

# Beach cast biomass as a resource

*Coastal Biogas Conference – Denmark. Nov. 13th 2019*

BIOECONOMY HOTSPOT GULDBORGSUND

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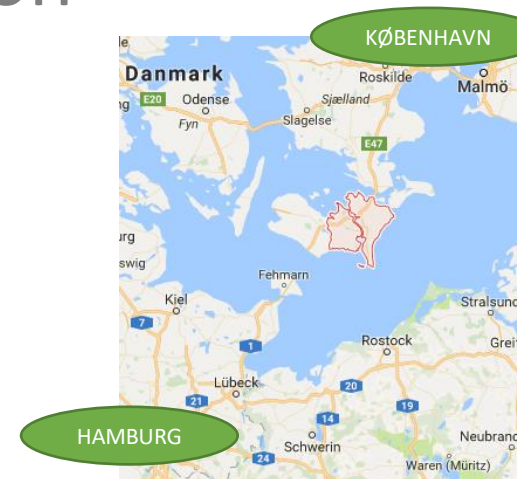
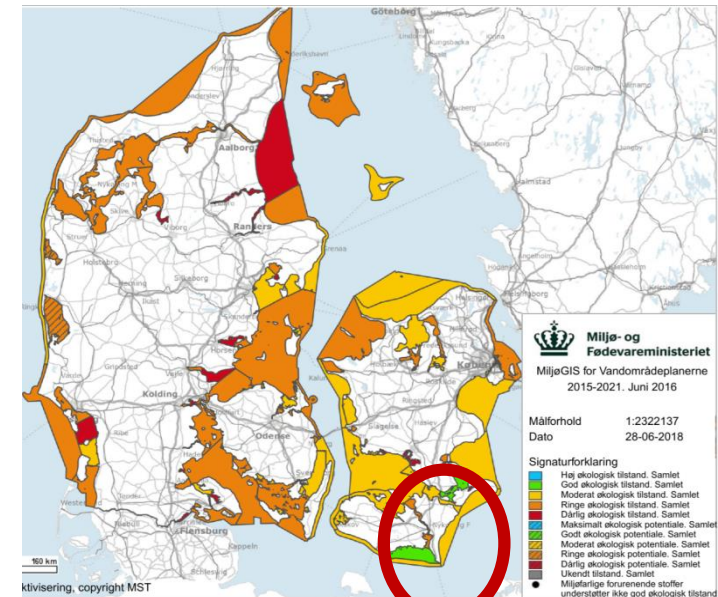
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GULDBORGSUND

# Municipality of Guldborgsund

- Rural municipality
- Richest soil – plant breeding expertise
- Good transport infrastructure
- Commitment to green transition through circular bioeconomy
- 328 km coastline



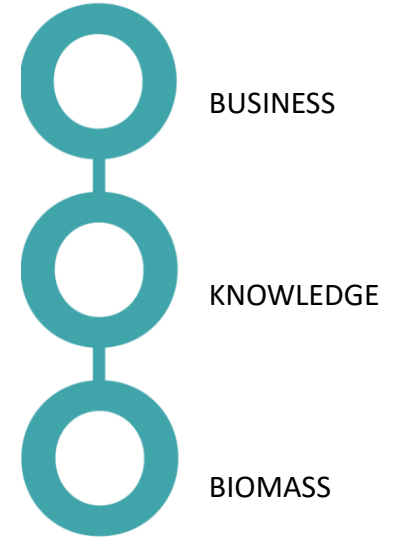
## What is our goal?

- New jobs  
*through*
- Green transition



## What do we do?

- We aim to ensure that local biomasses and the potential for new crops are in focus with the researchers, so that they can help identify the greatest potentials for new production.
- We pave the way for ties between researchers and companies interested in creating new products based on local biomass - and with a focus on local value creation.
- We support initiation of projects with strong practical focus together with local, national and international partners.
- Dansk Bioøkonomi Konference is an important supportive activity.



