




BEST

Bioenergy and
Sustainable Technologies



 Bundesministerium
Arbeit und Wirtschaft

 Bundesministerium
Klimaschutz, Umwelt,
Energie, Mobilität,
Innovation und Technologie



 Für die
Stadt Wien



Advanced Biofuels Overview

Hybrid Seminar Prospects for Pyrolysis Oil as
Advanced Biofuel in Shipping and Aviation, 24.11.2022

DI (FH) Andrea Sonnleitner

My background

- BEST – Research centre in Austria
- Sustainable Supply and Value Cycles
- Unit Biofuels

- IEA Bioenergy Task 39
- Biofuels to Decarbonize Transport
- National Delegate for Austria



fossil carbon free
heat, power, gas and
transportation fuels



economic and
efficient renewable
energy systems

**Next generation
biofuels**



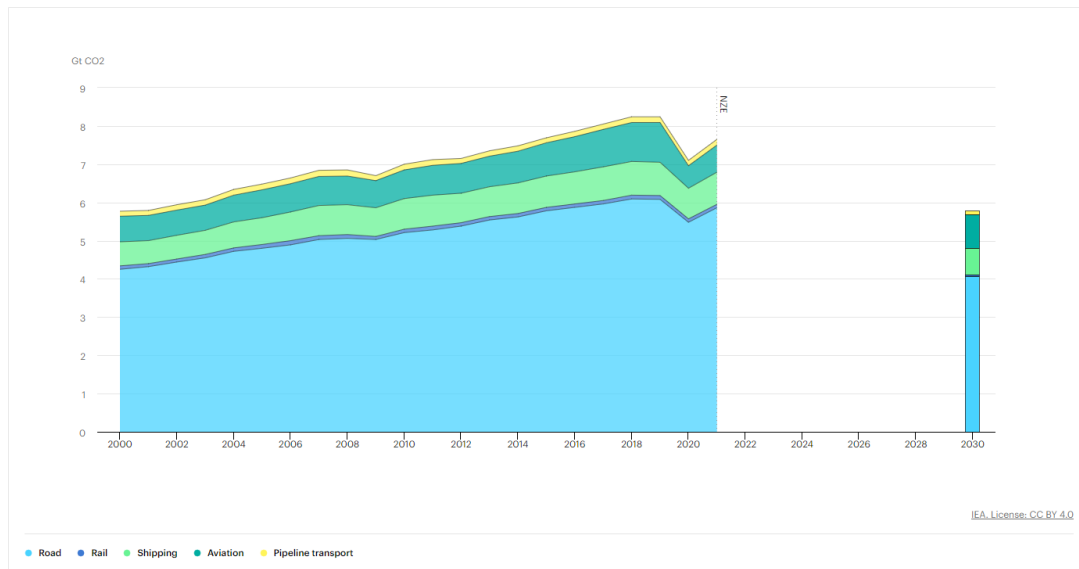
IEA Bioenergy
Technology Collaboration Programme



Task 39: Biofuels to decarbonize transport

24.11.2022

IEA, Global CO₂ emissions from transport by sub-sector in the Net Zero Scenario, 2000-2030

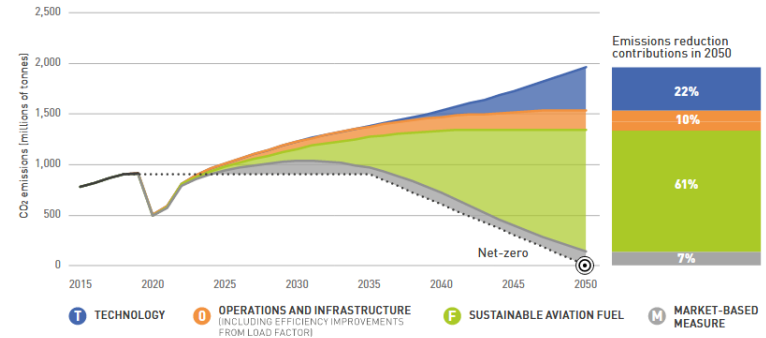


- Aviation Sector
 - 2-3 % of global CO₂ emissions
- Shipping Sector:
 - 2-3 % of global GHG emissions
 - Largest source of anthropogenic sulphur emissions

<https://www.iea.org/data-and-statistics/charts/global-co2-emissions-from-transport-by-sub-sector-in-the-net-zero-scenario-2000-2030>

Regulations and targets – Aviation Sector

- **ReFuelEU** proposed volumetric mandates for SAF – 2% in 2025, 5% in 2030, 20% in 2035, 32% in 2040, and 63% in 2050
- **Inflation Reduction Act (USA)** proposed blenders tax credit
- Aviation sector committed to achieve **CO₂-neutral growth from 2020** (2050 maximum GHG emissions of 325 million t CO₂)
- International Air Transport Association IATA goal **reduction in net aviation CO₂ emissions of 50% by 2050**, relative to 2005 levels



Waypoint 2050 – Air Transport Action Group
https://aviationbenefits.org/media/167418/w2050_v2021_27sept_summary.pdf

