

Advancing Gas Cleaning of Product Gas for a Greener Energy Production

Area Biorefineries Syngas Platform Vienna

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Topic

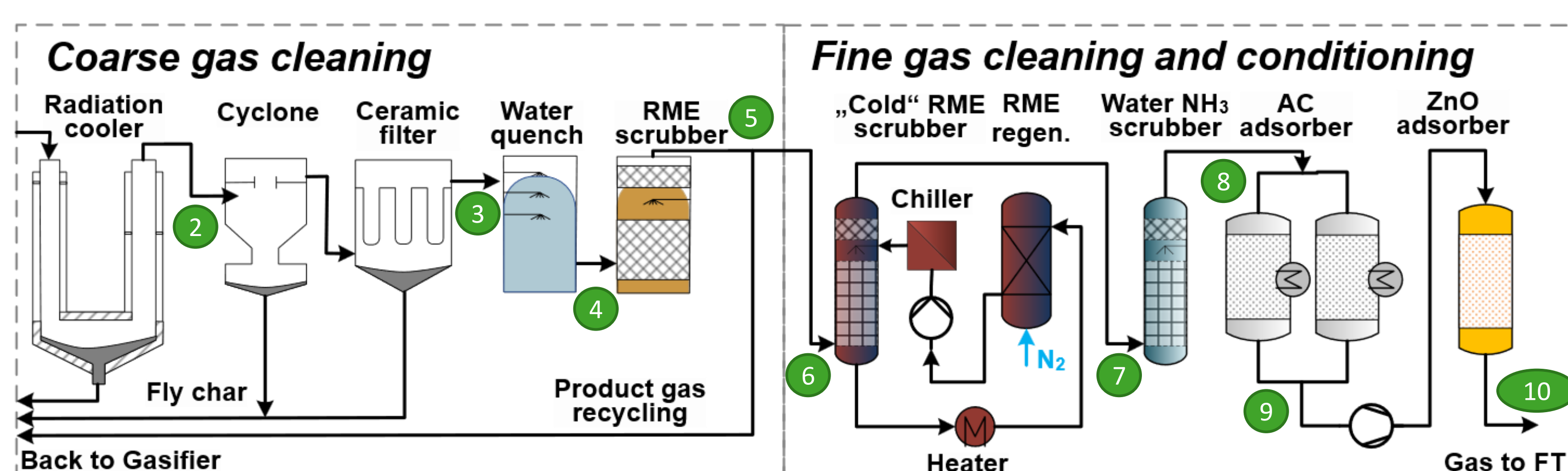
The reduction of impurities in product gas from biomass and waste stream gasification through gas cleaning is a crucial step towards the sustainable production of fuels and chemicals via synthesis processes and therefore towards a carbon circular economy. Raising the efficiencies of gas cleaning steps enables smaller, more cost-effective systems and increases the attractiveness of this future-oriented technology.

Scope

Research questions:

- Identification of challenging organic impurities along the product gas cleaning chain
- Process optimization of gas cleaning steps, focus on organic compounds in fine gas cleaning
- Development of a concept for commercial-scale gas cleaning set-up

Figure 1: Gas cleaning chain at the Syngas Platform Vienna with marked measurement points



Results

In four demonstration campaigns since the project start in April 2024 the currently used product gas cleaning chain (GCC) at the Syngas Platform Vienna (Figure 1) was successfully demonstrated for several different feedstock listed below. The evaluation of the GCC was done by measurements of different impurities (mostly N-, S- and tar compounds) along the GCC leading to crucial information about the different cleaning steps.

Results of tar measurement for forestry residues (FR) in comparison with the benchmark fuel wood chips are pictured in the Figures 2 and 3.

A reduction of PAH for FR at the water quench (-36% of inlet conc.), the RME scrubber (-83% of inlet conc.), the cold RME scrubber (-84% of inlet conc.) was determined. The reduction for Benzene was only measured at the fine gas cleaning. A reduction via the cold RME scrubber