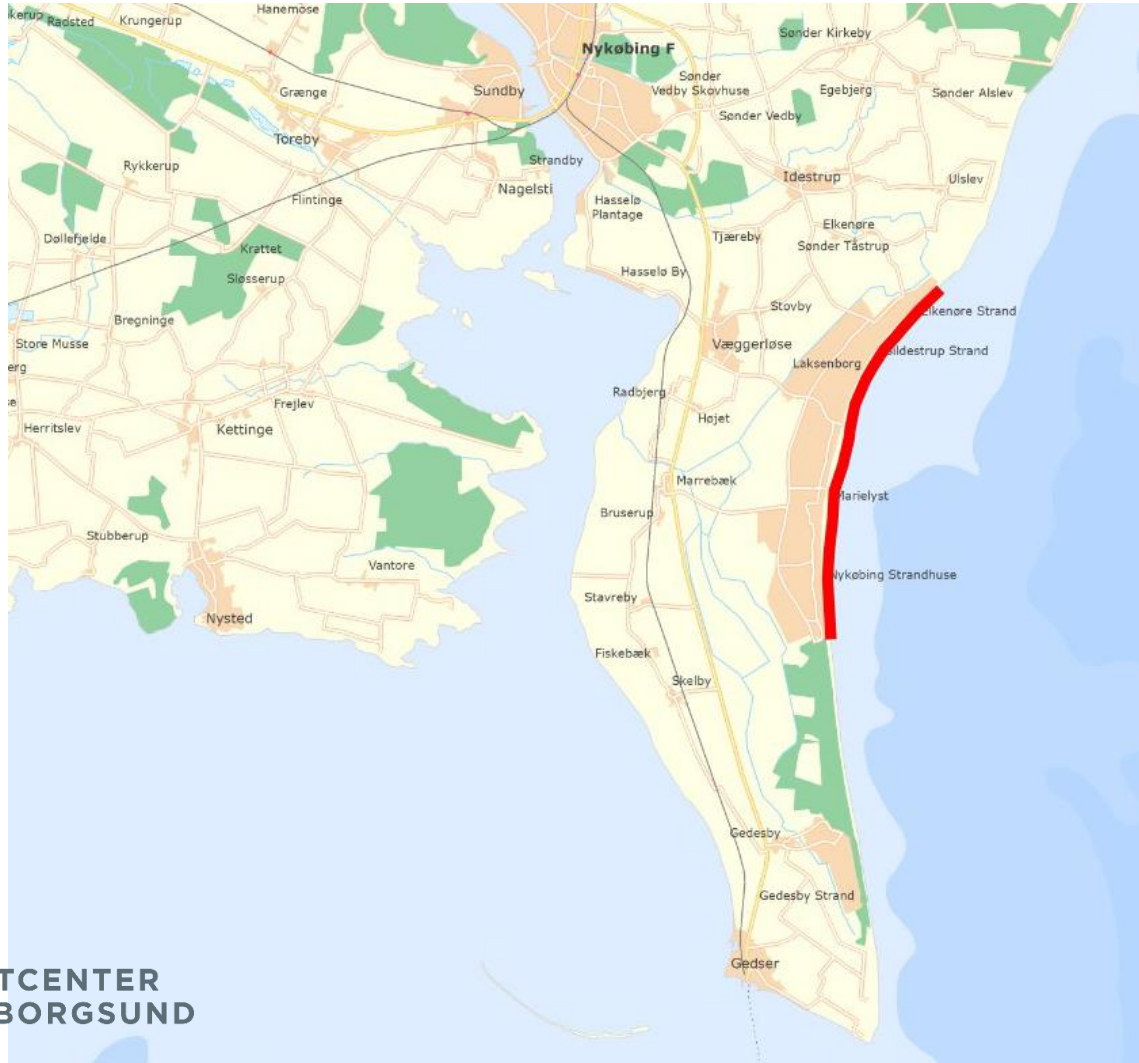


# Origin of idea



# Beach cast is removed from ultimo June – mid August

## A municipality service to support local tourism



Totally 150 – 250 m<sup>3</sup> removed from Marienlyst beach. ~ 7-12 truck loads.

Ad hoc smaller quantities are removed from Nysted and Gedesby beaches.

There are more locations with beach cast where no action is taken.



