Research. Transfer. Sustainabilty.

METHANOL STANDARD

Methanol: The renewable Fuel that drives us tomorrow

Methanolstandard – Examination of the technical foundations for standardizing methanol fuels in Europe

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In collaboration with an interdisciplinary consortium of industry (FEV Europe GmbH, BMW AG, Ford Werke GmbH, Liebherr-Components Deggendorf GmbH, ASG Analytik-Service AG, Tec4Fuels GmbH) and research (tme RWTH Aachen University, OWI Science for Fuels gGmbH, FiW e.V.), FiW investigated the technical and normative framework for introducing renewable methanol fuels in the European region. This involved both technical and economic as well as ecological assessments along the entire fuel value chain, from production to application in internal combustion engines. The project „Methanol Standard" was funded by the BMWK as part of the „New Vehicle and System Technologies" funding measure.

The last ten years of the energy transition have shown that the sustainable transition from fossil to renewable energy sources still holds significant challenges, especially for the transportation sector. Green Methanol production, based on green hydrogen (H_2), carbon dioxide (CO_2), and biomass-based synthesis gas, has reached an industrial technological maturity. However, there are still obstacles and knowledge gaps within the EU, including missing unified fuel standards for the use in internal combustion engines and a comprehensive ecological and economic assessment of the fuel life cycle. These questions were addressed within the scope of five work packages, which were focused on different parts of the methanol value chain reaching from production to the use in an internal combustion engine.

The FiW took on two out of the five total work packages in the area of methanol production investigations and assessments. The first work package involved identifying production technologies with the highest level of matu-

rity and determining their potential based on technical and economic indicators. Within this evaluation, the conditions for cost-efficient production of methanol were identified. In parallel, practical experiments on methanol synthesis utilizing H_2 and CO_2 were conducted using a test reactor. During the lab-scale experiments, tailored catalysts with enhanced product yield for the direct synthesis of methanol from CO_2 and H_2 were tested and evaluated. The impact of various promising catalyst additives, which increase both the conversion rate and selectivity, was demonstrated. The results are intended to be utilized in subsequent projects to implement the catalysts on a pilot scale plant.

Furthermore, FiW conducted an environmental life cycle assessment of methanol fuels, covering the entire lifecycle from raw material extraction to use as a fuel. The assessed scope is often referred to as the „Well-to-Wheel" balance. The environmental impacts of methanol production were accounted for in the conducted life cycle assessment, including greenhouse gas emissions and emissions into soil and water. Hence, environmental impact categories quantified using established impact categories such as greenhouse gas potential, acidification potential, and eutrophication potential were used. The study considered the production pathways identified in the first work package for renewable methanol. Taking into account existing EU regulations, the study demonstrated the compliance of future renewable methanol fuels with the Renewable Energy Directive II. Furthermore, the results of the life cycle analysis were compared to conventional fuels.

Project overview

PROJECT TITLE

Methanolstandard – Examination of the technical foundations for standardizing methanol fuels in Europe

PROJECT PERIOD

08/2020 – 12/2022

PROJECT PARTNERS

FEV Europe GmbH; OWI Science for Fuels gGmbH; tme RWTH Aachen University, Lehrstuhl für Thermodynamik mobile Energiewandlungssysteme; ASG Analytik-Service AG; Bayerische Motoren Werke AG; Ford Werke GmbH; Liebherr-Components Deggendorf GmbH; Tec4Fuels GmbH

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SUPERVISED BY

TÜV Rheinland Consulting GmbH

CONTACT

Forschungsinstitut für Wasserwirtschaft und Klimazukunft
an der RWTH Aachen e. V.
Kackertstraße 15 – 17 / 52072 Aachen

Fabio Voit, M.Sc.
T +49 241 80 2 68 47 / voit@fiw.rwth-aachen.de

Dr.-Ing. Kristoffer Ooms
T +49 241 80 2 68 22 / ooms@fiw.rwth-aachen.de

www.fiw.rwth-aachen.de

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