



Master Thesis:

Experimental investigation of oxyfuel combustion of biomass for CO₂ production in a fluidized bed pilot plant

The Center for Solar Energy and Hydrogen Research Baden-Württemberg (ZSW) is one of the leading institutes for applied research in the major topics of the energy transition: Photovoltaics, wind energy, batteries, fuel cells, electrolysis, eFuels, circular economy, policy advice and the use of AI for process and system optimization. More than 300 colleagues and around 100 scientific and student assistants work at the ZSW locations in Stuttgart and Ulm. ZSW also operates a test field for wind energy and another test field for PV systems. ZSW is a member of the Baden-Württemberg Innovation Alliance (innBW), an alliance of ten business-related research institutions.

The Department of Renewable Energy Sources and Processes (REG) at the Stuttgart site will be offering a master thesis from October:

Carbon-containing eFuels and base chemicals can be produced sustainably and climate-neutrally via P2X processes. They are characterized by a high gravimetric energy density and therefore represent an attractive option for the transport and storage of renewable electricity. Water electrolysis is an important future technology here - it produces hydrogen and oxygen. In contrast to hydrogen, which already has a wide range of applications, the use of the by-product has hardly been considered to date. The use of oxygen for the efficient provision of CO₂ from biomass could represent a potential utilization pathway. As part of a project, this utilization pathway is to be investigated experimentally by producing CO₂ using oxyfuel combustion of sewage sludge. The focus is on both partial and full oxyfuel operation. The aim is to convert the solid fuel sewage sludge almost completely to CO₂ and at the same time achieve O₂ contents in the oxyfuel flue gas of less than 1% by volume.

Tasks:

- Thematic familiarization with sewage sludge utilization, oxyfuel combustion and fluidized bed technology
- Preparations and preliminary considerations for planning experiments at the fluidized bed pilot plant
- Participation in test campaigns for partial and complete oxyfuel sewage sludge incineration
- Evaluation and interpretation of the results, mass and material balancing, analysis of the generated gas atmosphere
- Presentation of the work results in report form and presentation of the final thesis

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