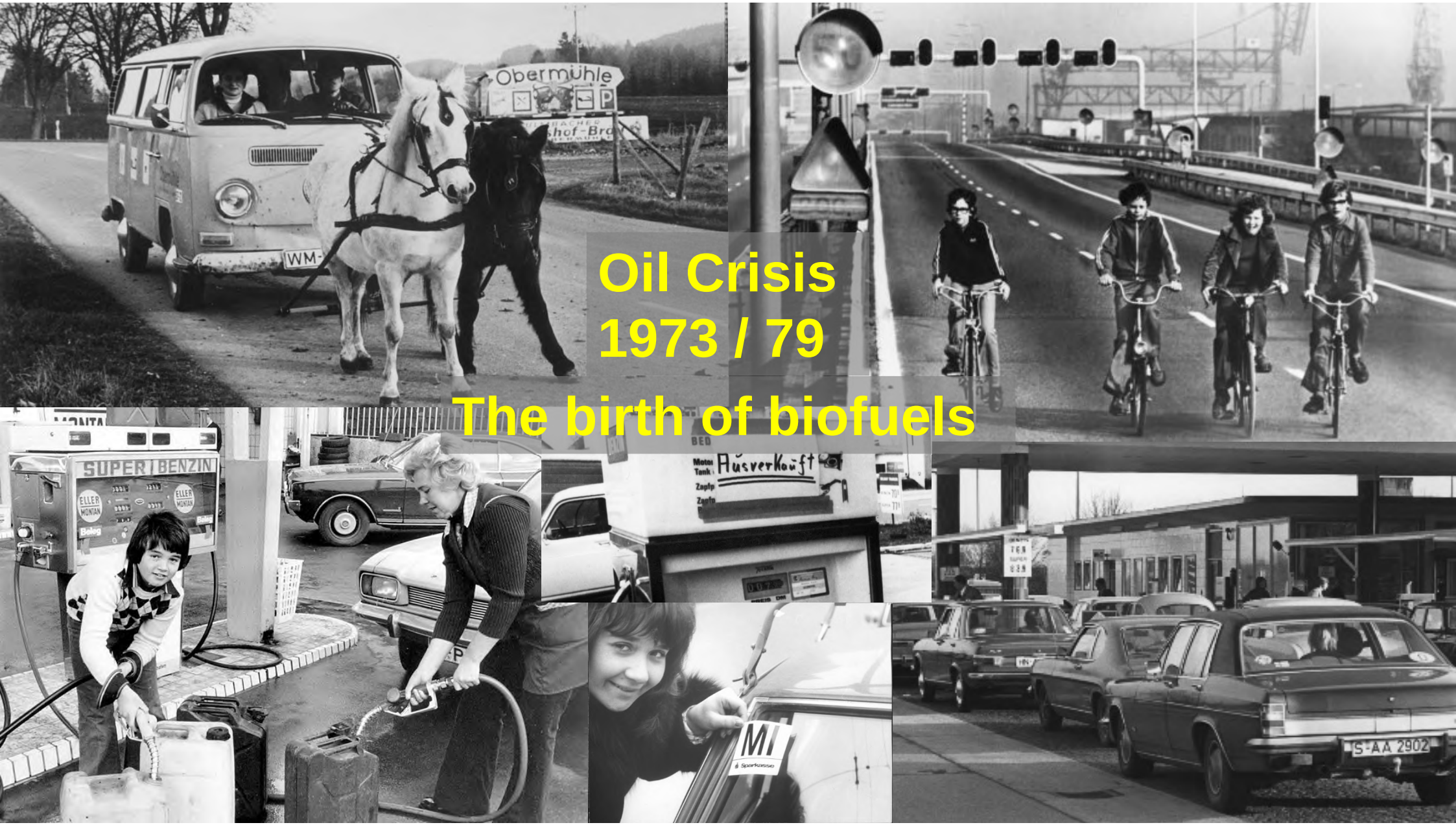
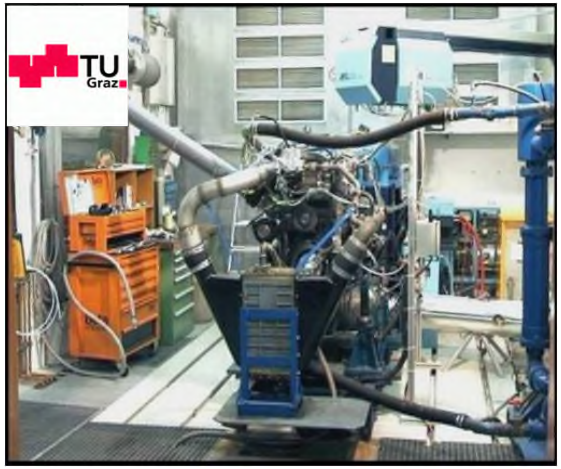
Is there still room for biomass-based biofuels in the defossilisation of the transport sector?

