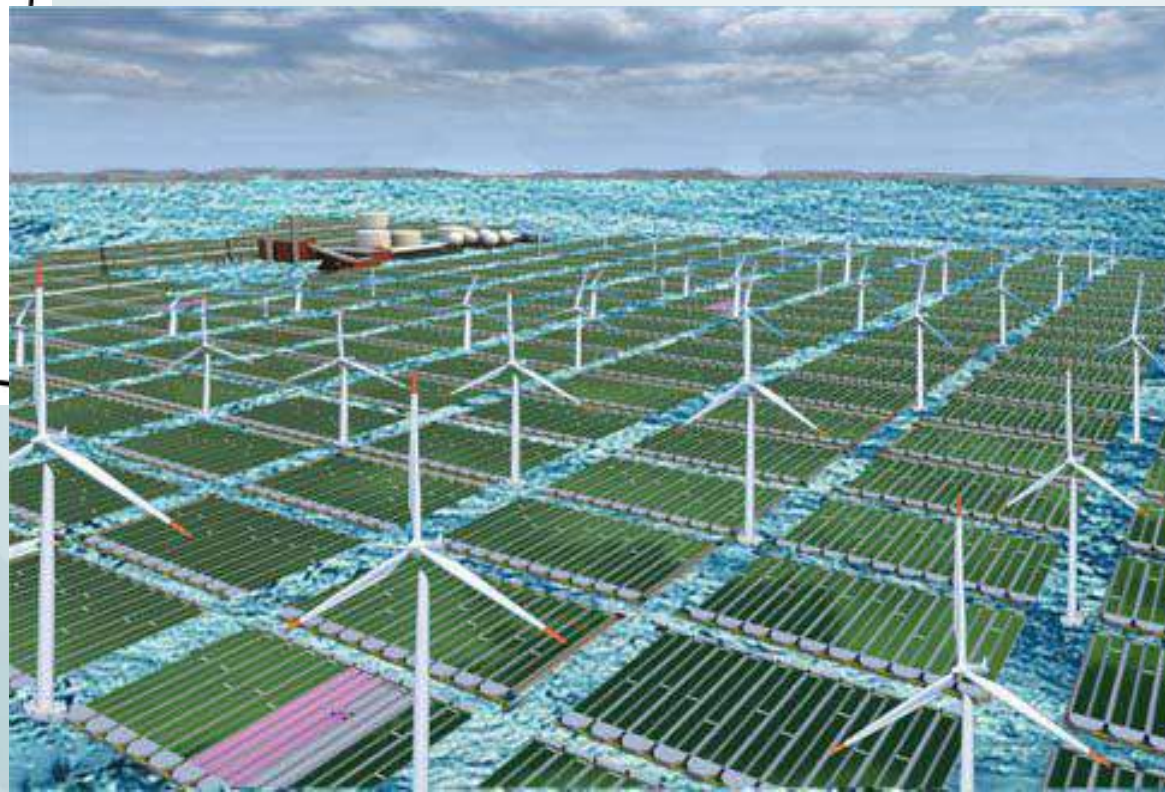
Growing focus on opportunities at sea

Projects and market must lead the way

Better use of the given resources





Thank you

- and see you again