

SE-28.2 Economic comparison of different electrofuels for energy scenarios in 2035 (S)

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Electrofuels (also called power-to-gas/liquids/fuels or synthetic fuels) can offer CO₂-neutral mobility and are therefore an alternative to battery-powered electric vehicles. This paper compares the cost-effectiveness of the electrofuels Fischer-Tropsch diesel (FTD), methanol (MeOH) and hydrogen, which was temporarily bound to so-called LOHCs (Liquid Organic Hydrogen Carriers).

The production costs of the mentioned fuels are mainly influenced by the energy-intensive electrolytic hydrogen production. Therefore, one focus of this paper is on the influence of electricity prices on the economic efficiency of the fuels. For this purpose, hourly electricity prices for various energy market designs in Germany in 2035 were simulated. These prices were implemented into a mathematical model, which covers the entire process chain from hydrogen production and chemical bonding to the energetic utilization of the fuels in a vehicle.

A sensitivity analysis was carried out to determine the parameters with the greatest influence on the fuel production costs. This has shown that the energy market design in particular, but also the investment costs for the electrolysis systems have a strong influence on the production costs of electrofuels. Besides that, the results display that the use of hydrogen, which is temporarily bound to LOHCs, offers a favourable alternative to the more widely discussed synthetic diesel and methanol.