Edgar Ahn, CIO; BDI Holding GmbH



Oil Crisis
1973 / 79
The birth of biofuels

Austria being the forerunner in biodiesel



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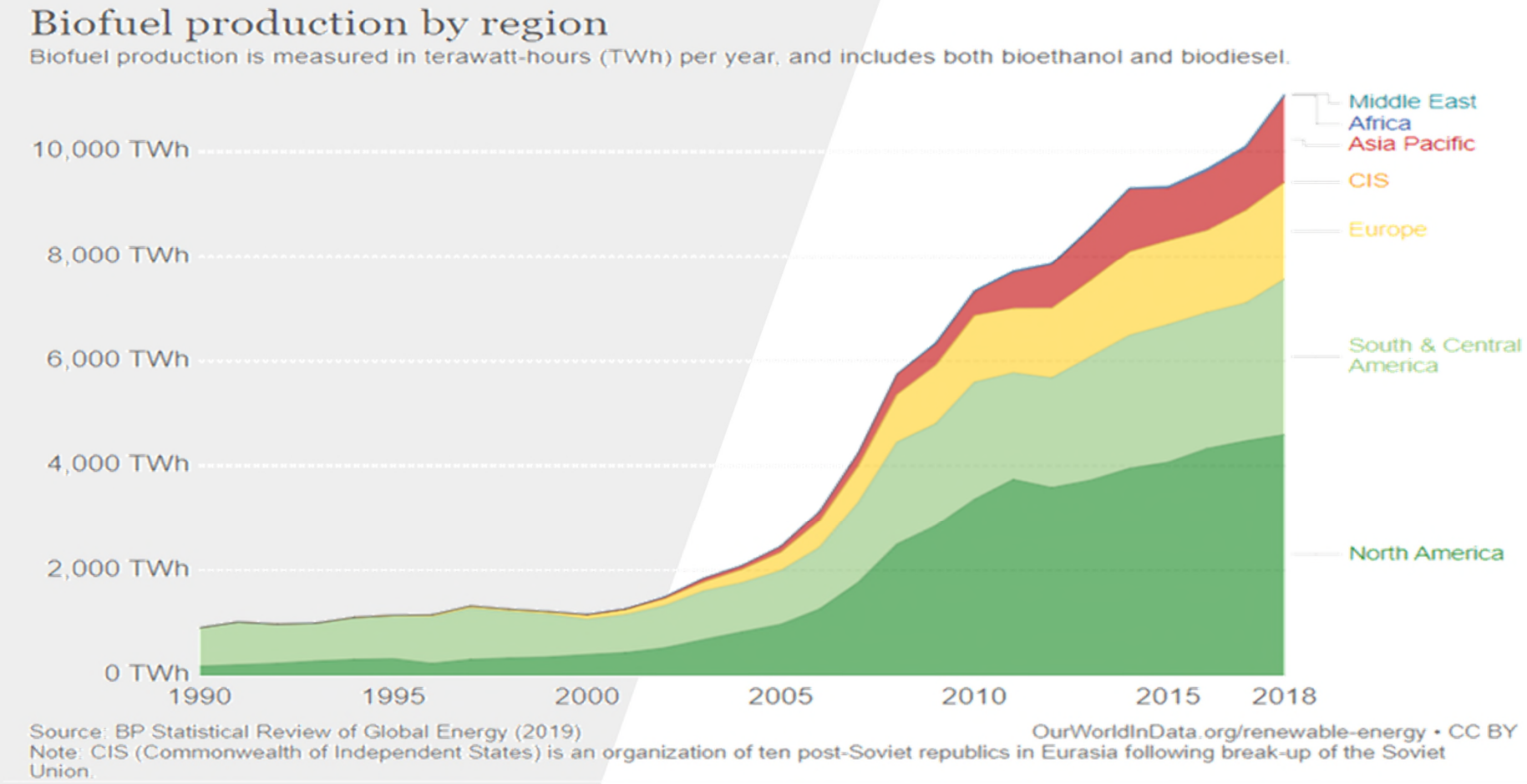
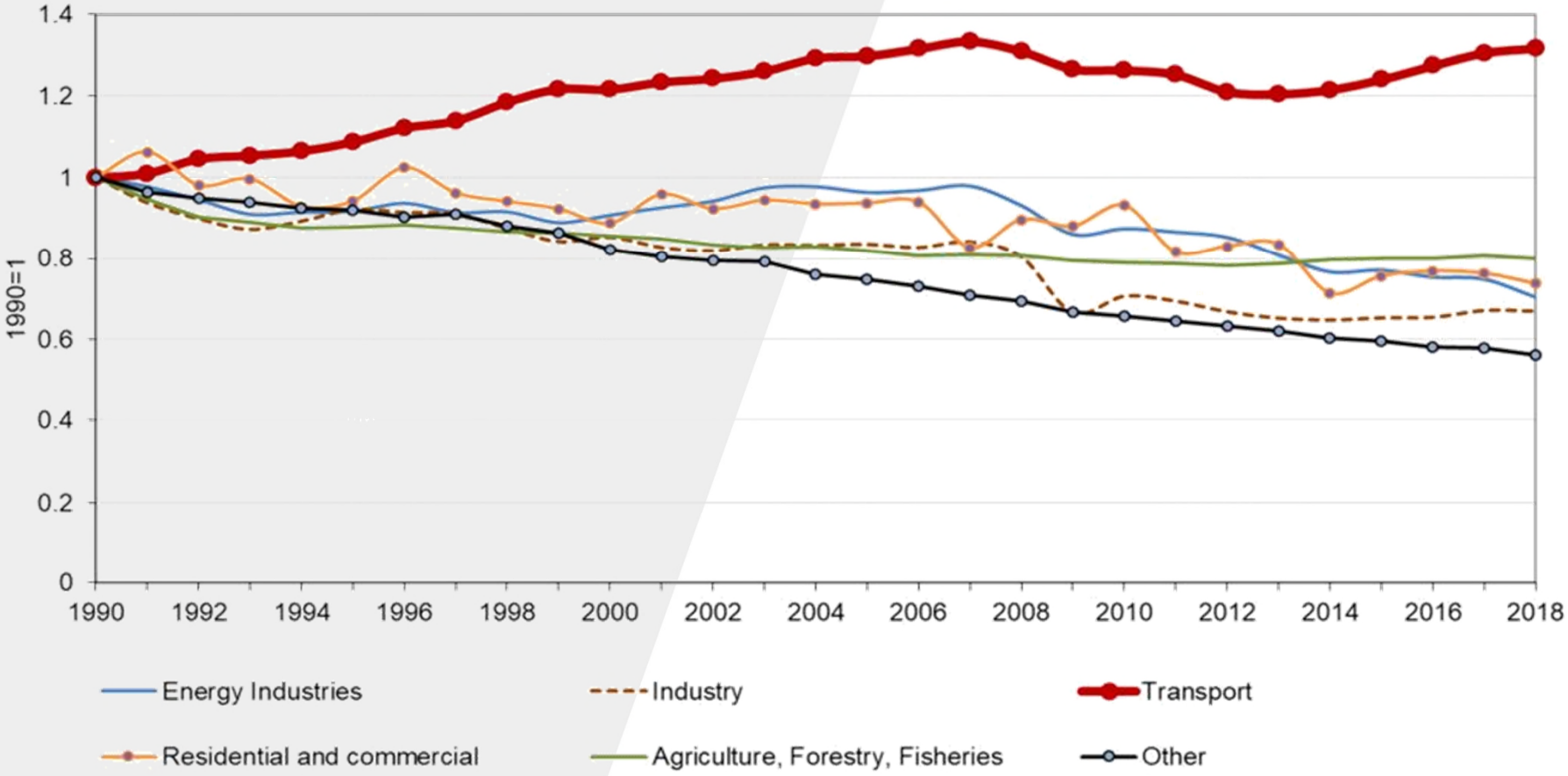
Rise of biofuels production in the world



