Allocation Analysis of Waste Treatment Nodes for Economic Optimisation considering Reduced Greenhouse Gas Emissions

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Abstract

The paper has analysing factors having a significant impact on greenhouse gas emissions (GHG) in the handling and processing residual waste. A present trend has been updating and modernising the waste treatment infrastructure. The proposed system has been following the waste management (WM) hierarchy. A software tool NERUDA was developed for the allocation design of newly built waste processing capacities. NERUDA serves as an optimiser of waste treatment strategy in a specific region from a waste producer point of view. The present version of NERUDA focuses on the economic aspects only. Besides the economic also the environmental aspects play an important role. For the environmental assessment of waste management processes, the GHG emissions are one of the most common and discussed environmental impact indicator. A global warming potential (GWP) is used as a unit to measure and standardise the GHG emissions. The next step in the development of NERUDA is the implementation of GWP parameter as environmental criteria. This paper results are a summary and an analysis of important factors, which have a significant effect on GHG emissions in WM. Waste to energy (WTE), landfilling and mechanical-biological treatment (MBT) are disposal processes considered in this analysis. The main factors for each of these waste treatment processes are analysed. The emphasis has been on WTE plants and consequences to allocation planning considering reduced GHG emissions. The main parameters that influence GHG emissions from a WTE are analysed and influence of waste input and heat utilisation strategy is quantified. GHG emissions of landfilling are mainly affected by the collected and diffused landfill gas. The MBT is characterised by the refuse derived fuel (RDF) utilisation (incineration and heat and power production). Transportation is also taken into account. These issues have been formulated
and proposed for the implementation of an extended objective function of NERUDA tool. In conclusions, the availability of the necessary inputs for the calculation is discussed.