Improved Operation of Waste-to-Energy Plants by Controlled Mixing of the Waste Feed

Background
Waste-to-energy (WtE) plants typically receive a variety of different wastes and waste fractions with varying combustion characteristics (e.g. caloric value, water content, biomass content, ash content). These differences make it difficult for WtE plants to maintain consistent operation. Therefore, the differences are reduced to a certain extent by mixing the waste in the reception bunker by the crane operators. However, until recently, it was not possible to control the mixing of the waste feed. The crane operators in WtE plants performed the mixing of the delivered waste based on visual recognition of waste fractions and many years of experience ("random" mixing of waste). This practice of homogenising the waste can be considered insufficient, as evidenced by the typically unstable steam production in WtE plants.

Methodology
By analysing the composition of exhaust gases from WtE plants, in particular the $O_2$, $CO_2$ and $H_2O$ concentrations, it is now possible to assess the composition of the waste stream in terms of biomass, polymers and water content with a high temporal resolution. This information is used together with information from the waste crane (location of the respective waste input) to create so-called "heat maps" of the combustion properties of the waste stored in the waste bunker (composition). These "heat maps" are subsequently used to control the mixing of the waste in the bunker prior to its introduction into the plant's combustion chamber (controlled mixing of the waste).

Benefits
- Increase in steam production, waste throughput and energy efficiency.
- Reduction in the consumption of auxiliary fuels and electricity.