

Sail Energy: Generating Renewable Fuels by Wind-driven Energy Ships and Power-to-gas

Prof. Dr.-Ing. Michael Sterner

Forschungsstelle Energienetze und Energiespeicher (FENES), Fakultät für Elektro- und Informationstechnik
Technische Hochschule Regensburg

We have developed a new storage and fuel generation concept: sail energy. The sail energy concept uses offshore wind and marine currents to generate renewable fuels like hydrogen and methane. This process is combining mechanical, electrical and chemical conversion steps, like shown in the following figures:

First, offshore wind power is converted by various sailing technologies (conventional, kites or Flettner rotors) on a ship into mechanical translation power. This force is converted into mechanical torque by using a marine turbo machine fixed at the vessel, that extracts energy from the ship's propulsion. The turbo machine includes an electrical generator for power generation.

The generated electricity is used to split water into oxygen and hydrogen onboard in an electrolysis unit. Optionally,

the so produced hydrogen can be converted into methane, which is fully compatible with today's natural gas infrastructure with all its multiple applications for heating systems, gas power plants and especially gas cars. Other possible fuels are methanol or other hydrocarbons.

By following the wind, the energy in the wind can be harvested constantly and thus very high full load hours of the energy ship and the conversion technology onboard achieved.

The paper describes the concept and its individual components. It shows general proportions and component dependencies based upon exemplary ship and process calculations. Additionally included is an analysis of the technical potential, proving that sail energy could cover the global energy demand. It will be among the first time, the concept is presented at a conference.



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Forschungsstelle Energienetze und
Energiespeicher (FENES)
Fakultät für Elektro- und
Informationstechnik

Technische Hochschule Regensburg
Postfach 12 03 27
93025 Regensburg
Germany

michael.sterner@hs-regensburg.de
www.hs-regensburg.de/michael.sterner
www.segelenergie.de