



# **Biobased ignition improvers as an enabler for single fuel methanol and ammonia combustion**

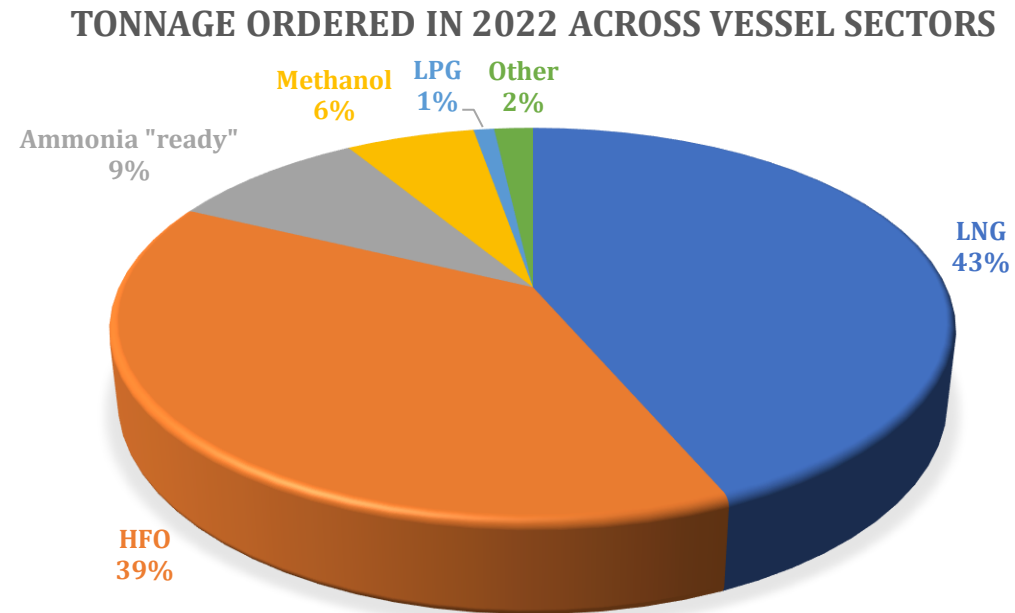
Michael Boot, [michael@vertoro.com](mailto:michael@vertoro.com)

# Problem

The maritime sector consumes **300 million tons of fuel oil per year** and emits **3%** of global GHG emissions.

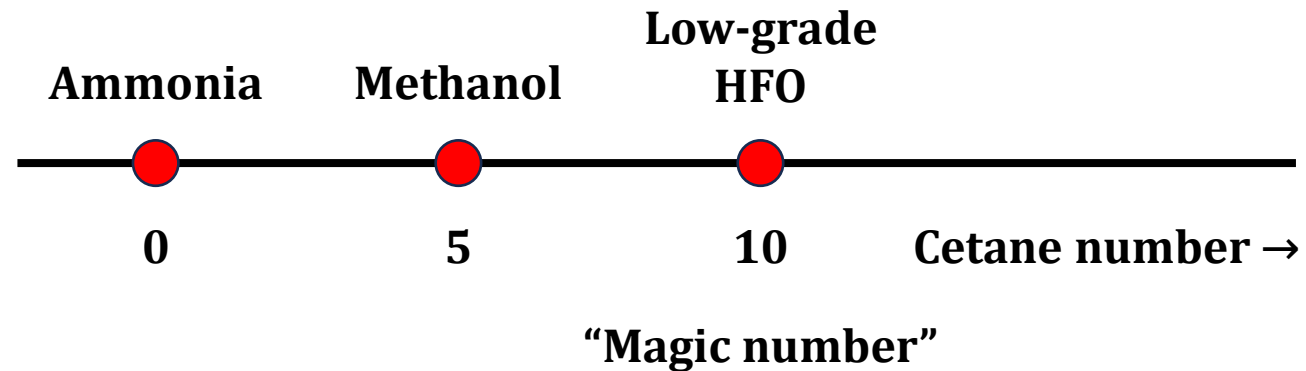


# Possible solution?



Source: Clarksons Research

# Common denominator: Poor ignitibility



# Improving ignitibility



← **Mechanical**  
(e.g., compression ratio)

