

Linking unit processes to generic process chains for comparative carbon footprint modelling of residual MSW treatment systems

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The residual municipal solid waste (rMSW) management sector encompasses several technologies, of which the most important are waste incineration, mechanical biological treatment and landfilling. Typically, numerous unit processes have to be linked up until they form process chains that can provide for final material/energy flows being either a product for secondary use or an elementary flow directed to ecosphere as presented in (Clausen, 2015 a). Following up the last paper (Clausen 2015 a), in this paper potential process chains for rMSW treatment are investigated.

Goal of this investigation is to define the necessary unit processes, their links and related material and energy flows as a basis for comparative modelling of different rMSW treatment technologies. The rMSW treatment options are selected according to the best available technologies in an EU context and broken down to unit processes of the different fields of engineering, such as comminution, classification, separation and sorting, as well as biological and thermal oxidation.

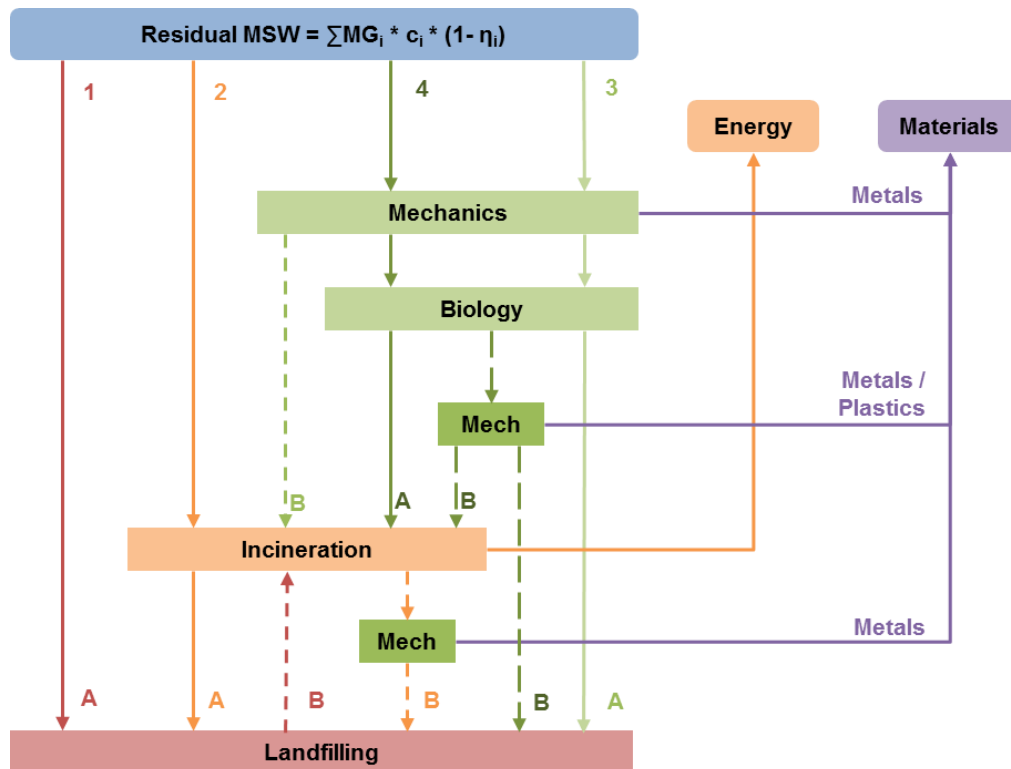


Fig. 1: rMSW treatment scenarios investigated in terms of related unit processes

As a result of the paper, the unit processes required for the pathways shown in Fig. 1 are derived and linked to generic process chains. Thereby, requirements yielding from an engineering perspective are highlighted. The material flow of rMSW, recovered energy flows and recovered material flows yielding from the process chains are demonstrated. Based thereon, a model that allows comparing different rMSW treatment options can be created as described in (Clausen 2015 b).

With the overall focus being laid on modelling the climate impact of different rMSW treatment options, apart from, also direct sources of greenhouse gas emissions related to the identified unit processes are included in the final results of this paper. In order to enable life cycle assessment, climate relevant upstream and downstream processes related to the derived process chains are part of the system presented in the paper.

References

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