COASTAL Biogas

Cluster On Anaerobic digestion, environmental Services and NuTrients removAL

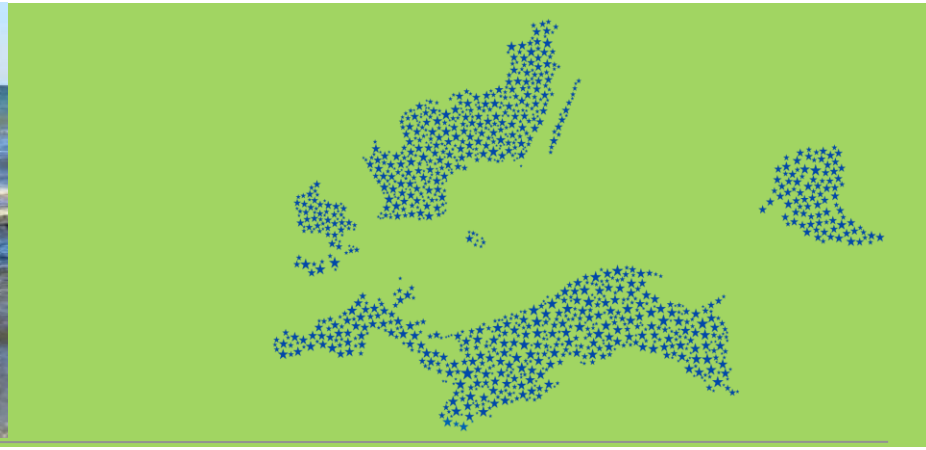
The final conference

9 December 2021

Beach cleaning and collection

Tyge Kjær

Roskilde University



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Introduction

- Beach cleaning: **As soon as possible after the seaweed has been torn up and arrived at the beach area.**

- Beach cleaning methods:
  - **depends on the circumstances, Has to be adapted to the character of beach and coastal areas**
  - **reduction in sand**
  - **affordable options**

- Conclusion:
  As fast as possible:
  - **minor odor nuisances**
  - **smaller beach area**
  - **more biogas**

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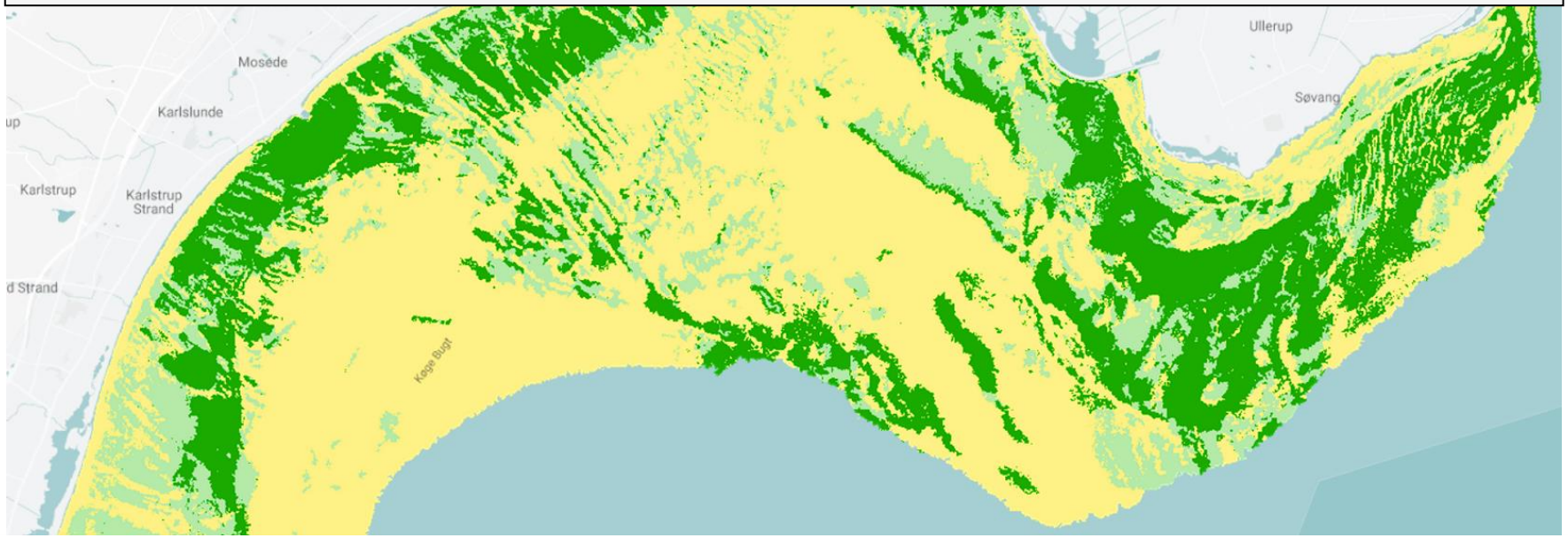
Seaweed on the beach