Development of GHG-Emission in EU 27



Source:
A.Ajanovic; energies, 2021,14,1070

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European Green Deal

2015 **COP21 in Paris ➔ +1.5°C goal**

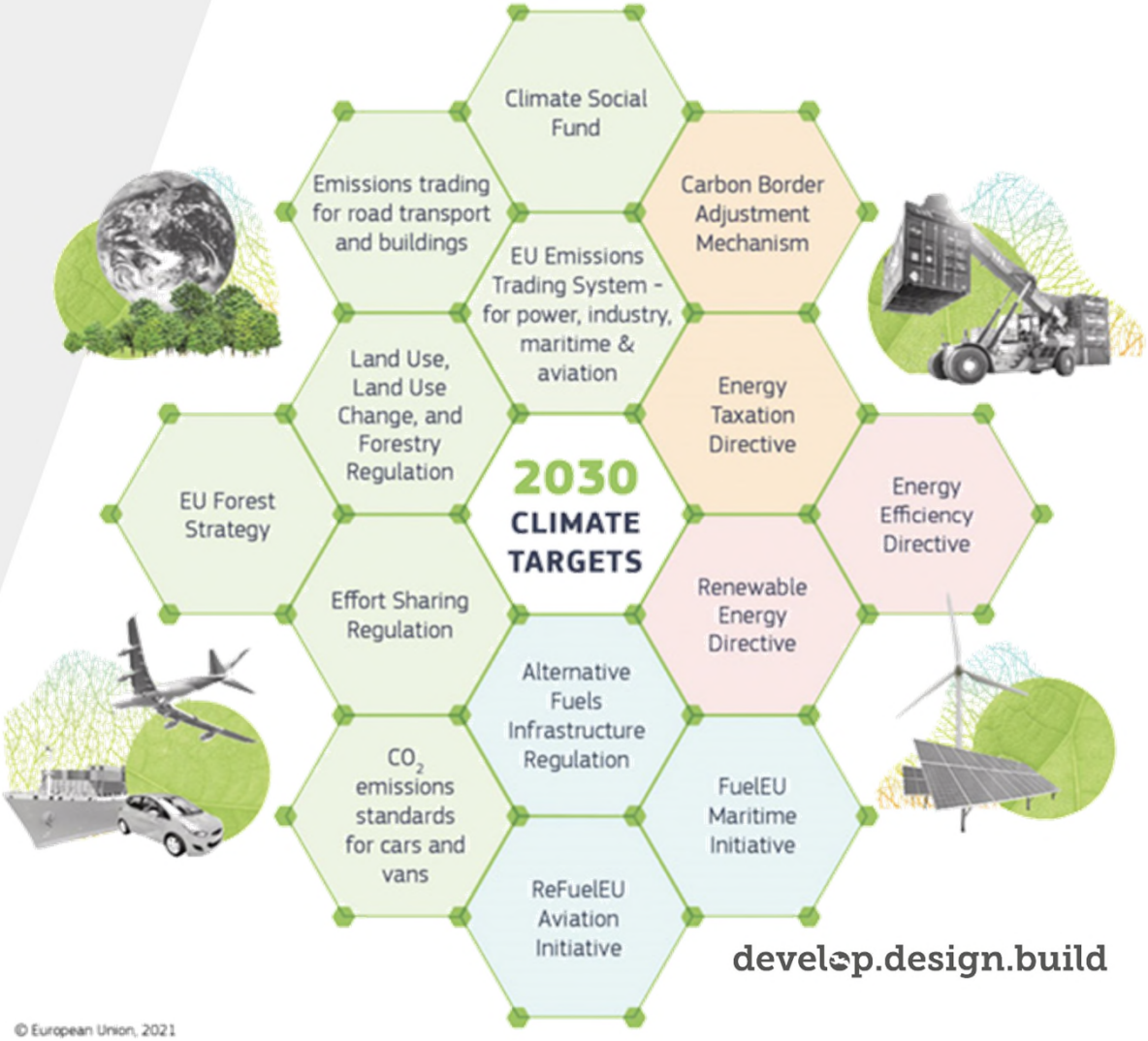