[https://www.linkedin.com/posts/svitzer\\_methanol-engines-single-fuel-vs-dual-fuel-activity-7066360747961798656-8s16](https://www.linkedin.com/posts/svitzer_methanol-engines-single-fuel-vs-dual-fuel-activity-7066360747961798656-8s16)

Nouryon



**Mechanochemical**  
(e.g., compression ratio + cetane booster)

<https://www.fastwater.eu/>



**Chemical** →  
(e.g., cetane booster)

# Alcohol/ammonia soluble ignition improver

## **Beraid® 3555M**

Polyethylene glycol derivative, specially developed as an ignition improver in alcohol fuels produced by Nouryon (NL)

## **Goldilocks®**

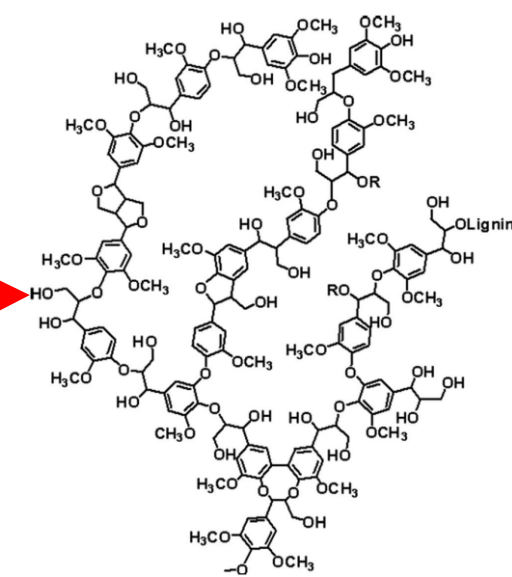
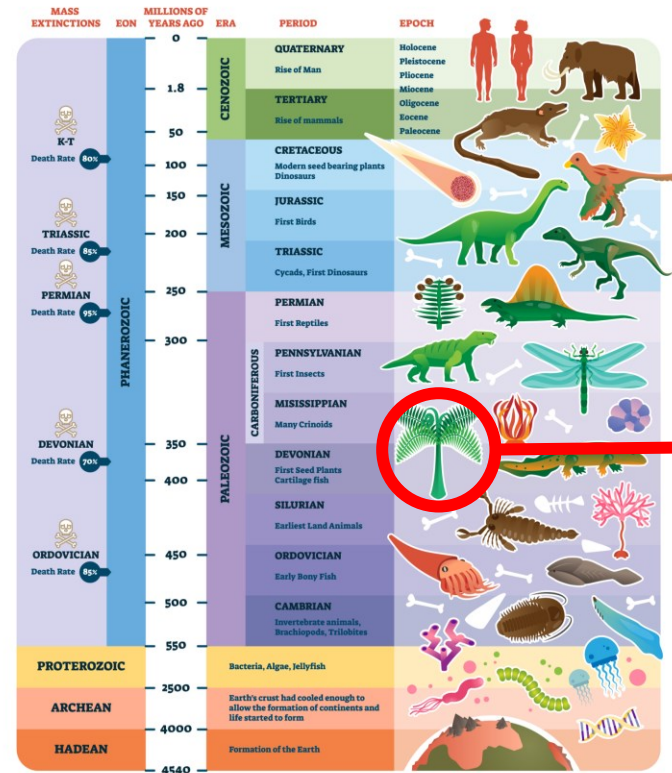
Lignin oligomer produced from REDII-IXA compliant lignocellulosic biomass produced by Vertoro (NL)

## **Sweet Goldilocks®**

Blend of sugars + lignin oligomer produced from REDII-IXA compliant lignocellulosic biomass produced by Vertoro (NL)

