Decarbonizing the shipping industry by introducing sustainable biofuels into the marine fuel-mix

GoodFuels

Oldenburg, June 12th 2018

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The Sustainable Fuel Company

Advanced biofuels applications

Advanced sustainable fuels are the best option for energy-intensive transport sectors like aviation, shipping and heavy road & rail transport.

Shipping

Aviation

Heavy Transport

Innovation

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GoodFuels position in the maritime fuel supply chain

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

Upstream

GoodFuels INNOVATION

- Product development
- Fuel standard development

Market pull

New products

Downstream

GoodFuels MARINE

- Market development
- Sales and marketing
- Tender desk

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What are sustainable biofuels?

Sustainable Marine Biofuels

Our current focus is on bio-derived hydrocarbons from **waste-streams**, that can be used as **direct replacement** in the existing fleet.

Environmental impact

compared to fossil MGO

75 - 90% CO_2 reduction

100% SO_x reduction
10% NO_x reduction
30% reduction of PM

** (Well-to-Propeller value)*

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Two different grades available

MD1

Waste-oil

- Used Cooking Oil (UCO)

MD2

Wood-based

- Crude Tall Oil (CTO)

EN 15940 for paraffinic diesel fuels

ISO8217: 2017 compliant

Drop-In fuel

Premium quality

Certified Sustainability

ISCC International Sustainability & Carbon Certification

RSB ROUNDTABLE ON SUSTAINABLE BIOFUELS

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GoodFuels MD1 and MD2 specifications vs ISO8217 (6th edition) DMA

As from the 6th edition, the scope of ISO8217 has been opened up to GoodFuels' bio-derived marine fuels. All MD1 and MD2 containing up to 50% renewable fuel fraction* are compliant with the global ISO8217 standard.

Characteristic	Min	ISO8217:2017-F-DMA	Max
Kinematic viscosity at 40°C, cSt	2	2.0 (MD1) … 3.7 (MD2)	6
Cetane index	40	>60	-
Density at 15°C, kg/m³	-	780 (MD1) … 815 (MD2)	890
Flash Point, °C	60	61 (MD1) … 80 (MD2)	-
Sulphur, max. weight-%	-	0.001	1.00
Acid number, mg KOH/g	-	<0.1 (MD2) … <0.5 (MD1)	0.5
Pour point, °C	-	< -6	*winter* -6
CFPP, °C	-	> -34 (MD1) … -8 (MD2)	-
Lubricity	-	375	520

*For all blends and even up to 100% marine biofuel, characteristics will meet the ISO8217 requirements. The only restriction on blending is that ISO8217 refers to hydrocarbons *predominantly derived from petroleum sources*, which implies at fuels should be at least for 50% of fossil origin.

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All our biofuels are 100% sustainable

Thanks to our independent sustainability board, and our ISCC & RSB certification, we offer complete transparency and protection for our clients reputation

Sustainability principles

- Waste and residue based
- No competition with food
- No direct or indirect land use change
- No deforestation or biodiversity loss
- No higher quality application possible
- Minimum 70% CO_2 reduction
- No negative social or legal impacts

Sustainability board

Barbara Bramble Prof. Martin Junginger Prof. Patricia Osseweijer

NGO partners

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Challenge Decarbonisation

2050 - 50%

Shipping will need to reduce its average carbon intensity by **more than** can be achieved through **energy efficiency interventions alone**.

