Potential for Pyrolysis in the Marine market

WBA Webinar: Pyrolysis Oil markets and global supply

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Our GoodFuels DNA

Advanced sustainable fuel is the best option for reducing the carbon footprint of the following transport segments:

- Aviation
- Shipping
- Heavy road & Rail

NGO's support the fact that for these sectors, sustainable biofuels are the best option for reducing the carbon footprint significantly.
The GoodNRG Group

Downstream we focus on market development & sales, upstream our focus is on product development

**Upstream**
- Product development
- Sustainability development

**Downstream**
- Market development
- Sales and marketing

Feedstock → Conversion → Blending → Logistics → Market & sales
Marine biofuel market
European GHG targets and low-carbon fuel requirement

To meet EU targets, Europe will need 60 Mtonne of low-carbon marine fuel in 2050

**Base case scenario:** Emission factors fossil fuel mix developing according to IMO low-LNG scenario

**Biofuels combustion emissions:** 0 g CO₂/MJ, (Source: Kyoto protocol)

**European emissions share:** 19% 2010 -> 13% 2050 (Source EU/IMO projection)

**EU target:** 50% GHG reduction vs 2005 levels (Source: The Commission’s 2011 White Paper on transport)
Global vs Local drivers for marine biofuel market

Whilst global regulation is slow to be developed, some markets have already introduced favourable regulations enabling the introduction of low-carbon marine fuels.

**Global**

- **IMO**
  - Efficiency measures: EEDI & SEEMP
  - IMO’s definitive **GHG strategy** in 2023

- **EU**
  - MRV regulation starting in 2018
  - Potentially including shipping in **EU-ETS** in 2021

**Local**

- **RED extension**
  - Inclusion of shipping in **RED** scheme

- **Ship rating schemes**
  - Sweden has adopted the **Clean Shipping Index** as basis for their fairway and port duties

- **Procurement: Waterworks**
  - In **tenders** for government contracts in **waterworks** CO₂ reduction is given a value

- **Procurement: Public transport**
  - New ferry contracts have to **reduce** their carbon footprint by **25%**
Potential for Pyrolysis
Technology development

Each feedstock requires specific conversion and upgrading, leading to many possible pathways. The marine market offers a lower entrance quality option.
Case study: Lignin pyrolysis and upgrading

The marine market shows significant advantages over other markets for bio-crude valorisation

3 routes for pyrolysis products

1. Direct blending of bio-crude into marine fuel
2. Partial upgrading to marine quality
3. Full upgrading to road/aviation quality

Advantages marine vs road/aviation

- Lower H₂ requirement for upgrading
- Lower GHG footprint of end-product
- Higher yield
- Lower CAPEX and OPEX

Case study for Biobased Delta Zuid-Holland

- Fast Pyrolysis of lignin fraction from a biorefinery running on woodchips
- Location: Port of Rotterdam
- Natural gas used to replace lignin energy
- Bio-oil upgrading options:
  1. No upgrading
  2. Mild hydrotreatment with variable deoxygenation -> Marine fuel
  3. Full hydrotreatment and hydrocracking -> Automotive fuel
Results: Lignin pyrolysis and upgrading
Minimizing upgrading requirement leads to optimal financial and environmental performance

**Production cost**

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<th>Scenario</th>
<th>Hydro-treatment</th>
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<th>Residual oxygen %</th>
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ULSFO Current Price Level: ~11 €/GJ*

**Carbon footprint**

- Minimal upgrading leads to optimal techno-economic and environmental performance
Conclusions

- Shipping needs enormous amounts of low-carbon fuels for a sustainable future.
- Although global regulations are slow to be implemented, local conditions are already creating markets for low-carbon marine fuels.
- Pyrolysis fuels for marine application show significant advantages over other markets, both economically and environmentally.
- To develop these fuels, cooperation with relevant fuel standard setting bodies is needed (ISO/CIMAC).

Let’s start!
GoodFuels is part of the Pyrolysis cluster Moerdijk
EC-funded project with 4 pilot plants, 8 feedstock options, creating 30 value chains
Contact

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