# Value from local beach cast?



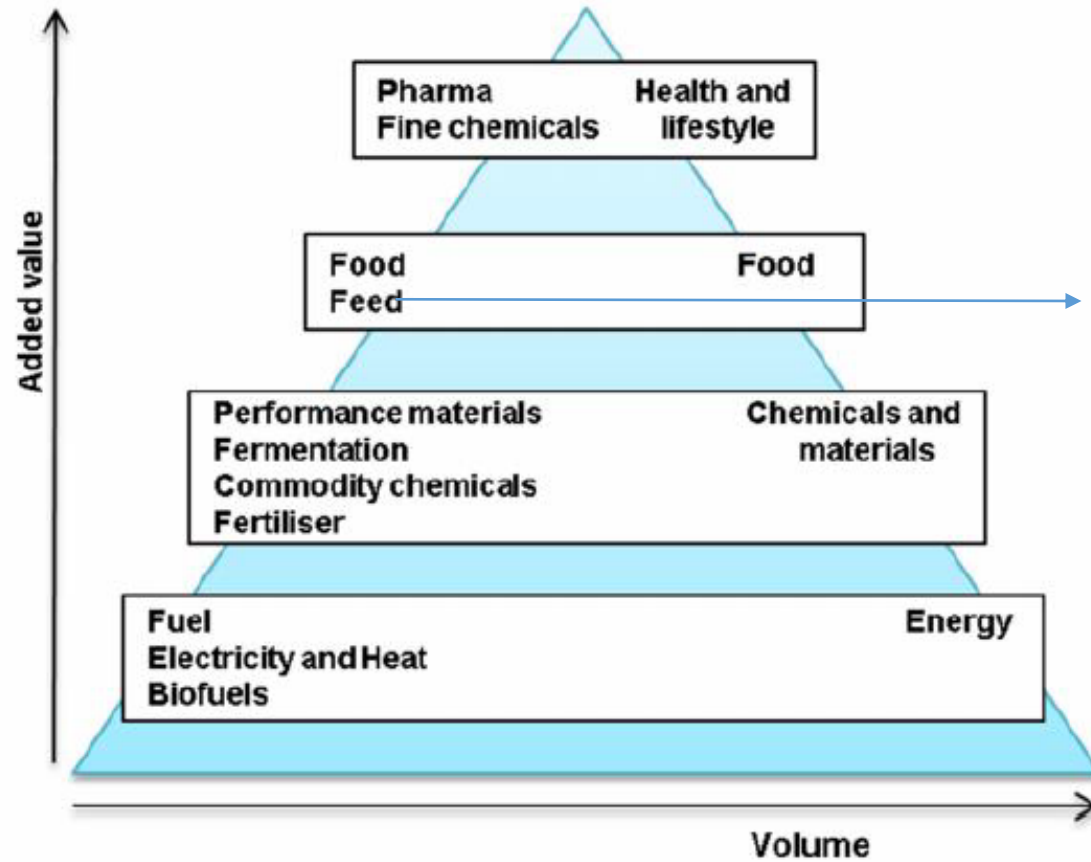
# BIOFISK case

Harnessing beach cast of wild seaweed and eelgrass as biomass for new productions and services.

Feasibility test of cast as medium for breeding insects for use in the production of protein fish feed.







Source: Kretschmer et al. 2013:86, adapted after Eickhout (2012), based on [http://www.biobasedeconomy.nl/themas/bioraffinage\\_v2/](http://www.biobasedeconomy.nl/themas/bioraffinage_v2/)



## Screening of local beach cast

- 48 samples, 6 beach locations in Guldborgsund municipality. June-October 2017
- Samples were dried. Dry matter, pH, conductivity, sand and ash content measured at Technological Institute.
- Composition analysis: sea grass, bladder wrack, sea lettuce, etc. - 9 samples were sent to EUROFINS and demonstrate heavy metal contents below threshold levels.

[Læs rapporten: bioguldborgsund/Viden/Lokale analyser og rapporter](#)



## Bioconversion of beach cast with black soldier fly larvae (BSFL)

- Beach cast (primarily eel grass) was used as feed for BSF larvae in mixes with
  - a) source-separated organic household waste (25-75%)
  - b) brewers mash (25-75%)

Conclusion: Up to 25% beach cast (primarily eel grass) can be added to larvae feed with out loss of growth.

