Study of a decentralized entrained-flow gasification plant in combination with biomass from hydrothermal carbonization for CHP

Abstract:
In this paper a new approach, consisting of hydrothermal carbonization in combination with gasification in an entrained-flow process for combined heat and power in a gas engine is investigated. Main advantage of such a system are the low consumption costs resulting from the type of applicable feeding materials that are not usable with state of the art technologies. In the first part a highly integrated plant for the production of biocoal with hydrothermal carbonization is investigated with a plant size of 16 MW of biocoal production. The process is modeled in Aspen Plus® in order to determine energy and material flows as well as to optimize the heat integration of the system. The decentralized utilization of biocoal from hydrothermal carbonization in an entrained-flow gasifier is simulated for a plant size of 1.6 MW biocoal input. Efficiencies of the heat and power generation are calculated for individual components and the whole process chain. Power can be produced with an overall electric efficiency of 26 %.

Stichworte:
hydrothermal carbonization, simulation, biomass, gasification, CHP, biocoal

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