– Report by UMAS, UCL & Lloyd's Register, 2016

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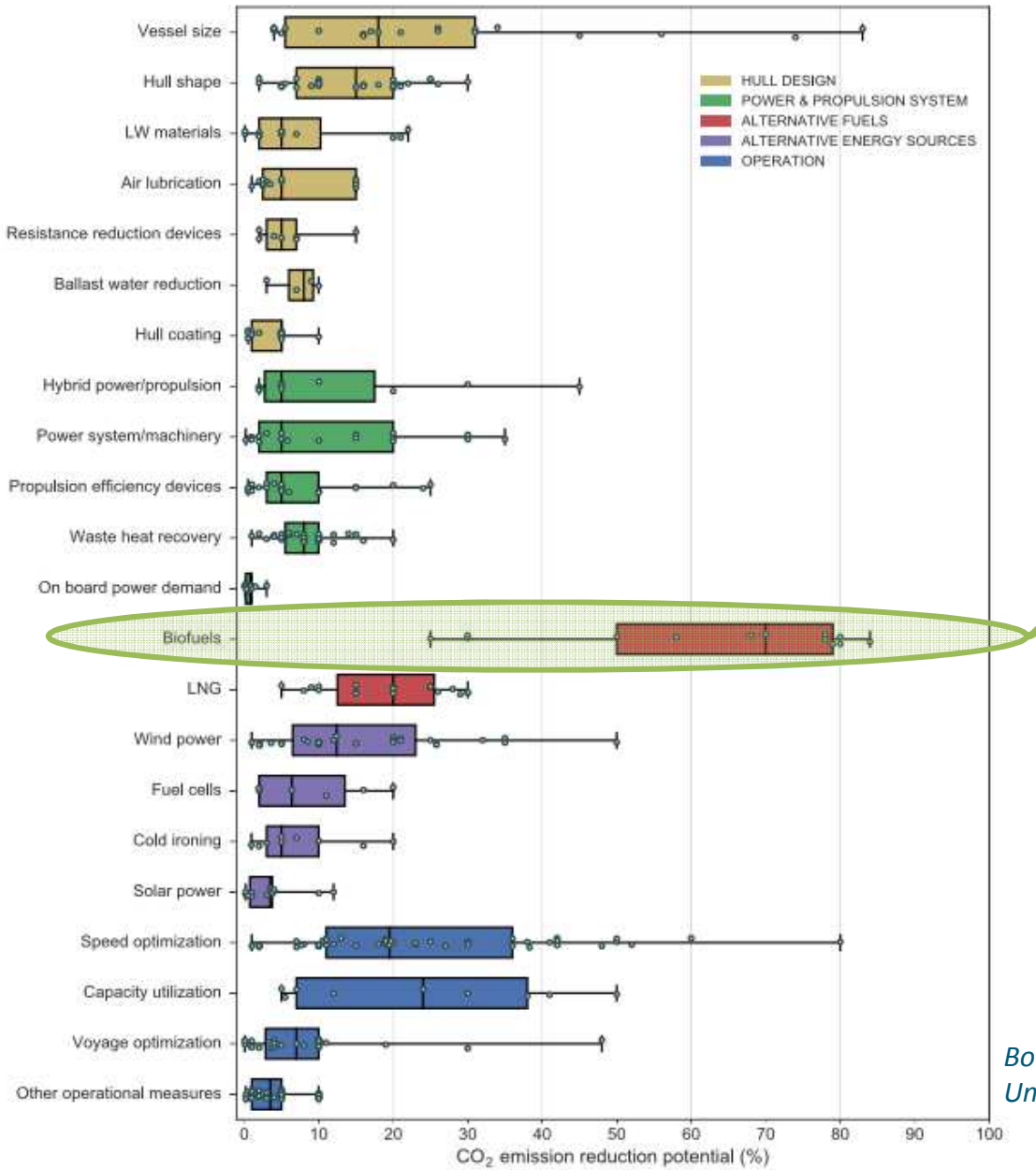
CO_2 reduction potential of different measures and technologies



