# Economic and environmental prospects of biofuels in the European transport sector

Dr.-Ing. Ralph-Uwe Dietrich, German Aerospace Center
(DLR e.V.), GERMANY

## Abstract (300 word limit)

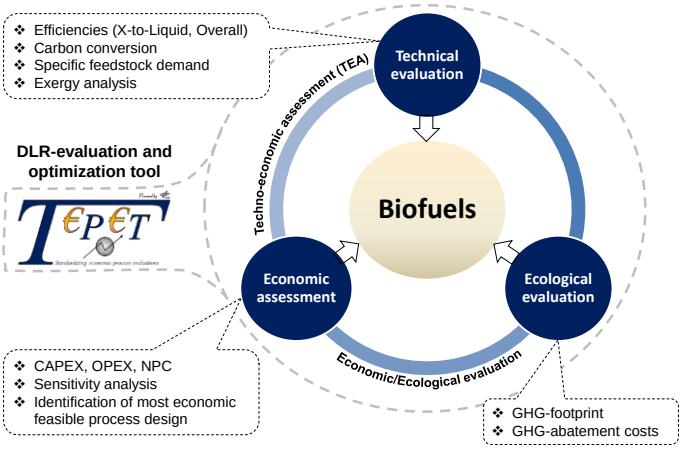
Decarbonization of the transport sector as proclaimed in the COP 21 targets requires the transition from fossil to renewable energy sources. While electric vehicles may become a viable option towards decarbonization of individual car traffic, at least aviation, shipping and heavy duty transportation will continue to rely on liquid fuels. Biofuels can replace a large share of fossil fuel in these sectors. However, the usage of biofuels within transportation is only reasonable with significantly reduced Greenhouse gas (GHG) emissions compared to fossil fuels and lower GHG abatement costs compared to other decarbonization technologies (e.g. Power-to-Liquid, hydrogen, electric mobility etc.). A detailed discussion of biofuels prospects in Europe shall be presented. Different biofuel production paths are compared and analyzed in terms of technical potential, fuel costs, GHG footprint and GHG abatement costs. Based on the results the following superordinate questions are addressed:

- What share of the European transportation energy consumption can be covered by biofuels?
- In which sector seem biofuels most realistic and most feasible and what type of biofuels are required?
- How compare biofuels GHG abatement potential and GHG abatement costs with other GHG reducing technologies?

A standardized techno economic assessment method was applied out in order to calculate the fuel production costs of the most promising biofuel routes. The methodology was adapted from a best-practice cost calculation standard from the chemical process industry and built up in the in-house cost estimation tool TEPET (Techno Economic Process Evaluation Tool). With transparent cost data input a reliable prediction of current net production costs of alternative fuels is achieved, what is automatically linked to the steady state PFD simulation

The impact of economic boundary conditions such as plant location, biomass price, key equipment costs and economy of scale can be demonstrated.

Figure 1: Methodology for biofuels evaluation within the transport sector




Recent Publications (minimum 5)

Dietrich, Ralph-Uwe und Albrecht, Friedemann Georg und Pregger, Thomas (2018) Erzeugung alternativer flüssiger Kraftstoffe im zukünftigen Energiesystem. Chemie Ingenieur Technik, 90 (1-2):179-192. WILEY-VCH Verlag GmbH & Co. KGaA, Weinheim.

Dietrich, Ralph-Uwe und Albrecht, Friedemann Georg und Maier, Simon und König, Daniel Helmut und Estelmann, Stefan und Adelung, Sandra und Bealu, Zoe und Seitz, Antje (2018) Cost calculations for three different approaches of biofuel production using biomass, electricity and CO2. Biomass & Bioenergy, 111:165-173. Elsevier.

Albrecht, Friedemann Georg und König, Daniel Helmut und Baucks, Nadine und Dietrich, Ralph-Uwe (2017) A standardized methodology for the techno-economic evaluation of alternative fuels – A case study. Fuel – The Science and Technology of Fuel and Energy, 194:511-526.

Martin, Stefan und Albrecht, Friedemann Georg und van der Veer, Pieter und Lieftink, Dick und Dietrich, Ralph-Uwe (2016) Evaluation of on-site hydrogen generation via steam reforming of biodiesel: Process optimization and heat integration. International Journal of Hydrogen Energy, 41:6640-6652.

König, Daniel Helmut und Freiberg, Marcel und Dietrich, Ralph-Uwe und Wörner, Antje (2015) Techno-economic study of the storage of fluctuating renewable energy in liquid hydrocarbons. Fuel – The Science and Technology of Fuel and Energy, 159: 289-297. Elsevier.



## Biography (150 word limit)

Dr.-Ing. Ralph-Uwe Dietrich leads the research area Alternative Fuels at the Institute of Engineering Thermodynamics at the German Aerospace Center (DLR) in Stuttgart. He is responsible for the research group on techno economic and ecologic evaluation of alternative fuels for aviation and global transport. He received his PhD in Engineering at the Technical University Clausthal in 2013 as a Scientific coworker at the Clausthaler Umwelttechnik Institute (CUTEC-Institut GmbH). Before that, he got 15 years of project manager experience at different enterprises (SME and Fortune 500) of the process and automation industry.

Email: ralph-uwe.dietrich@dlr.de

**Notes/Comments:**