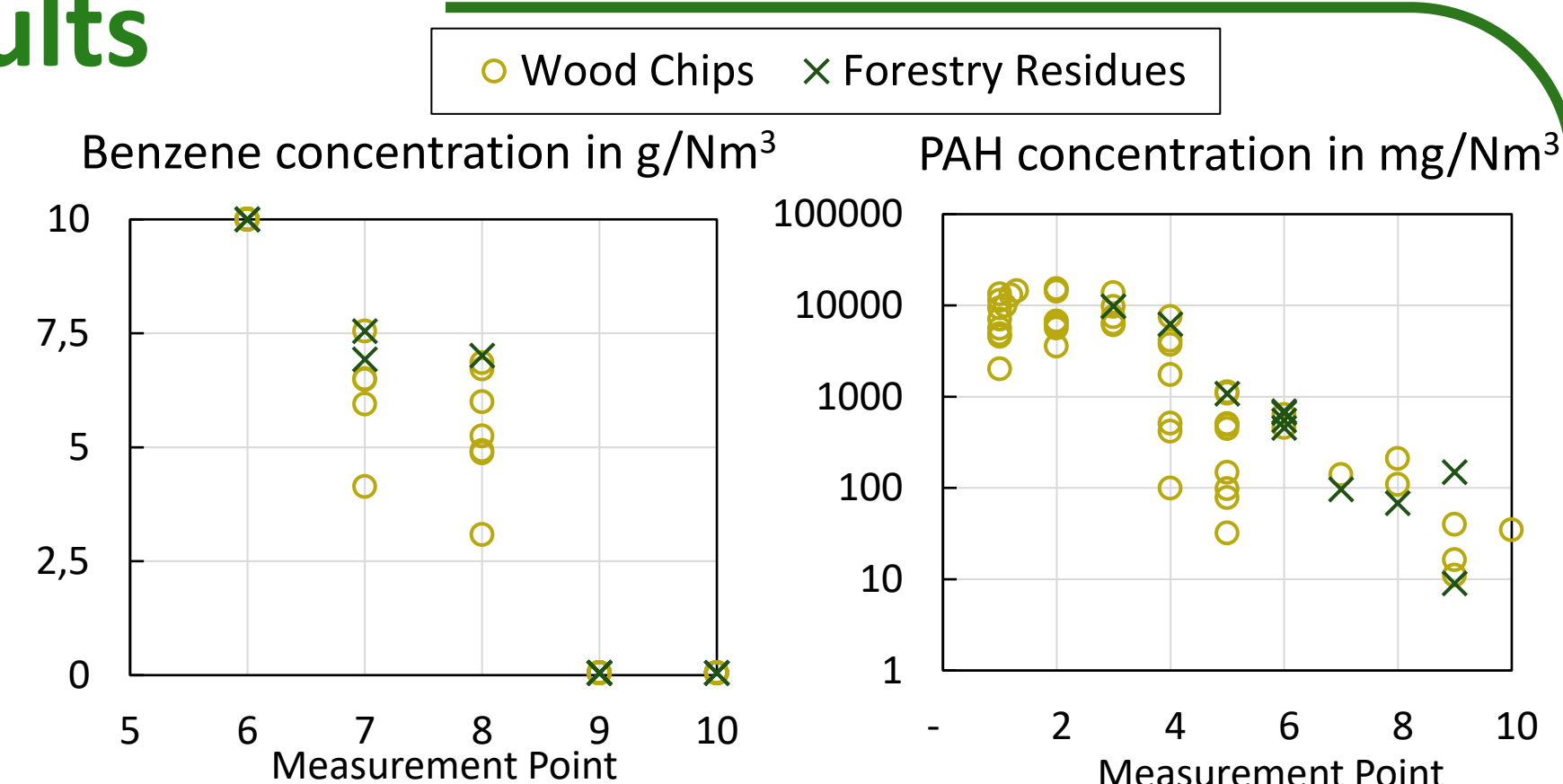


Figure 2: Benzene concentration along the GCC, upper detection limit: 10 g/Nm³, lower detection limit: 0.05 g/Nm³

Figure 3: Polycyclic aromatic hydrocarbons (PAH) concentration along the GCC

can not be calculated because of missing inlet concentrations (upper detection limit). A further reduction at the activated carbon step (-99% of inlet conc.) result in a Benzene concentration under the lower detection limit.

Key Facts industry-related dissertation project

- University:** TU Wien
- Duration:** April 2024 – September 2026
- Mentor:** Katharina Fürsatz
- Supervisor:** Matthias KUBA, Hermann HOFBAUER

Feedstocks used at the Syngas Platform

- Forestry Residues
- Corn Cobs
- Coconut Shells
- Cashew Shells
- Plastic Waste Material
- Sewage / Paper Sludge