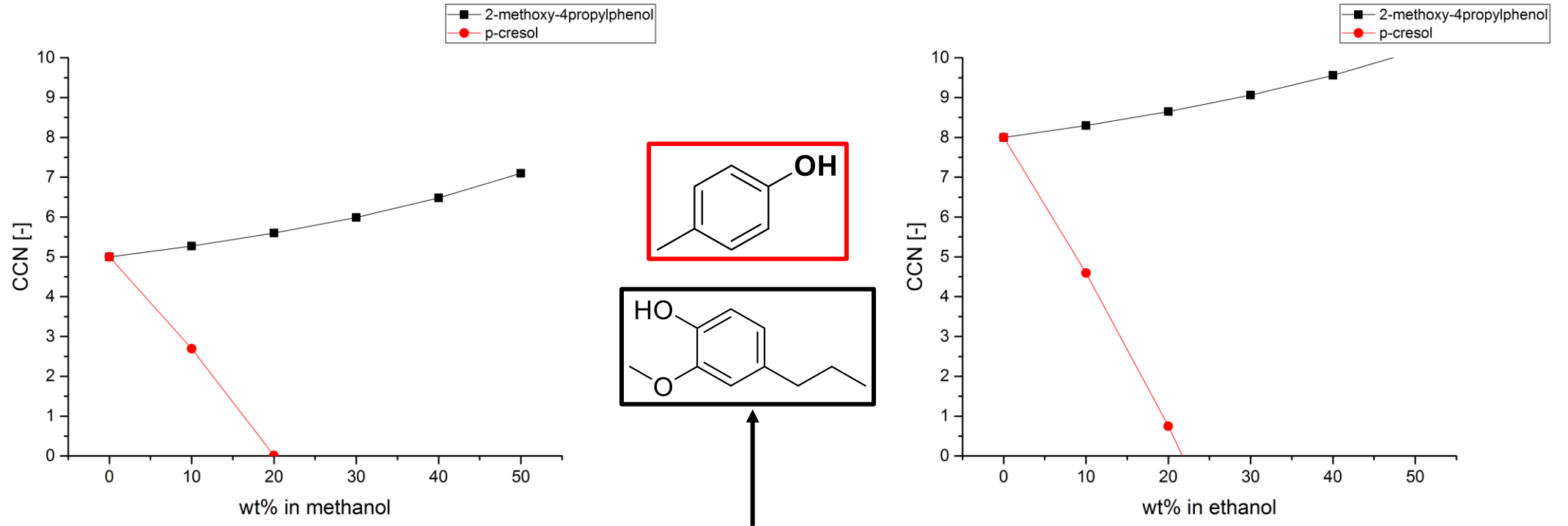
# Intermezzo: Lignin's origin story

## GEOLOGIC TIMELINE



# Early work on lignin model compounds

Source: Kouris et al., 2018, 6th TMFB Conference Tailor-Made Fuels