12.2019 **Green Deal announced**

06.2021 **European climate law**

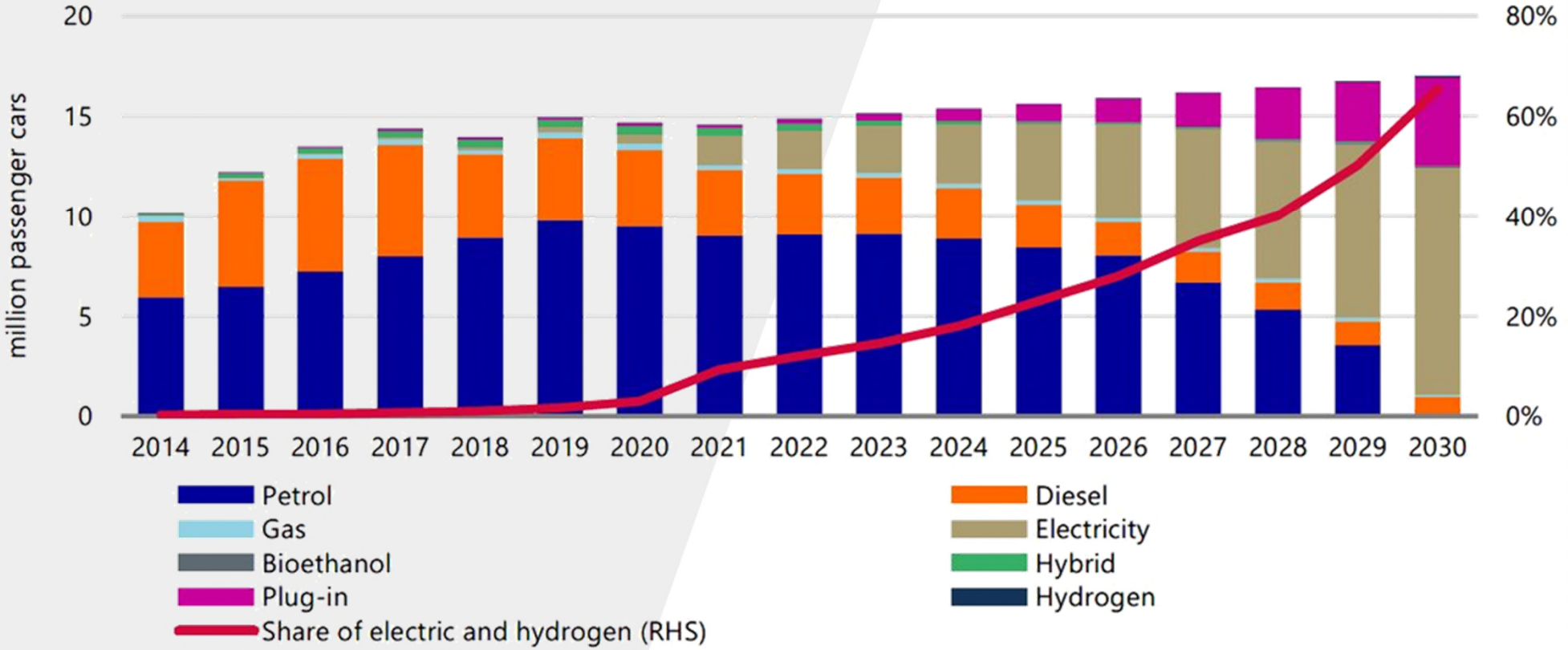
07.2021 **„Fit for 55“ package, under negotiation with EU Parliament & EU Council**

Regulations concerning transport:

- **ETS System**
- **RED III**
- **ReFuelEU Aviation**
- **FuelEU Maritime …**



New car registration, 2014 – 2030



Source:
RaboResearch, 10-2021; Eurostat 2021

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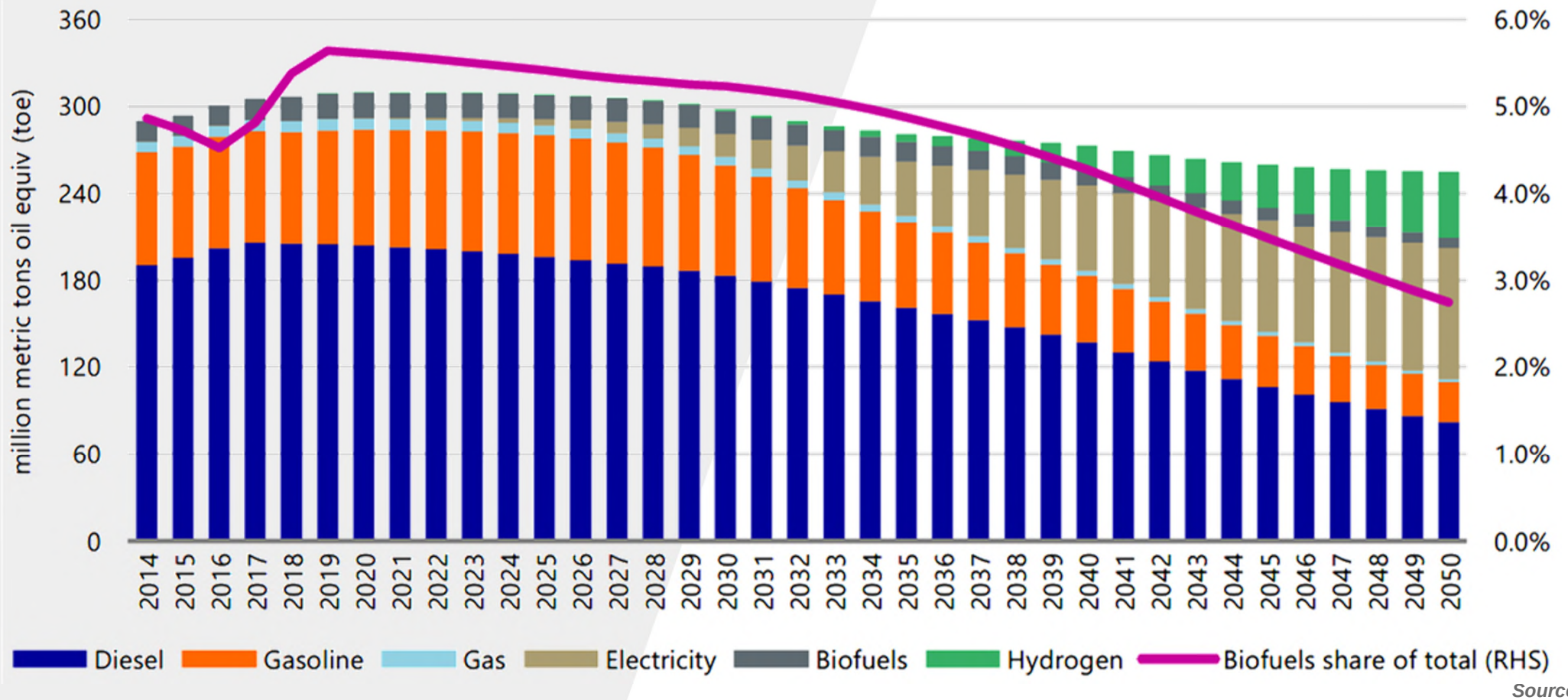
EU fuel demand forecast, 2014 – 2050



Source:
RaboResearch, 10-2021; Eurostat 2021

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Biofuels in road transport – RED III

REDIII	Proposals
Overall RES Target	40% / 40% – 45%
Transport Target	13% / 13% – 16% GHG reduction
Crop based biofuels (e.g. 1st Gen. Bioethanol / biodiesel)	2020 share + 1%, max. 7%
Biofuels & biogas based on RED-Annex IX Part B (UCO, animal fat cat.1 & 2)	max. 1.7% in 2030, but can by increased by MS subject to EC approval
Advanced biofuels & biogas based on RED-Annex IX Part A (e.g. algae, tall oil, ligno-cellulosic biomass, etc.)	binding min. 0% – 0.2% / 0.2% in 2022, 0.5% / 0.5% – 1% in 2025, 2.2% / 2.2% – 4.4% in 2030
Renewable fuels non-biological origin (RFNBO; e.g. H_2, e-fuels, PtL, ...)	min. 2.6% in 2028; 2.6% – 5.2% – 5.7% in 2030
B10	allowed but B7 protection grade until 2030

Explanation: red = EU Commission; green = EU Council; blue = EU Parliament; black = agreed

Biofuels in aviation – ReFuelEU aviation

ReFuelEU Aviation	Proposals
Sustainable Aviation Fuel (SAF) Target	2% in 2025, 5% – 6% / 6% in 2030, 20% in 2035, 32% / 32% – 37% in 2040, 38% / 38% – 54% in 2045, 63% / 63% – 85% in 2050
Synthetic fuels (RFNBO)	0% / 0% – 0.04% in 2025, 0.7% / 0.7% – 2% in 2030, 5% in 2035, 8% / 8% – 13% in 2040, 11% / 11% – 27% in 2045, 28% / 28% – 50% in 2050
Feedstock base	Annex IX A and B biofuels; all biofuels which comply with REDII sustainability criteria with the exception of biofuels produced from „food and feed crops“, recycled carbon fuels; intermediate crops, palm fatty acid distillate and all palm and soy-derived materials, and soap stock and its derivatives - until 31.12.2034