Big untapped CO2 reduction potential

Bouman et al., NTNU Trondheim University, 2017

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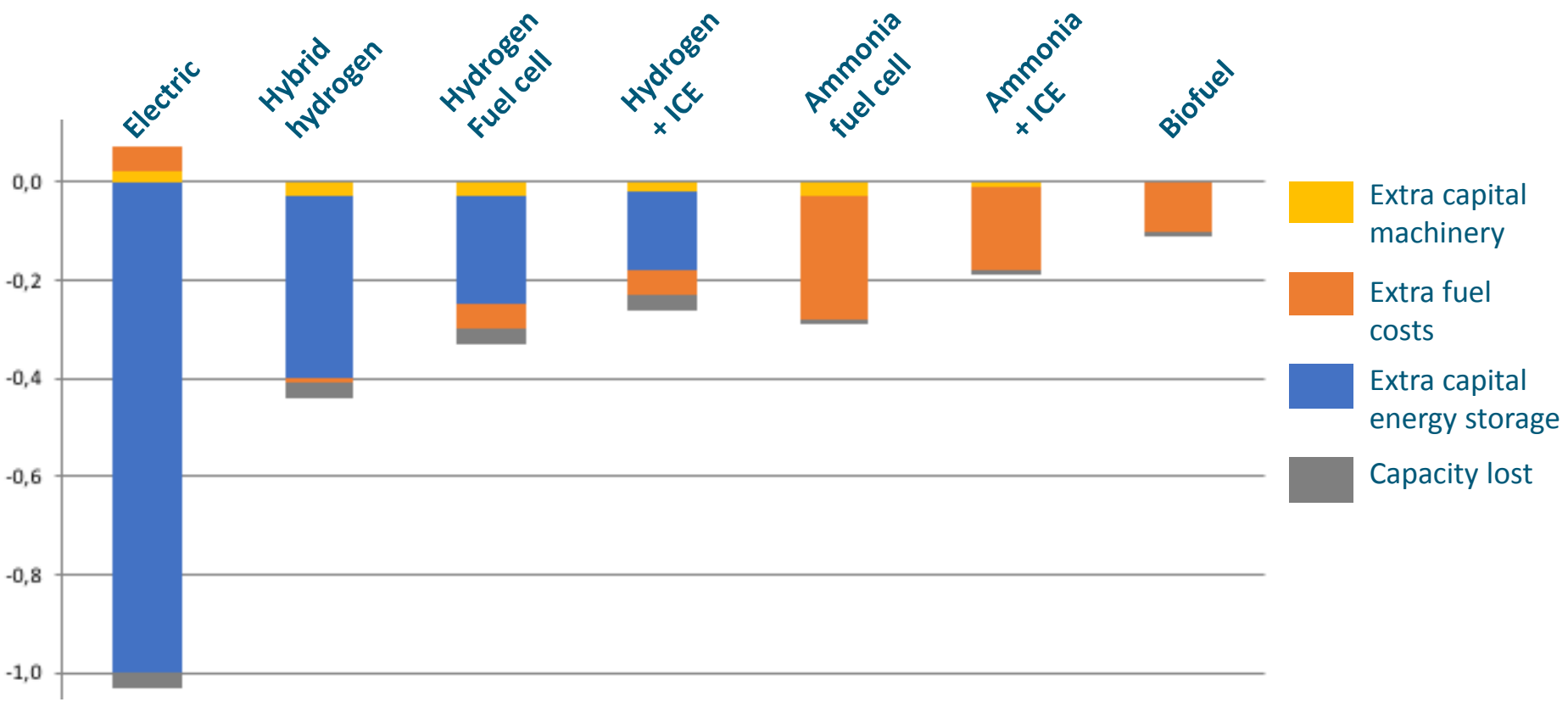
Zero emission options

Biofuel is the most cost efficient option for zero emission vessels in 2030

Relative profitability impact compared to:
9.000 TEU container vessel running on HFO + scrubber



Source: Lloyd's Register & UMAS Zero Emission vessels 2030: How do we get there?

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What does it take to integrate low carbon fuels in the marine fuel mix of the future?

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Typical marine biofuel projects & partners

Baggerbedrijf De Boer Dutch Dredging · Koninklijke Marine · Van Oord Marine Ingenuity · HEINEKEN · Nederlandse Kustwacht · Port of Amsterdam · MPA Singapore

CLEAN ENERGY NOW.
READY TO SCALE UP.
MAKE IT HAPPEN.

DHL Global Forwarding to be the first ocean forwarder offering advanced biofuel services

GoodShipping Program · DHL Global Forwarding

Port of Rotterdam · Boskalis · GoodFuels Marine · GoodFuels

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Back up

Government

Key actions

National

- Incentives equal to road fuels

Global

- GHG targets
- Carbon pricing mechanism

Shipping

Key actions

- Awareness & dedication
- Willingness to invest
- Offtake contracts

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Biobased

Key actions

- Develop marine fuel products
- Scale production
- Develop quality standards

Best Practice example for coastal shipping in Germany

Utilizing the competivie Advantage

Emden / Leer region

- German Greenshipping Hub
- Beneficial geographic location:

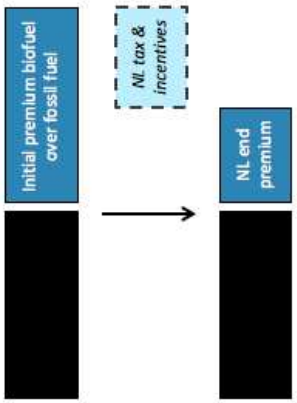
Price incentives Netherlands

- Shipping included in RED scheme
- Double accounting

no obligation but Opt-in → **obligated**

→ Bunkering in the Netherlands Reduces the Biofuel Premium

→ Geographical advantage for ship operators in den Ems region



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