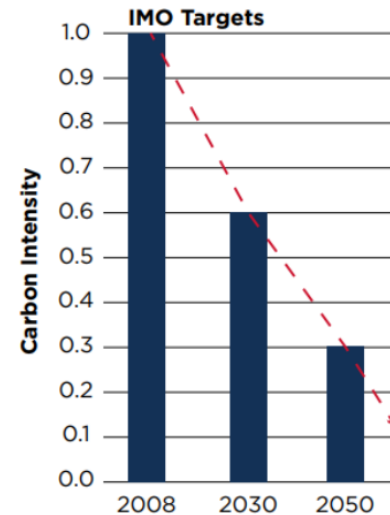
Regulations and targets – Shipping Sector

Overall GHG emission targets

- US Renewable Fuel Standard
- European Green Deal

International Maritime Organisation (IMO) targets:

- Reduction of carbon intensity by at least 40 % in 2030 and 70% in 2050
- Reduction of total GHG emissions by at least 50 % in 2050
- Since 2020: Maximum Sulphur content of 0.5 wt%



Sustainable marine and aviation fuels

- Use in maritime engines less than 0.1 %
 - Alternative fuels include HVO, Biogas, ethanol, methanol, hydrogen, ammonia, electricity
- Current volumes of Sustainable Aviation fuels less than 1 %
 - Most SAF oil based, but large volumes need to be based on more abundant feedstocks
- Challenges:
 - High production costs
 - Availability of feedstock and sustainability
 - Uncertainties regarding the legal framework
 - Low supply - Number of facilities → Scale-up and Commercialisation → **Demonstration**

Production technologies for advanced (bio)fuels

Fully commercial	HEFA (Hydrotreated esters and fatty acids) technologies	Coprocessing
Next commercial	Gasification and Fischer Tropsch Synthesis	Alcohol-to-Jet
Emerging technologies	Pyrolysis and Hydrothermal liquefaction	Power-to-Liquid

- Drop-in Fuels
- Certification (f.e. 9 certified SAF pathways)
- Feedstock and Technology → GHG emissions, production costs

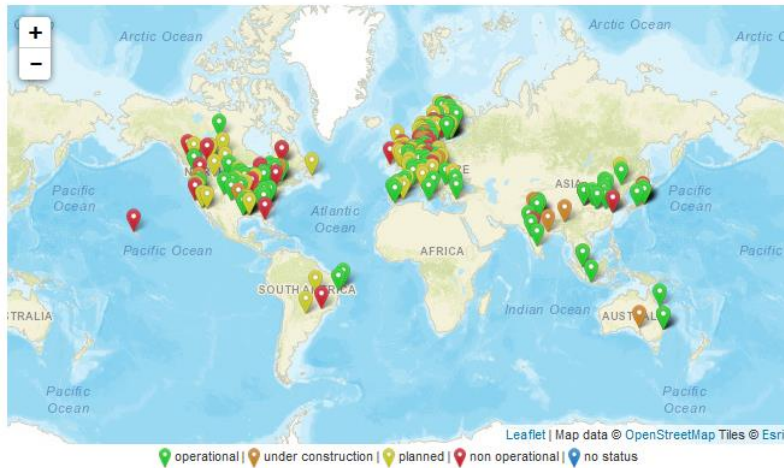
Worldwide production and demonstration facilities

This database has been elaborated and is maintained by



Database on facilities for the production of advanced liquid and gaseous biofuels for transport

Task 39
 IEA Bioenergy



<https://demoplants.best-research.eu/>

Type

- TRL 1-3 Research
- TRL 4-5 Pilot
- TRL 6-7 Demonstration
- TRL 8 First-of-a-kind commercial
- TRL 9 Commercial

Raw Material

- agricultural residues
- biomass / biomass coal blends
- forest residues
- lignocellulosics
- oilcrops, oils and fats
- organic residues and waste streams
- other
- sugar and starch crops
- waste gases

Technology

- Alcohol-to-jet
- E-Fuels Biomass Hybrids
- Fast Pyrolysis
- Fermentation
- Gasification
- Hydrothermal Liquefaction
- Hydrotreatment
- Lignin Depolymerisation
- Other Technology

Output

- bio-oil
- biogas
- butanol
- clean syngas
- diesel-type hydrocarbons
- diesel with biogenic content
- DME
- ethanol
- FT liquids
- gasoline-type fuels

Status

- planned
- under construction
- operational
- non operational
- cancelled
- idle
- on hold

- heat
- hydrogen
- isobutene
- methanol
- other
- power (electricity)
- pyrolysis oil
- renewable diesel (HVO)
- SNG
- sustainable aviation fuels SAF

Advanced biofuels for Shipping and Aviation

- essential for GHG emission reduction
- Demonstration and scale-up necessary
- Drive commercialization forward
- Reduction of costs
- Consistent policy important
- No silver bullet – we need every single technology



Decarbonisation of maritime and aviation transport

More information and details:

IEA Bioenergy Task 39 reports published in 2021:

- Progress in Commercialisation of Biojet/Sustainable Fuels (SAF):**
 Technologies, potential and challenges
- Progress towards biofuels for marine shipping:**
 Status and Identification of barriers for utilization of advanced biofuels in the marine sector

<https://task39.ieabioenergy.com/publications-new/>





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