

Thesis

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Characterization of oxyfuel gasification of biomass on a 100 kW counterflow gasifier in a field test.

Content:

One research focus of the Chair of Energy Process Engineering is the gasification of biomass and the subsequent methanation of the synthesis gas produced to substitute fossil methane. Usually, allothermal steam gasification is used. The synthesis gas produced by this process is free of nitrogen and can thus be converted to natural gas quality after the methanation step by simple condensation of the water vapor contained in the product gas. Autothermal air gasification, on the other hand, is widely used for the subsequent use of the wood gas in gas engines and thus for the generation of electricity and heat.

Within the BMWK project "SyntheseReady" the flexibilization of air gasification plants is investigated. To this end, a 100 kW counterflow air gasifier from ReGaWatt GmbH is being modified for oxyfuel operation and characterized in trial operation. By substituting the gasification medium (air) with an oxygen-water vapor mixture, a nitrogen-free synthesis gas with a high hydrogen content is also produced during autothermal gasification, which is suitable for the production of biomethane.

Within the scope of this final thesis, several test campaigns will be carried out at the site of the field test plant and the synthesis gas produced (composition, calorific value, tar content) will be analyzed and suitable operating points for the flexible operation of future "SyntheseReady" power plants will be identified.

Task:

- Literature research on the topic of biomass gasification and tar formation.
- Carrying out minor modifications to the plant and control system
- Support during transport and commissioning of steam generator and measuring equipment
- Supervision of test campaigns lasting several days at the plant site in Senden, Germany
- Analysis of the gas composition in FactSage for the adaptation of a simulation model in IpsePro
- Evaluation and written documentation of the work

Requirements:

- interest in gasification, methanation as well as experimental development
- independent working style (experimental campaigns always take place in cooperation with FAU and ReGaWatt staff)
- willingness to travel for several days (travel expenses, accommodation, daily allowance will be covered by FAU)



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