**Goldilocks® is an oligomer of this compound**

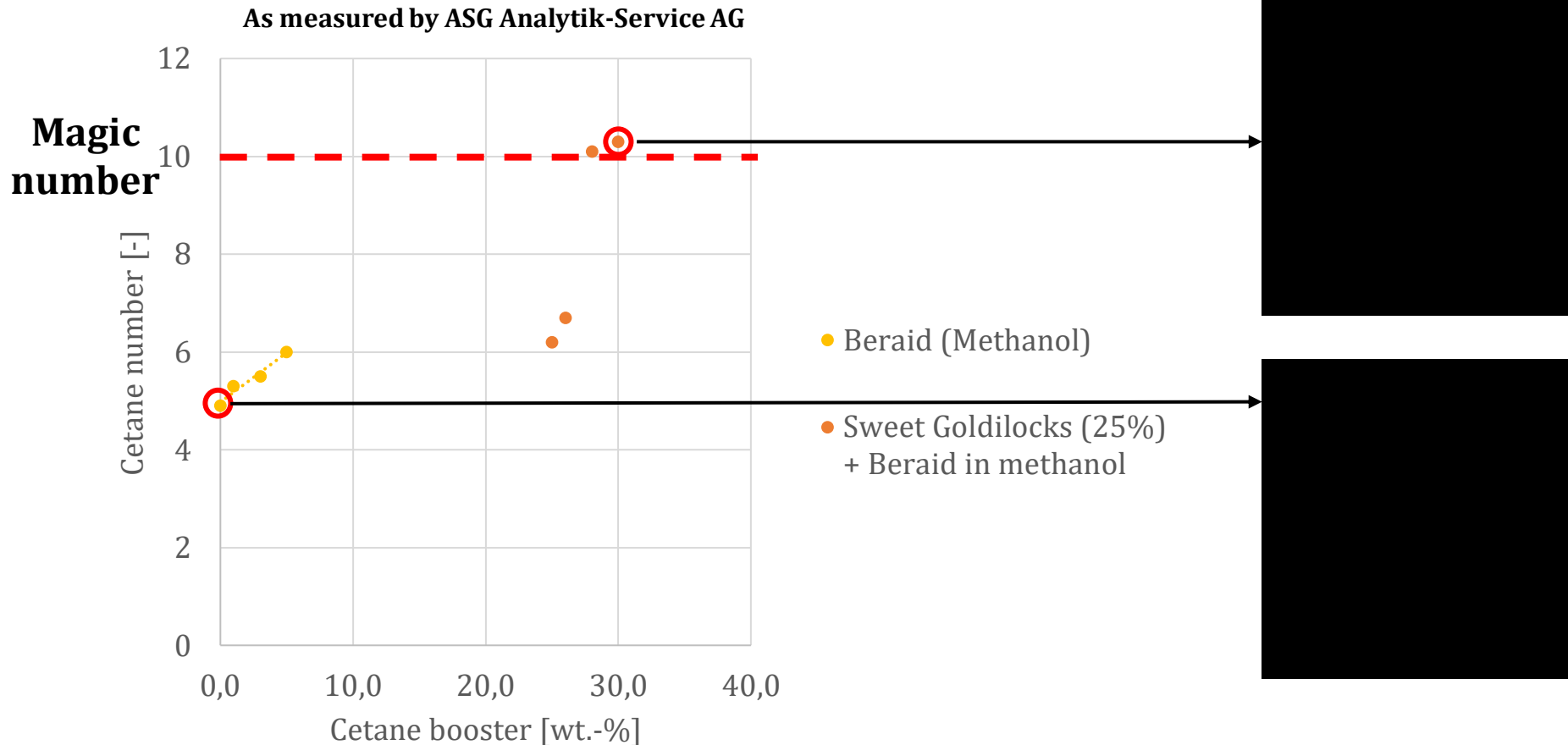


# Production process for (sweet) Goldilocks®



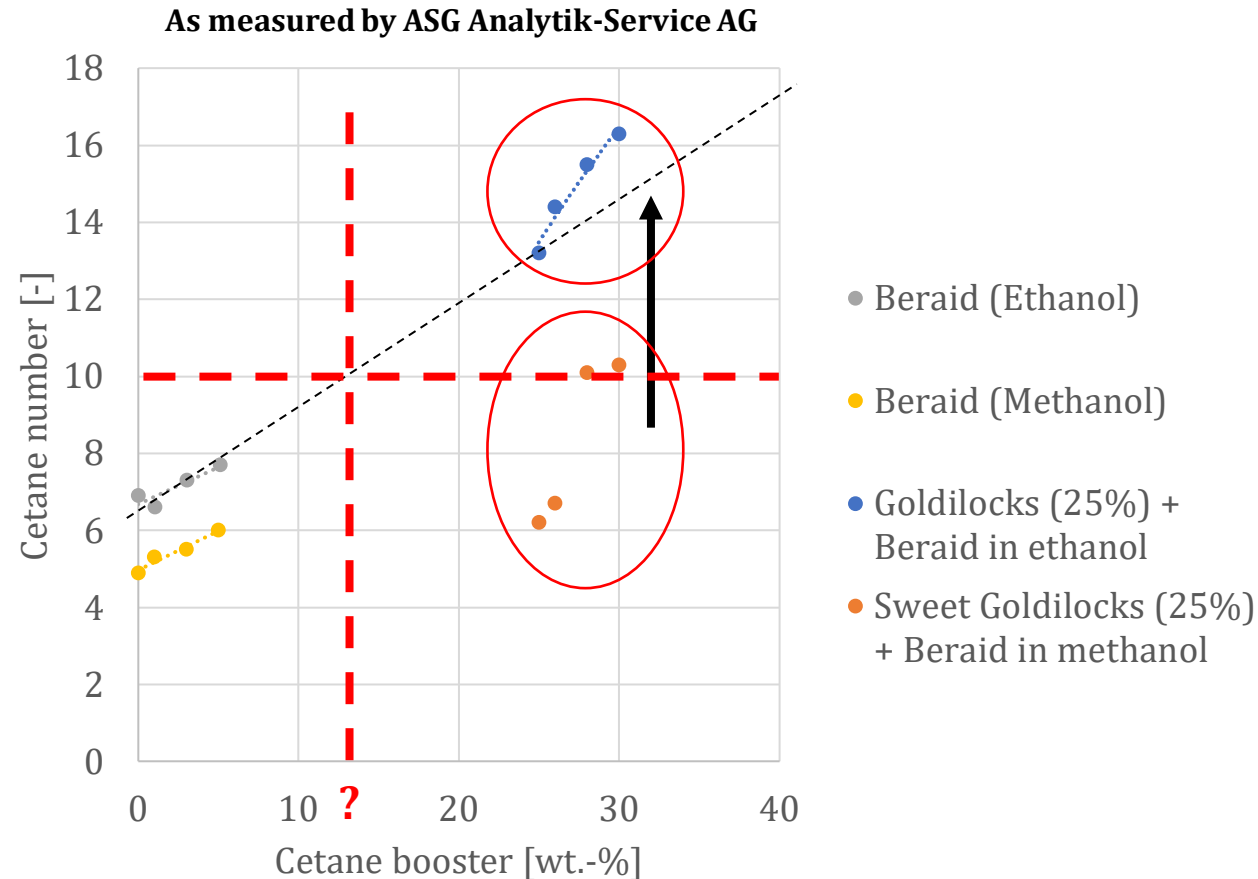
**Sugars (hemicellulose fragments) can be removed to produce Goldilocks® in (m)ethanol**

