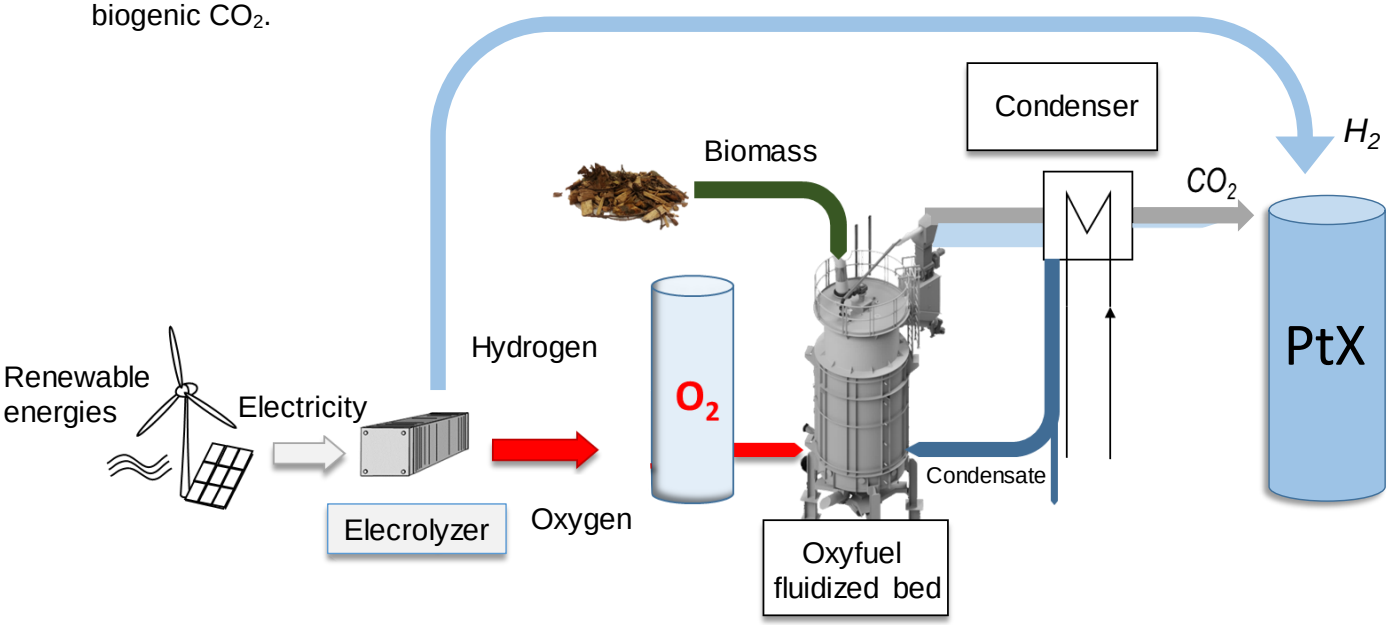
Friedrich-Alexander-Universität
Technische Fakultät
Department Chemie- und Bioingenieurwesen (CBI)
Lehrstuhl für Energieverfahrenstechnik
Prof. Dr.-Ing. Jürgen Karl

Master's Thesis

OxyGreenCO_2: Process Simulation of a Biomass-Fired Oxyfuel Fluidized Bed

Topic:
In addition to hydrogen, CO_2 is a key component of many Power-to-X processes for the production of e-fuels and chemical feedstocks. However, such technologies can only be sustainable if both the hydrogen and the CO_2 originate from renewable sources. Currently, biomass is the most important source of green CO_2. An innovative concept for generating biogenic CO_2 from biomass is oxyfuel combustion in fluidized beds with the addition of oxygen. The oxygen is produced as a byproduct of electrolysis and can be used directly in this process. To control the high combustion temperatures, the novel oxyfuel combustion process uses condensate from partial condensation to to cool down the fluidized bed. The overall process not only offers the possibility of providing valuable process heat but also results in exhaust gases that consist almost entirely of valuable, biogenic CO_2.



In this Master's Thesis, a simulation model for this innovative biomass firing process will be developed at the Chair of Energy Process Engineering using the software *IPSEpro*. Based on this model, the process will be simulated and analyzed under various boundary conditions. The focus will be on investigating different types of biomass and varying firing capacities.

Task:
- Development of an oxyfuel process model in *IPSEpro*
- Simulation of the process under various boundary conditions
- Evaluation of the results and written documentation of the work

Your profile:
- Enthusiasm and motivation for research and simulation
- Ability to work independently

Start:
- As soon as possible

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