- The Danish Food Administration does not approve that larvae fed with beach cast are used for food or feed for production animals (zoo and pets excepted).

Læs rapporten: [bioguldborgsund/Viden/Lokale analyser og rapporter](https://bioguldborgsund.com/Viden/Lokale-analyser-og-rapporter)

## Black Soldier Fly larvae bred on residue biomass – New sustainable protein source for fish?



### Feed-screening and dietary experiments:

- Larval and frass production,
- Substrate reduction
- Feed conversion rate,
- Larval weight and survival rate (%)

Analysis of larvae and frass: protein, carbohydrate, lipid and ash (+Larvae: amino acids profile and chitin concentration. +Frass: NPK and sugar profile)

LCA

Business model



Production of ice worms (Enchytraeidae)  
– a local source of omega-3 fatty acids and fish feed?

Martin Holmstrup and Kirsten Engell-Sørensen



# The project in a nutshell

Removal of N and P from the sea



Decomposing beach cast



Worm production



Live feed

Tørret, formalet og brugt  
som foderingrediens



Fish feed



Frass/compost for farming  
and horticulture





Habitat  
&  
Natural coast protection

BIO  
OKO  
NOM  
ISK

VÆKSTCENTER  
GULDBORGSUND



## CHALLENGE

Beach wrack is often regarded as a nuisance, particularly when it lands unexpectedly and in large quantities on tourist beaches. The challenge is to find a balance between public demand for 'clean' beaches, environmental protection and local economies.

**Six Case Study sites** to test the environmental, social & economic impact of different beach wrack recycling options.

## BALTIC BEACH WRACK

CONVERSION OF A NUISANCE  
TO A RESOURCE AND ASSET

## OUTPUTS

A 'Toolkit' of sustainable recycling options

Guidance on resource management and value chains

Information on socio-economic responses

Transnational & cross-discipline stakeholder support network

Cross-border & public-private co-operation

## RESULT

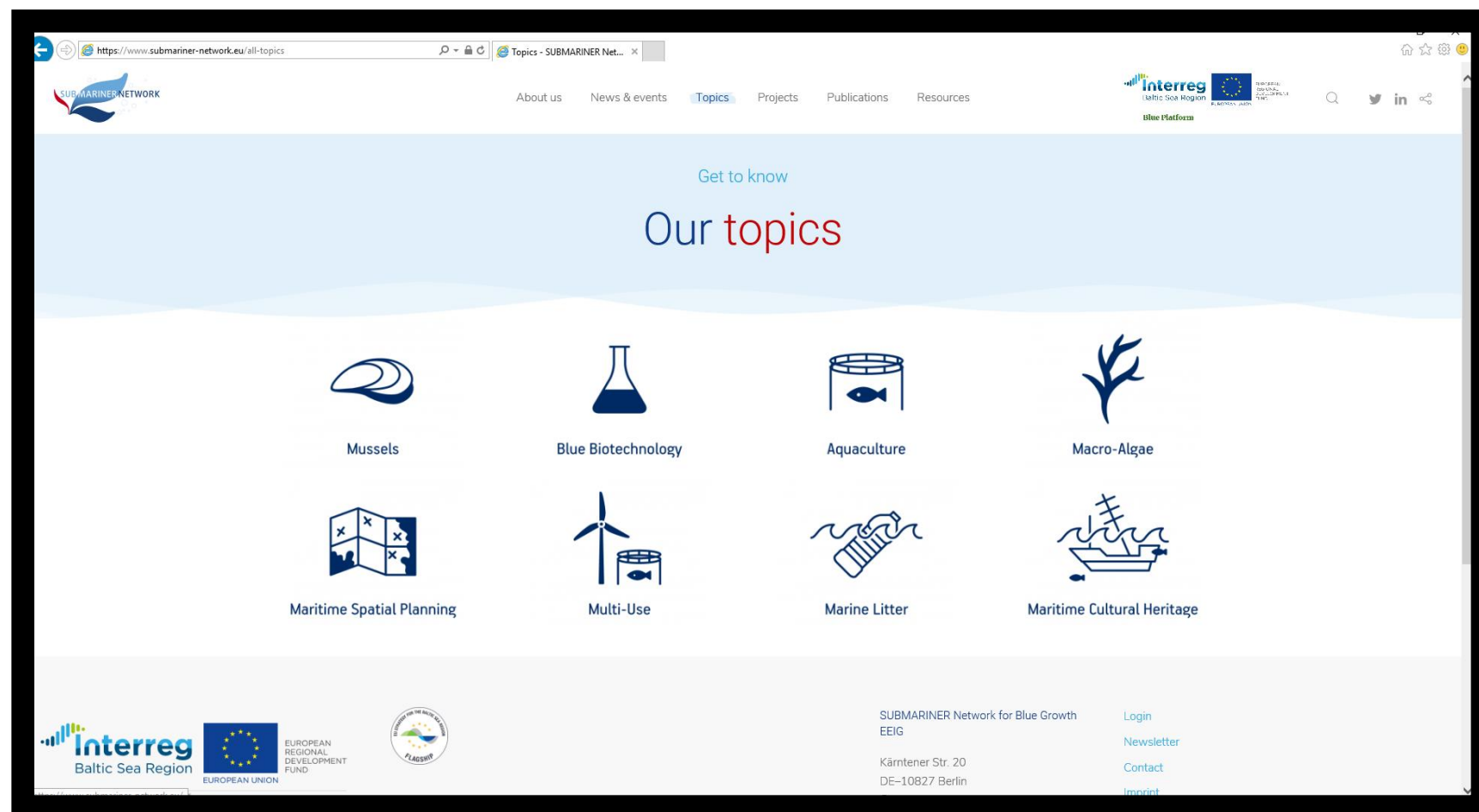
Coastal authorities adopt beach wrack management strategies that are environmentally sound and include sustainable recycling options for pollution & nutrient remediation that provide blue growth opportunities.



