

# A framework for the sustainability assessment of waste management systems including local impacts

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## Keywords

Waste, sustainability, stakeholders, LCA, LCSA

## Brief description

The study presents a sustainability framework for the assessment of waste management systems in European cities. The main innovation of this framework is the general and comprehensive approach and the thorough methodology for its definition.

## Summary

To improve the sustainability of waste management in European cities, proper methods and indicators that allow good decision-making need to be defined. The goal of this study is to provide a comprehensive framework to assess the sustainability of waste management. This framework presents three main innovations. Firstly, the framework integrates the analysis of environmental, social and economic impacts. Secondly, a clearly defined methodology was used for the definition of the framework. Finally, unlike other studies, it reaches enough detail to allow the application of the framework to any city.

For the selection of the set of impact categories (types of impacts; e.g., global warming, eutrophication) to be included in the framework, a selection process was conducted using surveys to evaluate the perception of stakeholders and experts, who rated different impacts (expressing the perceived relevance for the project). The resulting preliminary set of categories was further refined considering the data requirements at three levels: transdisciplinary (social, economic, environmental), multi-scale (geographical location of processes causing the respective impacts) and multi-size (magnitude of impact). Once the set of impacts was defined, a proper indicator was selected for the measurement of each impact. For some categories this was a straightforward process, since the indicators are well established and applied, especially in the context of life cycle based environmental indicators (e.g., kg of P eq. was used for eutrophication). However, this was not the case for the categories assessing social impacts at a local scale. Different options were proposed in each case and evaluated to select the most adequate one (e.g., the odour footprint was selected for odour).

This study was developed within the ongoing project REPAiR (European Union's Horizon 2020; <http://h2020repair.eu/>). Future stages of the project include the application of this sustainability framework to different European cities such as Gent (Belgium) or Napoli (Italy), to assess the urban metabolism and the eco-innovative solutions proposed (entailing circular economy strategies) with the aim to inform local to national governments about the sustainability of the material usage in these cities. The preliminary results of this research were published in *A Holistic Sustainability Framework for Waste Management in European Cities: Concept Development* by Taelman et al. (2018) in the journal *Sustainability*.