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

The present invention describes a novel method to assess the temporal variability of the waste feed composition and to control the mix of the feed based thereon to improve the performance of Waste-to-Energy plants. The overall economic benefit of the method after implementation is valued at more than 300,000 EUR/year for a medium-sized Waste-to-Energy plant.

Background

Waste-to-energy (WtE) plants typically receive a variety of different wastes and waste fractions with varying combustion characteristics (e.g. calorific 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

REFERENCE
M033/2019

POTENTIAL APPLICATIONS
Waste-to-Energy plants

KEYWORDS
Waste-to-Energy, waste mixing, energy efficiency, biomass content, in-time waste characterization

IPR
AT granted
EP, US, CN pending

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