IEA-Advanced Motor Fuels
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Task 60

Technology Collaboration Programme
by IEA

Task 60: The Progress of Advanced Marine Fuels

Project Duration	November 2019 – November 2022
Participants **Task sharing** **Cost sharing**	 Austria, Canada, China, Denmark, Finland, Korea, Sweden, Switzerland, and USA Methanol Institute, USA
Total Budget	EUR 1,795,000 (USD 1,980,700)
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Purpose, Objectives, and Key Question

In 2013, AMF released its first Task report on marine fuels (Task 41). This report highlighted the fact that no alternative fuel option existed without significant added cost or other serious impediments. The preferred fuel, HFO, was soon to be banned or restricted due to its high sulfur and fossil carbon content. Recent developments, however, have highlighted several new fuel options that should be assessed.

Task 60 seeks to answer the key question: How can new forms of advanced marine fuels contribute to carbon-neutral shipping in the future?

Activities

The last 4 of 10 virtual meetings were held in 2022. USA, China, Austria, and Korea were the main presenters at the meetings.

Key Findings

Following are highlights of the four main presentations held in 2022:

- **USA** reported that all work in engines and fuel is being redirected towards hard-to-decarbonize sectors. New programs will be built up to make low-carbon fuels available at U.S. ports. Adding marine vessels to the GREET® model is another focus point. Past focus has been on bio-intermediates, HTL, pyrolysis, and biocrudes. Some biofuels don't blend very well due to water content. Upgrading is necessary to make miscible blend stocks. An extensive corrosion study has been performed. The results look promising for blends of up to 50%. Acid numbers should be kept low. Good ignition was obtained with 5% biocrude. Biodiesel shows good results up to 25%. In higher blends, viscosity is reduced. Cetane increases with biodiesel. Oak Ridge National Laboratory also made a digital twin of a 2-stroke research engine. By 2050 a substantial amount of residue will come from sustainable aviation fuel (SAF) production, which could then be used for marine fuels. The GREET model, developed in 1995, calculates GHG, air pollution, and water and energy use for many fuels and is widely used for policy development. About 17 marine fuels have been covered so far. Novel pathways are catalytic fast pyrolysis of wood, landfill gas synthesis, HTL, and lignin-ethanol. A recent paper published WTH emissions of various marine fuels. Many of the new fuels have lower sulfur content than traditional marine fuels. The next paper to be published will deal with novel pathways from sludge and manure, CFP, and HTL. A carbon abatement cost below 200 \$/tonCO_2 is possible.
- **China** presented a finished report titled "Assessment of Progress on Methanol Technology and Infrastructure for Fishing Vessels and Watercraft." The report details the Chinese fleet of fishing vessels and the potential for converting these to methanol fuel.
- **Austria** presented the HyMethShip project and the hydrogen-methanol propulsion concept with an onboard pre-combustion CO_2 removal system. They also presented a life cycle cost study of different marine fuels with potential impacts of a 150 EUR/ton CO_2 tax. Finally, they presented the LEC ENERsim energy systems optimization tool with a case for a marine power system.

- **Korea** presented ammonia dual fuel approaches with gasoline and diesel internal combustion engines along with combustion properties, transport, and storing systems for ammonia.

Publications

A final report of Task 60 will be available during the first half of 2023 and can then be downloaded on the AMF TCP website: https://www.iea-amf.org/content/projects/map_projects/60.