(1) Grows at different depths - shows some examples

(2) Currents/waves bring the decomposed seaweed to the beach as a mushy mass.

Some of the seaweed is transported at the surface or close to the surface; but the major part is transported below the surface, carried by the inward sea currents.

Types of seaweed and the weather thus play a major role



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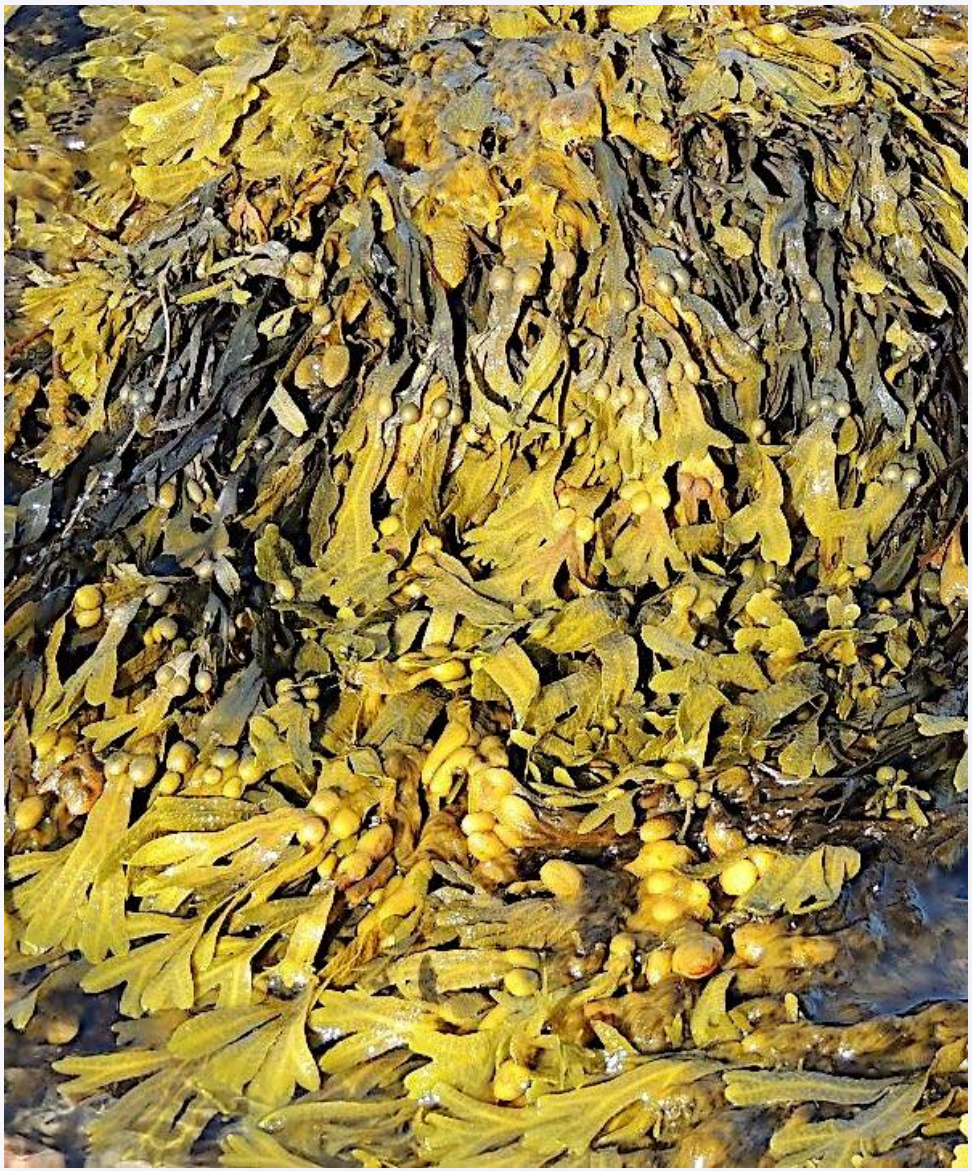
Seaweed Køge Bay