- Improve existing technology for the collection and processing of beach cast cost, sand etc.
- Crushing and compression technologies
- Prepare a business case for compost / fertilizer made on the beach
- The requirements of the costumers for the compost are investigated
- It is investigated whether composting of beach cast is economically sustainable in the long term
- To optimize the charcoal technology for the specific composition of the beach cast (salt, sand, etc.)
- To test the use of beach cast to restore sand dunes
- To test the possibilities of creating a fertilizer product by adding beach flush to biological sludge plant
- And more.....

<https://www.submariner-network.eu/blue-platform>

## Blue Platform



## Blue Platform



Macro-algae

The SUBMARINER Network is a partner in the GRASS project in the Baltic Sea. Through capacity building and awareness raising, the project aims to increase demand for macroalgae and unlock the potential of macroalgal sectors in the Baltic Sea Region. This webpage presents the key findings and other relevant information on macro-algae in the Baltic Sea.

↓ GRASS project flyer

Biogas production from beach wrack


Shortages in biomass available for bioenergy production have increased the interest on the use of macroalgae. Macroalgae are typically high-moisture material (80-90 %) and are considered to be more suitable for aqueous processing techniques such as anaerobic digestion or fermentation carried out by microorganisms. Anaerobic digestion uses anaerobic bacteria to breakdown or "digest" organic material in the absence of oxygen. Biogas can be used mainly for the generation of electricity or heat, or used as fuel in the transport sector. Biogas fuel needs to be upgraded to methane. Two of the advantages of using macroalgae in biological processes are their high water content, which is mixed with dryer material, and the fact that macroalgal cells do not contain large quantities of hard materials such as lignin or cellulose that are difficult for microorganisms to break down. Some of the disadvantages of using macroalgae are the presence of salt, polyphenols, and other compounds that can inhibit the digestion process.