# First proof of concept sweet Goldilocks®



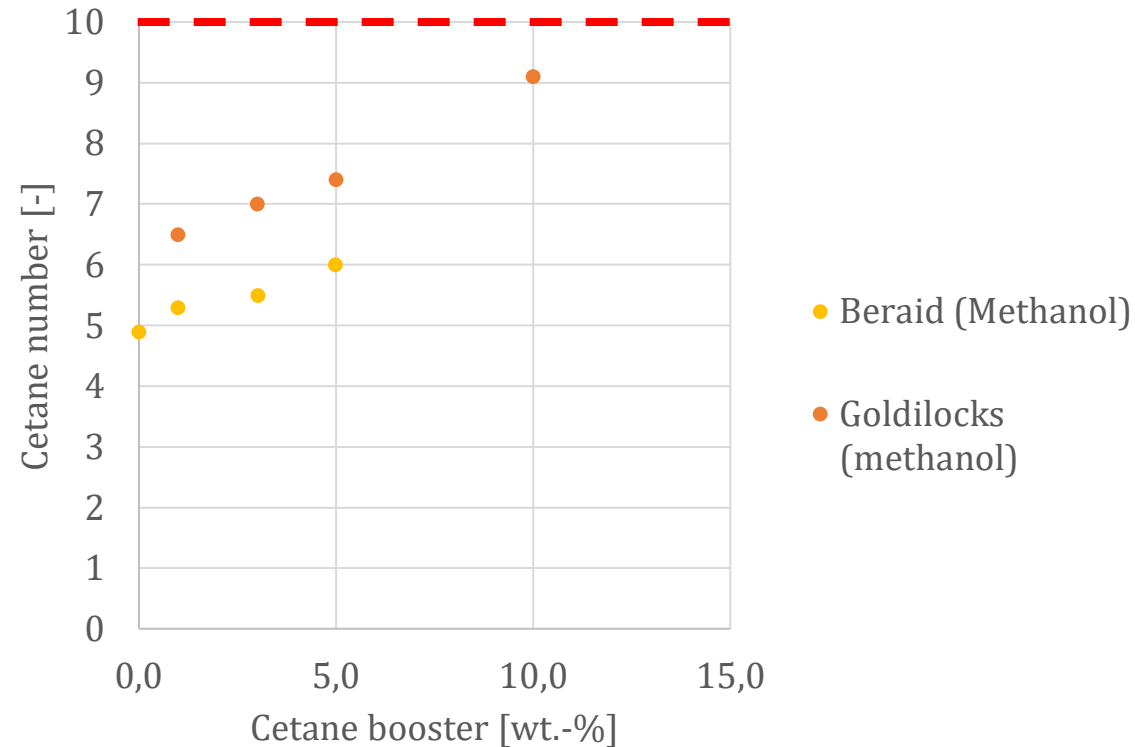
**25% sweet Goldilocks® has similar cetane boost as 5% Beraid® 3555M**