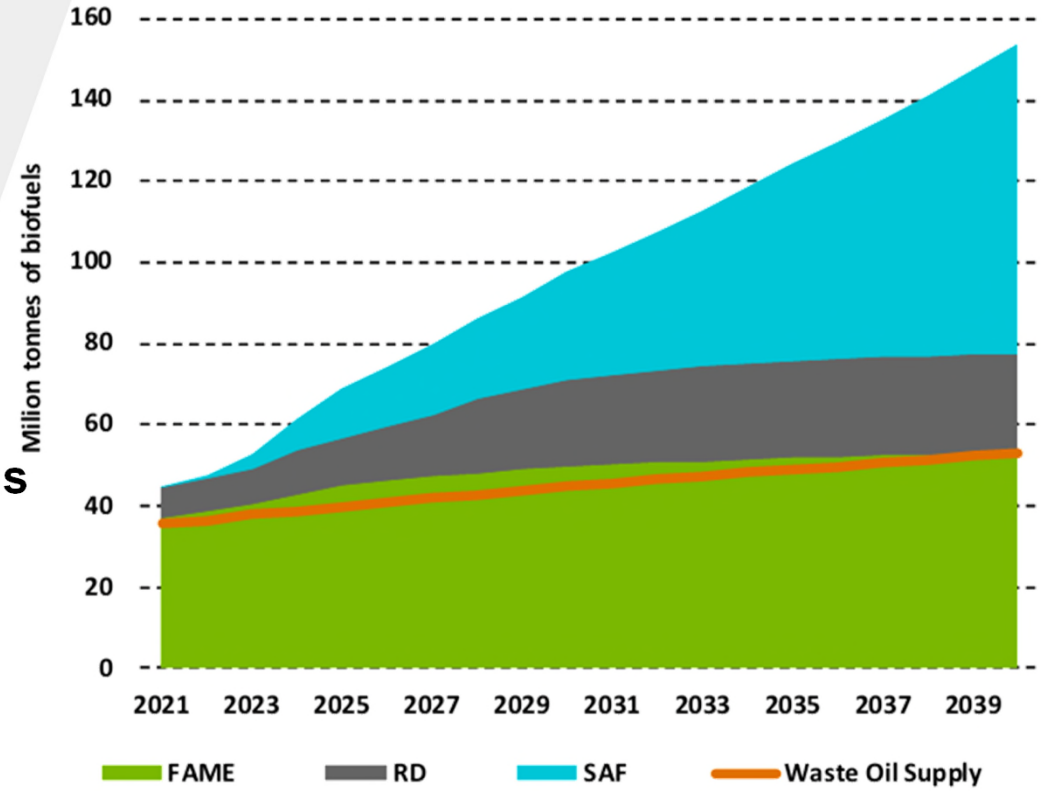
Explanation: red = EU Commission; green = EU Council; blue = EU Parliament; black = agreed

Lipid-based biofuels vs waste oil supply

- BF-production$_{2021}$ reaches 45 Mio. tons
  (38 Mio. tons FAME, 7 Mio. tons RD)
- Food oils account for 2/3 of feedstock
- Demand$_{2040}$ will reach 150 Mio. tons
  ➔ mainly through SAF
- Waste oil supply will reach only 53 Mio. tons

  ➔ „fight for waste oil feedstock“

  ➔ short-fall will need to be met with novel feedstocks & new technologies (BtL, CCU)



Source:
LMC International, 10-2022

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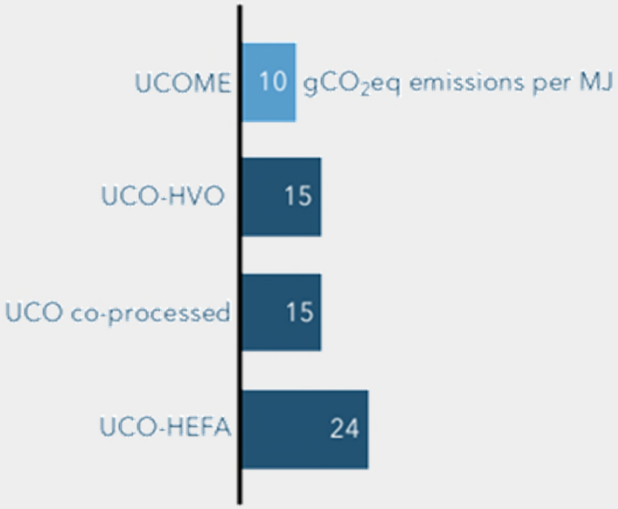
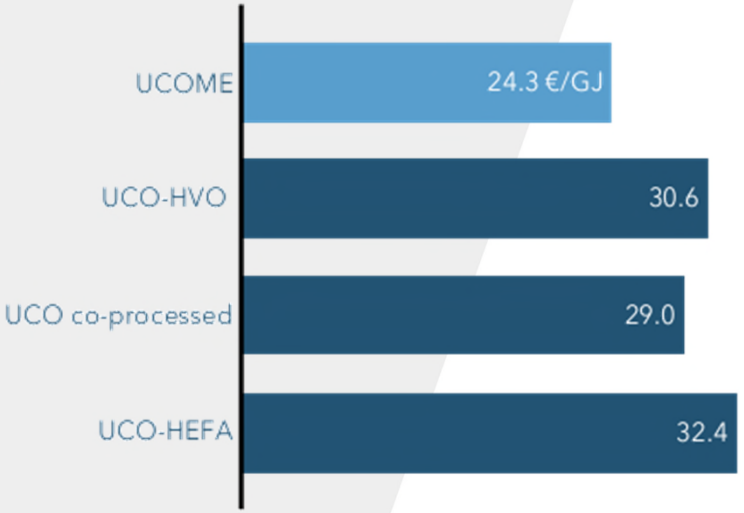
Comparison HEFA vs. FAME

