Optimization of industrial Bio-SNG production from low-grade fuels

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1. Introduction and Short Description:

In the course of the rising energy demand of the world and the simultaneous need for the reduction of harmful emissions, the question arises how mankind can ensure a global sustainable development for the (near) future. With a view to the ambitious target of the Paris Agreement to hold the increase of global average temperature to well below 2°C compared to pre-industrial levels, innovative energy technologies have to be developed to provide safe and affordable energy.

Dual fluid gasification can be named as a promising technology to support the targeted energy strategy. By means of this process solid feedstock can be converted to a mid-calorific product gas with a favorable composition to produce a large variety of end products, such as synthetic natural gas (SNG), Fischer-Tropsch diesel, mixed alcohols, methanol, basic chemicals and hydrogen.
Research and process development on the production of SNG from syngas has been carried out for over 100 years. Still, the process has not proven to be economically competitive, if conventional expensive fuels, like wood, are used. Therefore, the focus of research lies on a successful development of the conversion of residuals and waste materials into a high-value product. However, these cheap alternative fuels, such as sewage sludge, usually show rather unfavorable properties for gasification and thus lead to technical challenges and limitations.
The aim of this work is to elaborate an optimal process route for Bio-SNG production from low-grade fuels for an industrial plant.
Hence, the discussion and evaluation of the following points are the object of this work:

- the **state of knowledge** for gas cleaning and SNG production
- suggestion of an **optimal process route**
- **simulation results** displaying mass and energy balances
- interpretation of achieved results

2. Methodology, Results and Discussion

The investigations in this work are based on an intensive literature study, operation data from the 100kW$_{th}$ dual fluidized bed pilot plant at TU Wien as well as other commercial plants, and simulation results obtained by the software package IPSEpro.

3. Conclusion and Outlook

The full paper will contain broad results which will be used to evaluate the suggested process route in terms of technical feasibility and economic performance compared to conventional ways of SNG-production.