# Sweet Goldilocks® vs. Goldilocks



**Goldilocks® on same trend line as Beraid® 3555M cq. sugars drag down cetane**

# Goldilocks® vs. Beraid® 3555



**Goldilocks® shows similar performance as Beraid® 3555M in methanol**

# Scaling (sweet) Goldilocks® production

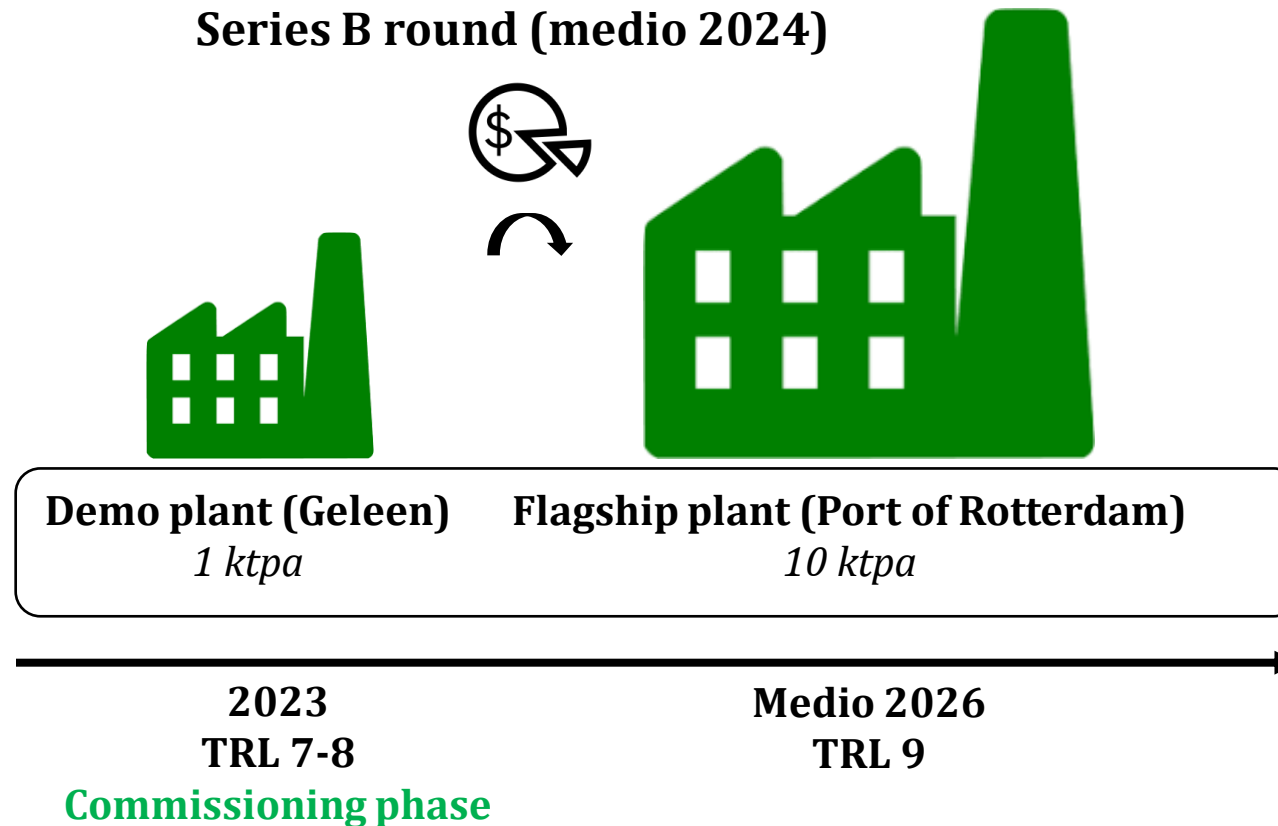
  
**USD 25+M**  
raised to date

 **MAERSK**  **SHIFT**

 **LI OF**  **Brightlands  
Venture  
Partners**

Series B round (medio 2024)



  
**Business Model**

BOO in EU

Licensing Globally

# Work in progress

- More concentrations of Goldilocks® in (m)ethanol
- New series of (2-stroke) spray combustion chamber trials
- Proof of concept Goldilocks® cetane improver for ammonia (NB lignin is highly soluble in ammonia)
- Impact of biomass feedstock type on cetane boost



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