

Classification of slagging tendencies of biomass fuels

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Slag and ash deposition problems have more than occasionally been observed in biomass fired plants. These problems can lead to reduced accessibility as well as performance of the combustion appliances. In addition to the more fundamental research in the area, initiative has been undertaken to evaluate the usefulness of fuel indices and different classification systems to help assess and predict these kinds of slagging problems. The objective of the present work was to formulate a classification system that is able to determine the slagging behaviour of a certain fuel in a specific combustion appliance. 15 different wooden and non-wooden pelletized biomass fuels were selected covering a broad range of fuel ash composition and slagging behavior. These pellets fuels were further subjected to controlled combustion experiments in 9 different combustion appliances. Based on the combustion results a fuel classification system relating raw material composition, ash content, concentrations of ash forming elements/matter and the type of combustion appliance to slagging tendency and potential operational problems of a fuel were formulated. The classification system is presented both as a matrix from which the recommendations can be deduced and in multivariate projection models/methods (i.e. PLS). The present work is part of the EU FP7-SME project AshMelT in progress 2012-2014, coordinated by the Austrian competence centre Bioenergy2020+.

Ash melting behaviour of solid biofuels in residential pellet boilers

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To overcome the 2020 goals of the EU, solid biofuels will have to take over a big role in the energy provision. Since the resources for wooden biofuels are limited and are in competition with other industry, new solid biofuels will be introduced to the markets. However, to be applicable in residential pellet boilers, certain quality criteria have to be met. The ash melting behaviour is one of these criteria. This work investigated the ash melting behaviour of solid biofuels and their impact on residential pellet boilers. Overall 14 different solid biofuels, ranging from different wood species to agricultural waste, were tested in overall 9 different combustion technologies, ranging in a power output from 5 to 200 kW. An assessment method to determine the severity of ash melting and the applicability of a fuel to a combustion system was developed. The results show, that the fuels have a slight variation of the ash melting behaviour in the different combustion systems and particularly have a distinctly different impact on the combustion system. The impact on the combustion system was made measurable by the applicability method and thus a ranking on how the combustion technologies cope with the ash melting was elaborated.

Comparison of laboratory methods to characterise ash melting behaviour

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The use of the AFT method for predicting slagging in pellet boilers is commonly failing and users of the results have troubled with understanding its relevance. It is thus the aim of the AshMelt project to develop and test a method more accurate and adequate for this purpose. For this purpose three potential laboratory characterization methods has been tested, using 14 different pelletfuels which also been tested in ordinary pellet boiler test runs in the AshMelt project. The methods tested were 1) the simple slag test, 2) The CIEMAT slag test and 3) the Slag Analyser. The presentation will reveal the comparison of results from these laboratory tests as well as comparison with the results obtained from the boilers test runs and there compatibility.

Off-gassing – Safety issues related with emissions from wood pellets along the pellet supply chain

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Safety issues along the pellet supply chain are currently in the focus of international standardization processes. Off-gassing is one of the main topics especially with respect to safe transportation and storage of biomass pellets. An introduction to the phenomenon of off-gassing is given and the risks and implications arising from this challenge for the pellet industry are presented.

The SafePellets project - Studies of self-heating in biopellets storages

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The presentation will provide an introduction to the methodologies and aims of the self-heating studies in the SafePellets project. A number of laboratory methods are used to measure self-heating potentials of various pellet types, and these results are verified in several scales of applied storages ranging from 1m³ to full scale silos and warehouses.

The importance of standardization and certification for small scale pellet producers

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With the increasing use of alternative biomasses for the production of high quality pellets, even small pellet producers have to deal with the methods of standardization and certification. Are the associated costs justified? A brief overview from the perspective of a pellet manufacturer.

Safety issues - impact on pellet industry

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CO off-gassing in pellet storages became a widely discussed subject in the pellet industry. Approaches have to be found not only to minimize the danger of off-gassing in pellet storages. Appropriate measures to avoid the formation of CO have to be defined for the production of pellets. Aim of the European research project SafePellets is to discuss the issue with experts from the pellet industry and to develop approaches to solve the problem.