Synthetic natural gas (SNG) can be produced by thermochemical gasification of biomass and subsequent catalytic syngas conversion. At the Institute for Energy Systems the complete process chain from biomass to raw-SNG is built up in a small-scale demonstration test rig of 5 kW. It consists of an allothermal fluidized bed gasifier, hot gas cleaning and a fixed bed methanation reactor. Experimental research with this test rig is used to determine the influence of several parameters (e.g. gasification and methanation temperature and pressure; syngas composition and purity; space velocities) on the performance of the different process steps. Extensive gas analysis and process measurement equipment are applied to obtain high-quality results. Despite finding ideal parameters and hence optimizing the bio-SNG output of this process, the second aim is to enhance the quality of prediction from simulations. Therefore, results of the described experimental investigations are compared to those obtained in detailed process simulations and show good concordance with deviations <3% in the gas composition. Extended understanding of the validity of these simulations is important for transferring the results to larger-scale reactors and/or other
synthesis reactions (e.g. methanol).

Stichworte:
allothermal gasification, methanation, synthetic natural gas (SNG), simulation

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