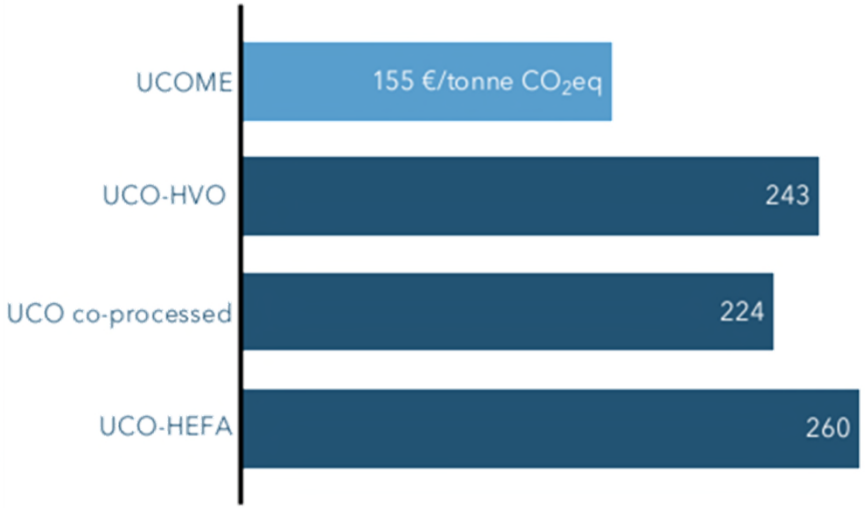
Greenhouse gas savings



Fuel production costs



Carbon abatement costs



2% aviation blending mandate in 2025

➔ 1.5 Mio. tons of waste lipids are diverted from biodiesel production

➔ 1 Mio. tons additional GHG emissions are released!

Source:
EWABA, Conversion efficiencies of fuel pathways for UCO, 5-2021

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Biofuels in maritime

FuelEU Maritime	Proposals
GHG reduction target	2% in 2025, 6% in 2030, 13% / 13% – 20% in 2035, 26% / 26% – 38% in 2040, 59% / 59% – 64% in 2045, 75% / 75% – 80% in 2050

Explanation: red = EU Commission; green = EU Council; blue = EU Parliament; black = agreed

- **Maritime sector ➔ a chance for Biodiesel:**
  - **Drop-in biofuel (100% or blend or as pilot fuel for Biomethanol application; Maersk)**
  - **Biodiesel is available all over the world; in big quantities**
  - **Biodiesel is biodegradable and non-hazardous to water**

Is there still room for biomass-based biofuels in the defossilisation of the transport sector?

Conclusion:

Road transport

- **Increased electrification + ban on ICE by 2035**
  ➔ negative impact on biofuels demand
- **Higher biofuel blends would help increase GHG-savings in existing ICE fleet**
- **HDV / LDV: Similar development of electrification foreseen, depending on:**
  - **expansion of production of sustainable electricity & it's distribution**
  - **expansion of e-charging infrastructure**
  - **➔ if not happening, biofuels remain only possibility to reduce GHG-emissions**
- **Biofuels remain only chance for difficult to electrify transport (e.g. vocational trucks)**

Conclusion:

Aviation:

- SAF based on fats & oils (e.g. HEFA) are drop–in solutions
  ➔ but are in feedstock competition with biofuels for road transport
- BtL-Kerosene ➔ technology mostly not at TRL9
  ➔ large amounts of “sustainable” biomass necessary, low yields
- Opportunity for e-fuels? Sustainability? TRL? Cost?

Maritime:

- Electrification possible, but only for particular applications
- Biodiesel is best drop-in biofuel for maritime sector, already available
- Biodiesel has additional benefits ➔ biodegradable & not water hazardous!

Thank you for your kind attention!

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