Dry Flue Gas Treatment: Preparation for Experimental Campaign and Preliminary Experiments.

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Flue gas treatment is a very important part of every Waste-to-Energy (WtE) plant. Currently, dry flue gas treatment methods are very popular because they are not burdened by wastewater production. Frequently, there are attempts to simplify the process, lower the capital costs, operating costs, and the production of residues classified as hazardous waste.

Simultaneous removal of multiple pollutants has a big potential for the simplification of dry flue gas treatment. However, individual processes have different optimal conditions. Therefore, the knowledge of the influences of various conditions on individual processes is crucial. To be able to test these influences, a unit has been built.

Before we could start the experiments, it was necessary to test all sections of the unit. We have tested the stability of the flue gas composition, pressure and flow rate measurements, filter cake formation, cleaning of filters, and regulation of temperature and pressure at various places of the unit.

We have also successfully tested the addition of sulfur (dissolved in toluene) to wooden pellets that we use as fuel for flue gas production. Last three experiments showed very close conversion rates of sulfur from fuel to flue gas. We are, therefore, able to set the concentration of SO_2 in produced flue gas. Also, the influence of the pollutant addition on the mechanical durability of used pellets was measured.

Dosing of sorbent particles (milled to approx. 10 μm) into the flue gas turned out to be difficult. We have made a dosing system out of an icing mesh sifter, stepper motor, valve, and a funnel. The character of dosed particles makes it difficult to set reliably a specific feeding rate. It is, however, possible to weigh the whole feeding system anytime during an experiment, which allows us to measure the real feeding rate and to test different feeding rates without having to stop the experiment.

During recent experiments, all parts of the unit were running. However, the main objective of these experiments was to complete our methodology and to verify its suitability for following experiments. The main experimental campaign will follow in June and July.