Unveiling a new class of synthetic fuels

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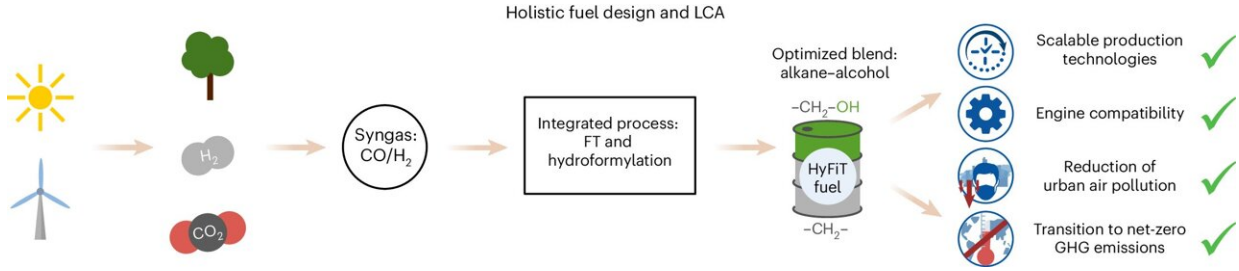

Holistic approach of HyFiT fuels. The approach comprises the fuel design and LCA of HyFiT fuels to validate their potential as possible diesel substitutes. Credit: *Nature Energy* (2024). DOI: 10.1038/s41560-024-01581-z

Researchers from RWTH, the Max Planck Institute for Chemical Energy Conversion, and ETH Zurich have made considerable advancements in synthetic fuels. Their study, which has the potential to revolutionize clean transportation, has been published in *Nature Energy*, titled "Towards Carbon-Neutral and Clean Propulsion in Heavy-Duty Transportation with Hydroformylated Fischer-Tropsch Fuels."

The shift towards sustainable transportation necessitates the development of energy carriers that meet the stringent requirements of modern applications. Synthetic fuels have emerged as a highly promising solution for transporting heavy goods. HyFiT fuels, as presented in this study, address the central challenges faced by current synthetic fuels.

Closing the carbon cycle: HyFiT fuels offer a flexible solution for closing the carbon cycle by utilizing either biomass or carbon dioxide as raw materials. This process employs scalable and mature technologies, ensuring a sustainable and versatile approach to fuel production.

Compliance with fuel standards: Experimental results validate that HyFiT fuels comply with global fuel standards and are compatible with existing vehicle infrastructure. Their compatibility with established sealing materials enables seamless integration into the current vehicle fleet, paving the way for immediate and broad adoption.

Reduction of pollutants: Testing on a light commercial vehicle revealed that HyFiT fuels produce significantly fewer particles and nitrogen oxides during combustion than conventional diesel. This marks a significant step toward reducing vehicular emissions and improving air quality.

Net-zero emissions: A well-to-wheel life cycle assessment demonstrated that HyFiT fuels can achieve net-zero greenhouse gas emissions and have a favorable environmental profile in various parameters. This makes them a solid complement to electrification, especially for heavy-duty long-distance transport.

This pioneering development in synthetic fuels is a testament to the power of interdisciplinary research and collaboration. It results from the innovative "Fuel Design Process," created at RWTH's "Fuel Science Center" Cluster of Excellence, and underscores the potential of collaboration in achieving sustainable energy solutions.

More information: Simon Voelker et al, Towards carbon-neutral and clean propulsion in heavy-duty transportation with hydroformylated Fischer–Tropsch fuels, *Nature Energy* (2024). DOI: 10.1038/s41560-024-01581-z

Provided by RWTH