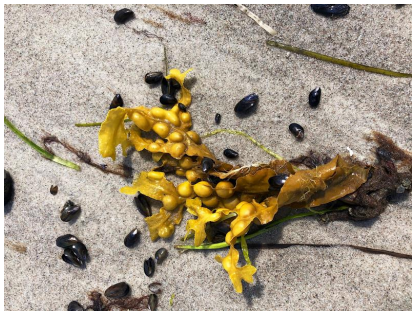
One of the five main types of seaweed

Danish:
Blæretang
Latin:
Fucus vesiculosus
Habitat:
The bladder roof grows in tidal zones, and is found on all coasts of Denmark; it prefers to grow in shallow water up to 5 meters deep



Direct collection at the beach

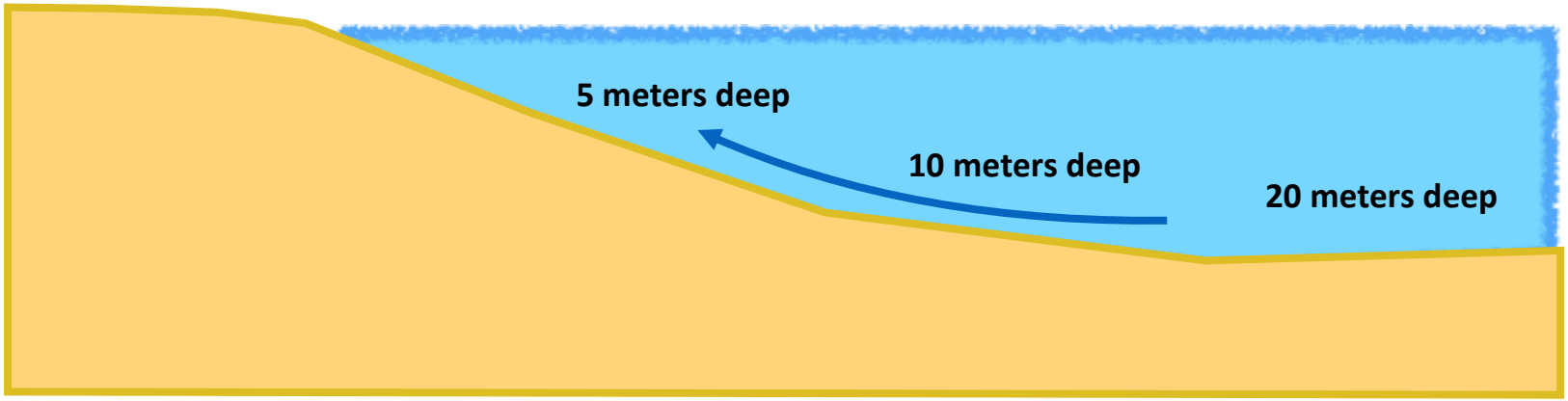
The different seaweed ends up on the beach as a mixed and partially decomposed mass



