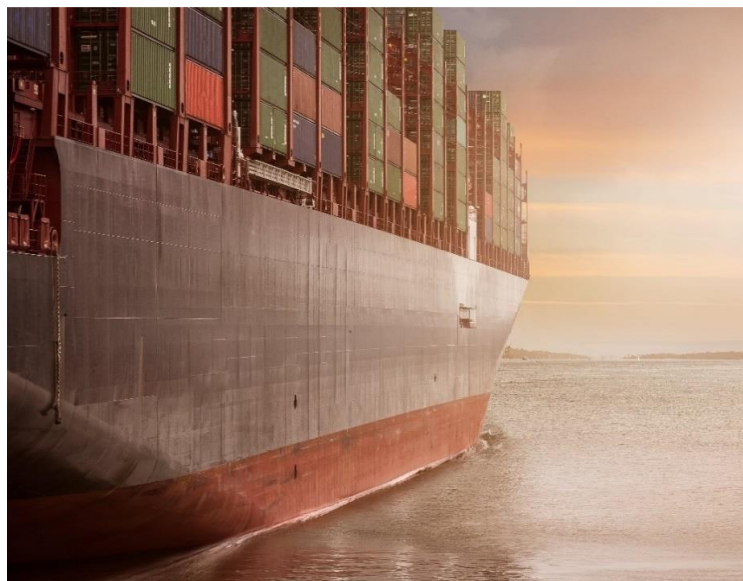
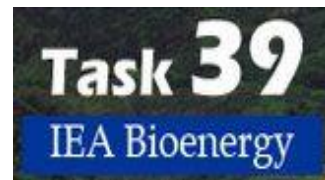




IEA Bioenergy
Technology Collaboration Programme



Biofuels in marine shipping report

Issues affecting utilization of advanced biofuels in the marine sector

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All the obvious reasons

- Biomass has the potential to fully supply the marine sector with sustainable fuel
- The marine sector accounts for for 2-3% of the global GHG emissions and is the largest source of anthropogenic sulphur emissions.
 - Liquid and gaseous biofuels is a promising solution for both reducing carbon emissions and meeting sulphur regulations
- There have been progress
 - in engine development, in sea-going biofuel trials of blends, as well as in 100% biofuel trials.
- The International Maritime Organization (IMO) has established targets to decrease the carbon intensity of the shipping sector by 50% in 2050,
- From 2020 IMO have restricted the maximum allowed sulphur content of marine fuels used in international waters from 3.5 wt.% to 0.5 wt.%.

No “silver bullet”...



- No major stakeholders is yet dedicated to any single future fuel option
 - Several strategies can be seen in the marked.
- Drop-in-fuels, require close to no adaptation on engine and fuel systems
 - Challenged by low supply and high production cost.
- Emerging biofuels such as biocrude, alcohols, emulsion fuels, and gaseous fuels are all able to be produced from sustainable sources and with low carbon intensity.
 - Challenged by the lack of infrastructure and compatibility issues with the main part of the existing engines and fuel systems.
- A solution for shipowners, is to show more adaptability and flexibility to the changing fuel market by retrofitting their vessels with dual-fuel and multi-fuel engines
 - Designed to use a range of different types of fuels including alcohols, RNG and other low-flash fuels as well as traditional MGO.

Sustainability criteria uncertainty

- Changes in regulatory framework defining fuel sustainability and the lack of an internationally recognized and utilized sustainability standards.
 - Europa has especially been experiencing shifting legislations (RED I in 2009, ILUC Directive in 2015, RED II in 2018).
- The fluctuating sustainability criteria creates uncertainty on the development of future markets
 - Obstructing the investment potential of sustainable fuel technologies.
 - Change in public perception of what is considered sustainable.
- In order to facilitate the big investments needed to be biofuel-ready (on engines, fueling, infrastructure etc.), **long-term** stability of policies and framework conditions are needed.
 - Further, international agreements and uniformity within these criteria will help reduce risks and stabilize the development within the sector.



Marine fuel standard incompatibility

- The complexity of biofuels associated with the wide range of feedstocks and production processes makes it challenging to include it in the current ISO 8217/2017, and is thus a barrier that needs to be overcome.
 - The recent IMO interim guidelines on using ethanol and methanol as marine fuels shows a path for alternative fuels and makes low-flash alcohol biofuels more attractive for ship owners.
- Some major stakeholders have initiated large R&D efforts in different biofuels, but not all players in the marine sector can be expected to follow their examples, and thus a general investment in R&D, trials in engine and fuel systems, and sea-going trials of emerging biofuel technologies are essential.

Economic incentive and the lack of targeted policies

- The overall costs (\$US/MJ) of fossil energy sources remain cheaper than biobased alternatives
 - the majority of the interviewed stakeholders identified lack of targeted policies such as a renewable fuel mandate, carbon taxation or subsidies, as essential to overcome the barrier.
- A clear need for international policies
 - Taking emissions from fuels burnt in international waters into account (how to factor in the costs of these emissions)
 - An increase of freight prices following the current discussions on carbon equalization pricing covering the emissions associated with the transportation, could be an important tool towards achieving this.
 - Lately we have seen many stakeholders across the value chain advocating for international carbon pricing.



Positive winds

- Many stakeholders are already showing great ambitions, enthusiasm, and climate-responsibility by being first movers in the field.
- The role of these initial actions towards transitioning the marine sector should not be underestimated!
- The next important task is to accelerate the development by **lowering the investment risks** related to sustainable biofuels for marine propulsion.
 - Involve de-risking fuel pathways through continued R&D of potential pathways, development of appropriate standards, and enabling suitable policies



Thank's

Progress towards biofuels for marine shipping

Status and identification of barriers for utilization of advanced biofuels in the marine sector

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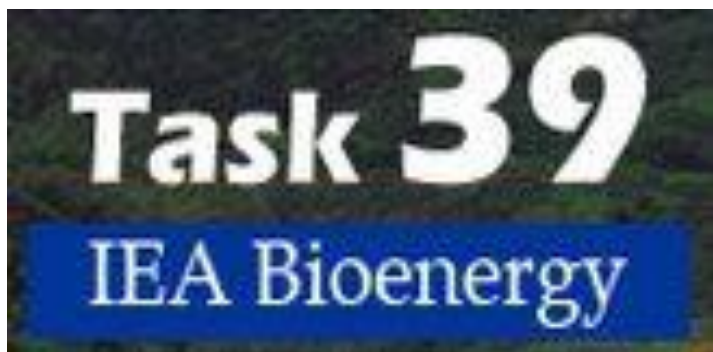
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IEA Bioenergy: Task 39



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...and Steve, Paul, Dina, the task leadership, etc.



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