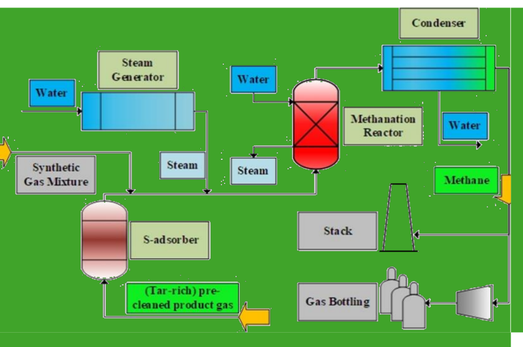

SuSNG (COMET in Acquisition)

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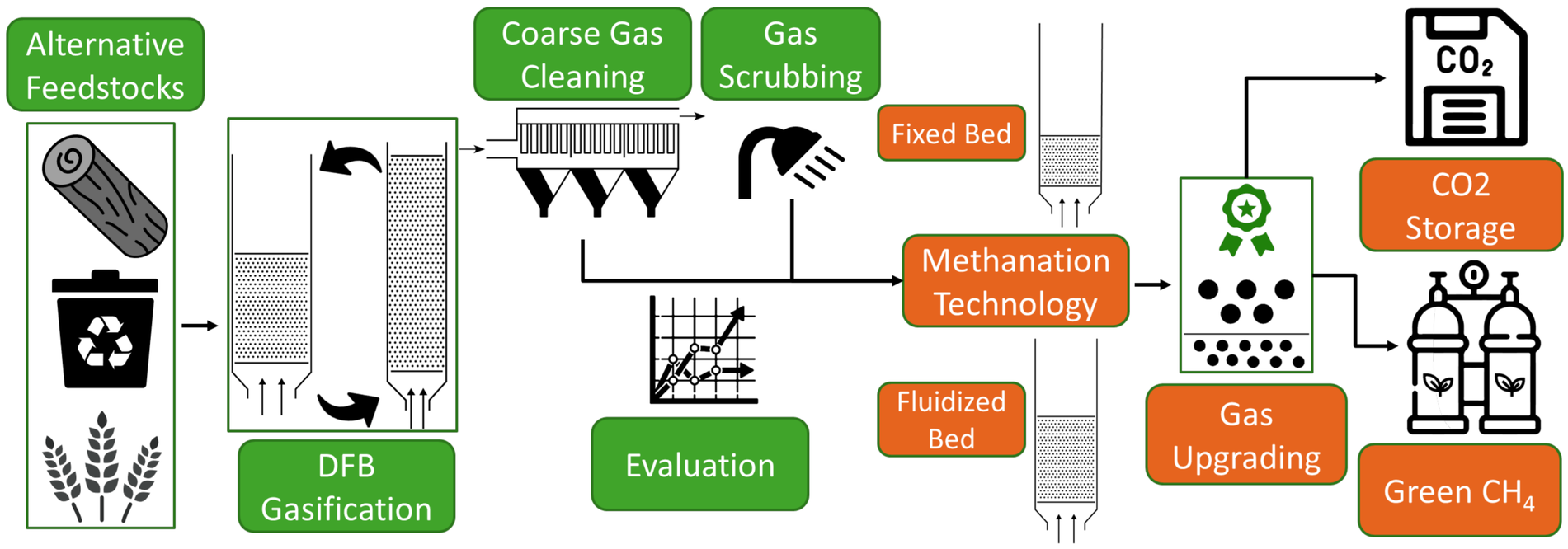

Introduction & Background

Aiming to defossilize the energy and transport sector, recent years have seen a multitude of initiatives and directives on a national and international level to substitute fossil energy carriers by renewable sources. A substantial contribution to this aim shall be the substitution of fossil natural gas by synthetic natural gas (SNG) and biogas. Thus, energy suppliers shall fulfill a green-gas-quota to reach a share of 10% of our natural gas consumption to be covered by renewable, sustainable methane.

The current share of renewable natural gas is below 1% of the total natural gas consumption, mainly provided by biogas production. However, potential shares of up to 25% are possible considering the thermochemical conversion of available biomass resources in Austria. The status quo and the perspective for SNG-production emphasize the necessity to develop methodologies for biomass conversion and methanation to industrial processes. For this purpose, the best-suited processing methods for SNG-production from a large variety of biomass types must be elucidated based on the requirements for the thermochemical operation, gas cleaning and purification methods, and methanation technologies.

State of the Art

Austrian research institutions and industries can rely on decades of experience in the field of thermochemical conversion of biomass, especially woody biomass. The gasification of woody biomass in dual fluidized bed (DFB) systems for the conversion of the feedstock to a product gas suitable for coupled heat and power generation has been demonstrated and is a state of the art operation. The product gas of DFB gasification is especially suitable for the production of SNG via catalytic synthesis due to a comparably high H2/CO-ratio and CH4-share as well the reduced N2-diluation. However, SNG-synthesis requires a syngas quality that can only be reached through adequate gas cleaning and gas preconditioning. Projects demonstrating the SNG production based on DFB gasification of woody biomass were successful in in Güssing, AT (1 MW), Gothenburg, SE (20 MW) und Lyon, FR (500 kW).

Key facts

Project phase: Acquisition
Project duration: 2024/11 – 2027/03
Project volume: 1 Mio. €
Funding: FFG Austria – COMET Programme – Grant Nr. 892426
Entry and participation into the project as partner is possible.

Methodology:

This project aims to investigate the following aspects with relevance to the production of SNG from biomass feedstocks via DFB gasification and subsequent catalytic methanation:

Theory & Simulation:

➢ Literature study for SNG production in industrial scale based on fossil resources and comparative study for the process chain including DFB gasification
➢ Scaling calculations based on mass and energy balances
➢ Study for process design and operational parameters of the DFB-to-SNG process chain
➢ Comparative Study and process simulation for different SNG-upgrading options
➢ Evaluation of sector coupling and industrial integration options

Experimental Work:

➢ Experimental campaigns at the 1 MW DFB gasification plant of the Syngas Platform Vienna with subsequent syngas methanation in lab-scale facilities (fixed bed, fluidized bed)
➢ Experimental runs for specific cases such as long-term operation to determine process stability criteria for SNG production for synthesis (high purity), as substitute for fossil energy carriers and as fuel substitute in industrial processes
➢ Gas analytics to determine functionalities of gas cleaning units and their necessity for the complete process chain
➢ Screening of alternative biomass types and biogenic residues for the utilization as feedstock in DFB gasification and implications for the gas cleaning and syngas methanation
➢ Lab-scale experiments to determine optimization potentials for large-scale unit operations, e.g., handling of synthesis catalyst and process stability given parameter variations

Goals

The goals of the project, as deliverable of the individual tasks and the sum of the project work, are:
•the process design for realization of DFB-to-SNG process chains from biogenic residues and wastes
•the detailed investigation and evaluation of product gas cleaning stages for providing necessary gas qualities for methanation
•the benchmarking of different methanation and SNG-upgrading technologies for the final SNG-product

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