Bladderwrack (Fucus vesiculosus)
Up to 5 meters deep

Eelgrass (Zoster marina)
Up to 5-10 meters deep

Sea lettuce (Ulva lactuca)
Up to 20 meters deep



Beach cleaning and collection

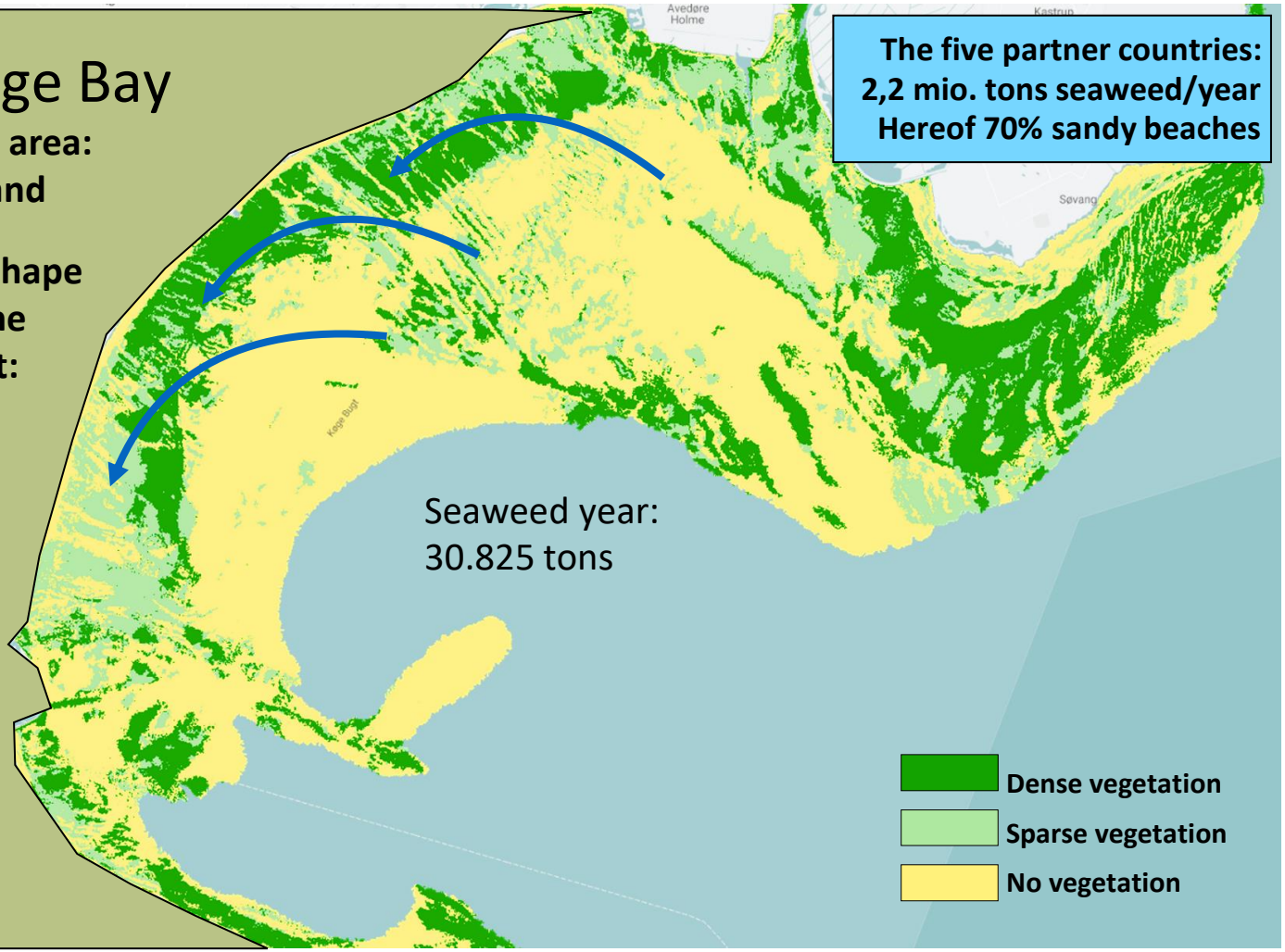
Estimates Køge Bay

Køge Bay catchment area:
49.492 hectar **farmland**

Surplus nitrogen in shape of nitrogen loss to the aquatic environment:
1.658 tons/year
About 20% losses

Estimated seaweed production in Køge bay:
30.825 tons/year

Estimated yearly Nitrogen uptake:
444 tons/year (max)



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Seaweed in Køge Bay

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Collection of Seaweed

Seaweed after storm and offshore winds

Main Issue

- **Minimum amount of sand**
- **Separation of plastic, metal, etc.**
- **As fresh as possible**

Seaweed in Køge Bay

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Direct collection at the beach

Different solutions • Optimal regarding SAND

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The monster - Testing

Better, men still not sufficient:

Test results (% of dry matter):

Collected at the beach:

- 48% Seaweed
- 40% sand
- 12% ash substances

Collected in the water:

- 49% Seaweed
- 33% sand
- 18% ash substances

Control - manual collected:

