

Final Thesis**Experimental Characterization of Biomass Oxy-Steam Combustion
in a Fluidized Bed Reactor**

Contents:

Biogenic CO₂ is needed as a carbon carrier in Power-to-X applications as well as for CO₂ fertilization in greenhouses. To replace the predominantly "fossil" CO₂, the "OxyGreenCO₂" research project is investigating the production of "green" CO₂ from biogenic solid fuels using oxyfuel combustion. CO₂ can be separated from the flue gas using a partial condenser. Oxyfuel combustion is also well-suited for the utilization of moist fuels, such as freshly harvested wood chips and biogenic waste materials from greenhouses. When combustion is carried out using a steam-oxygen mixture, this is referred to as oxy-steam combustion.

For this reason, the Chair of Energy Process Engineering converted a fluidized-bed combustion system to oxy-steam operation and established a process chain consisting of oxyfuel combustion followed by partial condensation. The goal of this thesis is to characterize the oxy-steam combustion. Oxy-steam combustion will be compared with air combustion. In addition, various fuels such as wood pellets and wood chips will be investigated, and condensate analyses will be conducted.

Tasks:

- Literature review on oxy-steam-combustion and direct-contact condensation
- Experimental characterization of oxy-steam combustion
- Written documentation of the thesis and clear presentation of the results

Requirements:

- Structured and independent working style
- Interest in practical work on the experimental plant
- Working language: German or English

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