

Synthetic fuels via Power-to-X – Status and potential of decentralized plants

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The net zero CO₂ emission targets set by many nations worldwide to limit global climate change can only be met by accelerating the efforts towards defossilization of the global economy. For transport and industry, which mainly rely on chemical fuels today, Power-to-X driven by renewable electricity, e.g., from wind and photovoltaics, and using CO₂ from ambient air, biomass, or unavoidable (non-energetic) industrial emissions is generally considered as a sustainable option to provide alternative synthetic fuels. However, how and where to produce such fuels is still under debate, and effective regulations which would support a market ramp-up are yet to be put in place in most countries. In this context decentralized Power-to-X plants could provide an opportunity for rapid market entry but face technological and economic challenges as well, e.g., due to variable supply of renewable power. The presentation will give an overview of the current status of the research carried out at the Institute for Micro Process Engineering together with partners from industry and academy on modular PtX technologies for decentralized plants. Kerosene and diesel fractions produced via the Fischer-Tropsch route followed by hydrocracking, isomerization and hydrogenation will be in focus. The CO₂ source as well as different options for producing the synthesis gas from carbon dioxide and water will be assessed from the perspective of process integration with a view to carbon dioxide utilization, overall energy efficiency and site requirements.