- 64% Seaweed
- 18% sand
- 18% ash substances

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Monster + sand separation on the beach

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Mixed mushy mass

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Seaweed collected in pile
Tranport to the biogas plant

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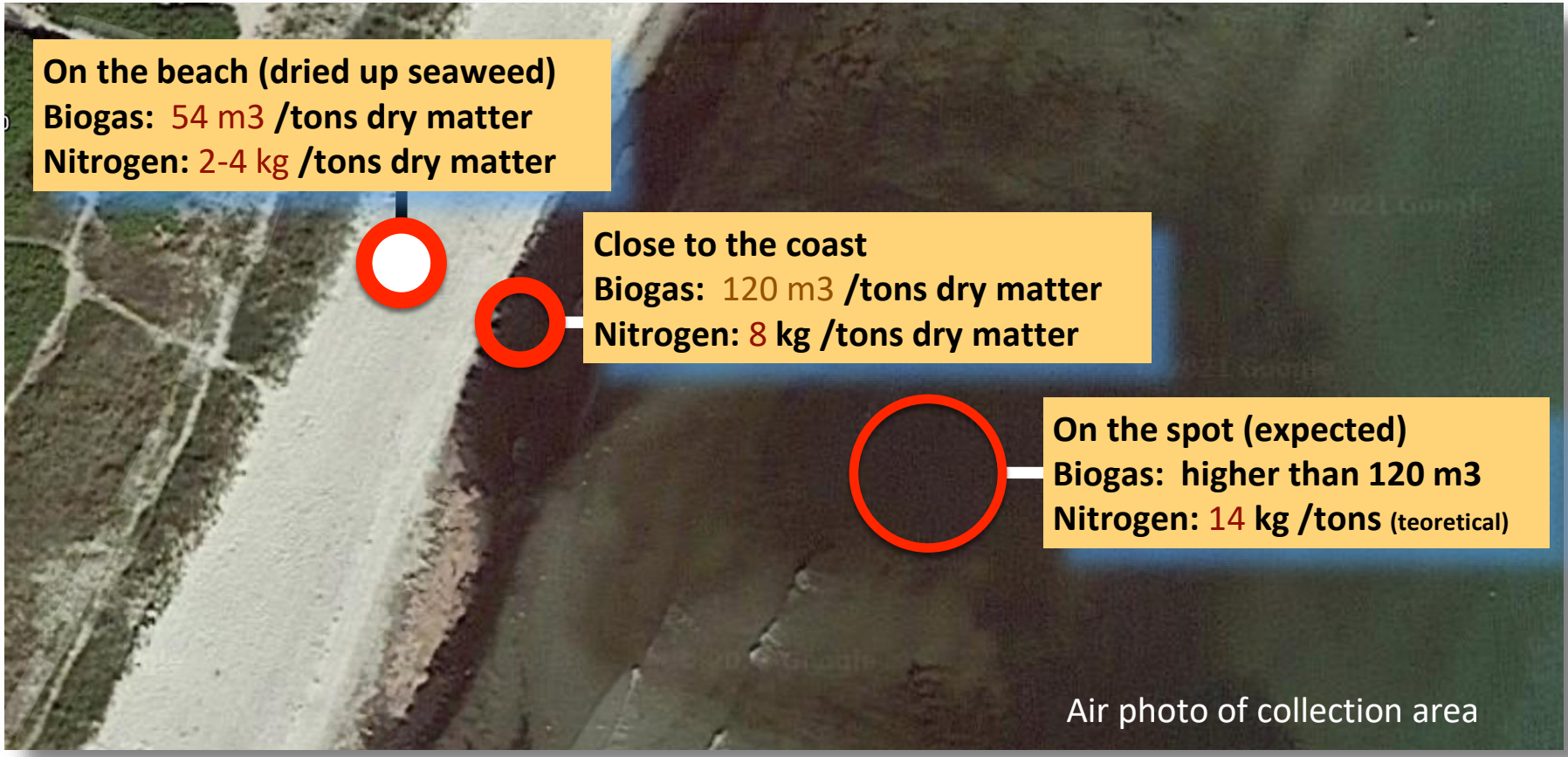
Collection: As fresh seaweed as possible:
More biogas, more nutrients, less sand and smell



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Thank you!

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