Applications of Macroalgae Harvesting and Cultivation

CO<sub>2</sub> uptake  
O<sub>2</sub> production  
Nutrient uptake  
Energy resource  
Feed  
Fertiliser  
Human Food

Projects

- GRASS
- FUCOSAN
- CONTRA
- Coastal Biogas
- Algae2Future
- MAB4
- Seafarm
- NetAlgae
- Baltic Blue Biotechnology Alliance
- Seafeed
- BIOCAS
- Wetlands Algae Biogas (WAB)
- MacroFuels
- Macrocascade
- POSIMA
- Blue Adapt (FI)



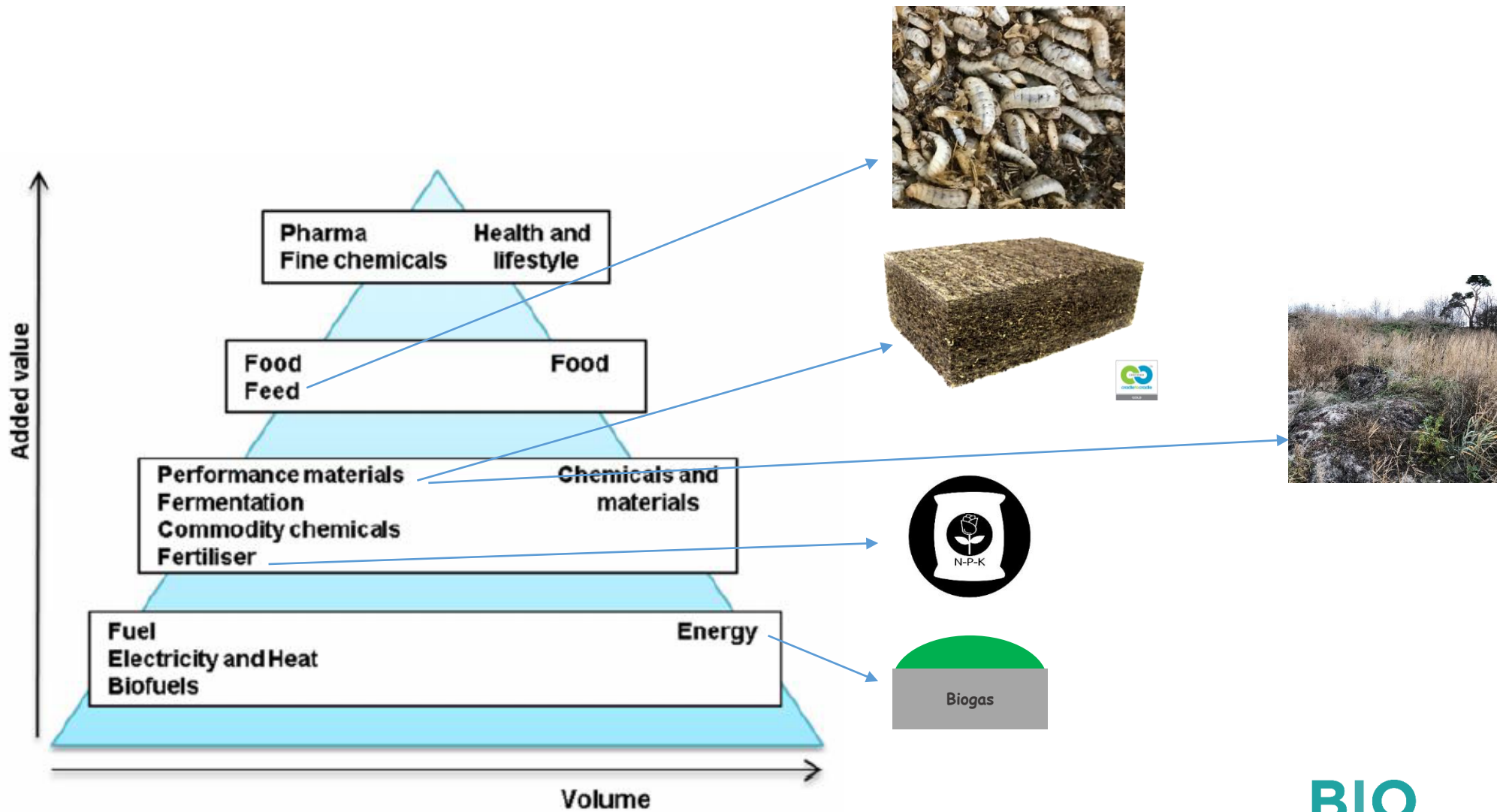


There is a long tradition of using eel grass and several relatively new reports.

The sources we know of will be shared at our homepage – soon 😊

[www.bioguldborgsund.dk](http://www.bioguldborgsund.dk)





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THANK YOU !

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