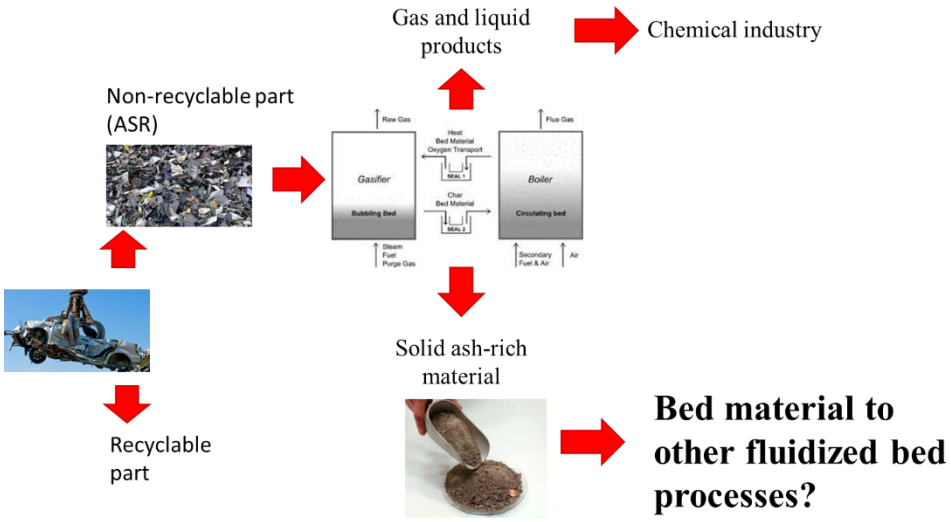
Applications of the ash-rich fraction derived from chemical recycling of Automotive Shredder Residue (ASR) in a fluidized bed gasifier

Recycling of plastics has become one of the main challenges of the century, as it can simultaneously reduce the need of fossil carbon for the production of new plastics, and address the environmental disaster related to accumulation of plastic wastes in the environment, notably in the oceans. Chemical recycling of plastics is of particular interest as it breaks plastics down to their molecular building blocks, from which new petrochemical products can be synthetized, with the same quality as those originating from fossil fuels. Gasification in fluidized bed is a technology that is suitable for the chemical recycling of many plastic wastes, due to the high flexibility of fluidized beds towards heterogeneous fuels, such as plastic waste streams.

Besides plastic mixtures, the wastes can also contain high fractions of inorganic material that could interact with the bed material in a fluidized bed gasifier, potentially causing operational issues that could make it impossible to run the process. In order to investigate a kind of "worst case scenario", Automotive Shredder Residue (ASR) were gasified in the Chalmers fluidized bed gasifier. This fuel contains polymers originating from every plastic components found in cars, as well as a very high fraction (> 30% in weight) of inorganics.

The experiments in the Chalmers gasifier showed that even such a difficult fuel could be converted into a range of useful gaseous and liquid compounds, without facing operational issues over a three weeks period. Nonetheless, the inorganic fraction accumulates in the bed material and remains as a side-product that could find interesting application.



Our suggestion is that this material can be used as bed material for other fluidized bed processes, e.g. as a catalyst, an oxygen carrier or an inert bed material. Your

task will be to investigate the physical and chemical properties of the ash resulting from ASR gasification to assess its suitability as a bed material. As the ash contains a significant amount of metal, the metallic and non-metallic fraction could be investigated separately and their respective potential applications discussed. The work will be mainly experimental and would be carried out in laboratory scale reactors, combined with analytical methods to examine the ash properties.

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