

PROJECT

Algenwasserstoff

Production of biogenic hydrogen through algae cultivation

Herstellung von biogenem Wasserstoff durch Algenkultivierung

Funding: National (Austria)

Duration: Jan 2009 - Jan 2010

Status: Complete with results



Background & policy context:

The project deals with the production and processing of renewable hydrogen from algae. The algae absorb carbon dioxide (CO₂) and produce biomass in the first step and hydrogen in the second step. The hydrogen can be used as a high quality fuel. The CO₂ source can be waste gas from fossil power plants.

Objectives:

The project focused on the development of a resource-saving overall process for hydrogen production from algae. This included a selection of suitable *Chlamydomonas reinhardtii* strains, which were suitable for the production of hydrogen. Furthermore, it was necessary to develop and evaluate a cultivation system and a hydrogen separation system.

Parent Programmes:

[A3plus - Alternative Propulsion Systems and Fuels](#)

Institute type: Public institution

Institute name: Federal Ministry for Transport, Innovation and Technology (BMVIT)

Funding type: Public (national/regional/local)

Other funding sources: Federal Ministry for Transport, Innovation and Technology (BMVIT)

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Key Results:

After a selection of suitable *Chlamydomonas reinhardtii* strains, the strains were stimulated in a two-stage batch process for the production of biogenic hydrogen. The production of biomass and hydrogen was carried out in separate reactors. The most efficient algae strain (*Chlamydomonas reinhardtii* CC125), the best possible cell density and the optimum cultivation conditions were established for hydrogen production. For the following production step, it was imperative to remove sulfur from the culture medium by washing and centrifugation. A continuous hydrogen production is possible by the interconnection of multiple photobioreactors using a process control system (for monitoring and control of key parameters). The measurement of the produced hydrogen was carried out discontinuously by gas chromatography. For the separation of high purity hydrogen, a membrane module was constructed.

To calculate the efficiency of the overall process, the process key data from the previous experiments were used. The calculations showed that it is currently not possible to produce hydrogen from algae in an economically reasonable way.

STRIA Roadmaps: Transport electrification, Low-emission alternative energy for transport

Transport mode: Road transport

Transport sectors: Passenger transport, Freight transport

Transport policies: Environmental/Emissions aspects

Geo-spatial type: Other