

Advanced waste monitoring

In a nutshell

Summary overview							
<p>The development and implementation of an efficient and effective waste management strategy is based on detailed knowledge of statistical data for the waste streams collected and managed at local level.</p> <ul style="list-style-type: none">• It is thus best practice to:• regularly collect and process available data at single waste stream level, and for the different steps of the collection, reuse/preparation for reuse, sorting, recycling, recovery and disposal processes;• regularly carry out a composition analysis of the mixed waste;• when waste management operations are contracted out, include contract clauses for the systematic communication of comprehensive data. <p>Waste monitoring data are useful both for internal analysis (such as evaluating the potential implementation of a new measure) and for sharing with the relevant public administration and citizens to drive improvement and awareness.</p>							
Waste management area							
Cross-cutting	MSW - strategy	MSW - prevention	MSW - collection	MSW - EPR	MSW - treatment	CDW	HCW
Applicability							
<p>Detailed waste monitoring is applicable to all local authorities and waste management companies managing municipal solid waste. For organisations starting the process, waste monitoring may focus first on the most relevant waste fractions and eventually be extended to all fractions step by step.</p>							
Specific environmental performance indicators							
<p>In addition to the common environmental performance indicators presented in the best practice Common Environmental Performance indicators, the most appropriate indicators to assess the successful implementation of this BEMP are:</p> <ul style="list-style-type: none">• use of web-based tools for tracking and reporting waste data (y/n);• frequency of composition analysis of mixed waste (one composition analysis every # months or years).							
Benchmark of excellence							

Composition analysis of mixed waste is carried out at least four times a year (during different seasons) every three years or after any substantial change of the waste management system.

Description

An efficient and effective waste management strategy is based on detailed knowledge of statistical data for the waste streams collected at local level and treated. Data collection and management can be carried out in detail: initially defining which information should be collected and then keeping a good and updated database, which allows the extraction and processing of the required information in order to implement a number of analyses on the management of waste. A detailed example of advanced waste monitoring, which phases to analyse (i.e. waste generation, collection, sorting, recycling, recovery and disposal) and the most suitable environmental performance indicators (e.g. capture rate, impurity rate), which can be calculated from the data collected, is provided in the best practice Coomon Environmental performance indicators.

A key aspect of improved waste monitoring is the ability to track information along the entire value chain of the collected waste, not only for the operations managed in-house (e.g. collection) but also on the fate of waste afterwards, when it may be managed by external companies and contractors (e.g. waste sorting and recycling). In such cases, it is important to include in the contractual agreement with the external organisation the provision to regularly communicate relevant data on waste management operations (e.g. sorting, recycling, energy recovery and disposal).

Thanks to advanced monitoring of waste operations directly managed by the local authority/waste management company or outsourced to other organisations, local authorities are able to track waste streams throughout their presence in the waste management system and even further (e.g. when used as recycled or reused materials and items). Web-based tools can be adopted for tracking and reporting waste data and for ensuring the easy access of the local authority or residents to all data on waste management.

Waste management systems are complex and their monitoring is an activity which requires human resources and a full understanding of the system. As a simplified example, Figure 1 illustrates the waste streams derived from households and household-type commercial waste.

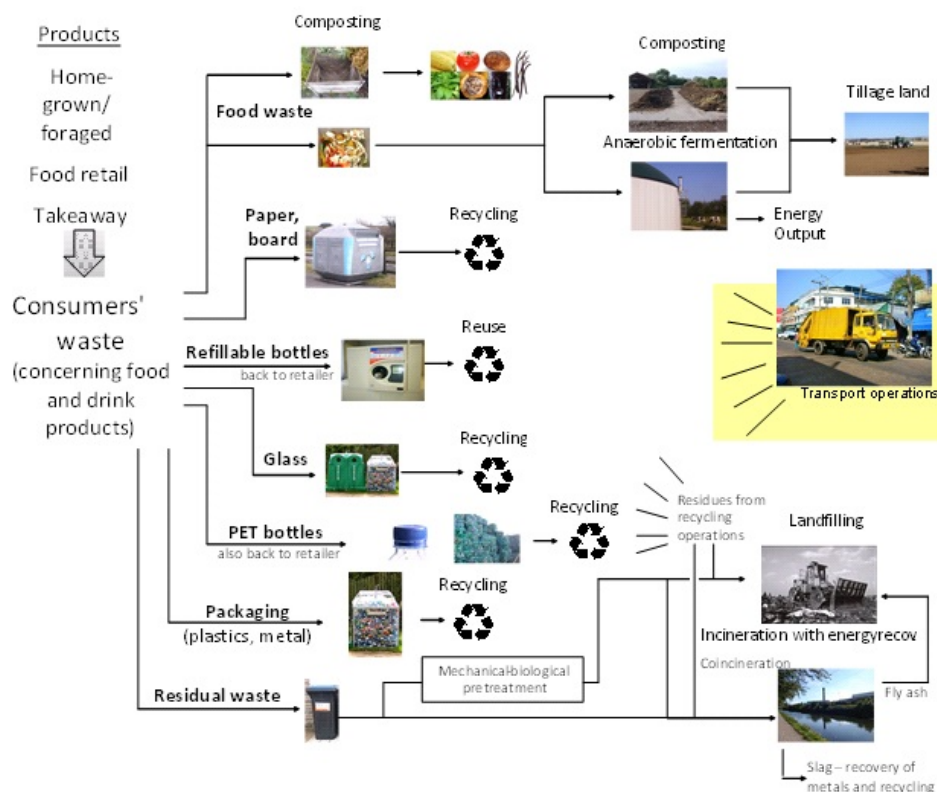


Figure 1. Important waste streams concerning municipal waste

Detailed waste monitoring requires regular analysis of the composition of mixed waste: this activity needs to be carried out in detail, (i) selecting a representative waste sample and (ii) in different periods of the year (i.e. to reflect seasonal changes). Knowledge of the composition of mixed waste then drives the improvements to the waste management strategy to further increase the capacity of the system to recycle and recover materials.

An important aspect of improved waste monitoring is the timely availability of data, which allows monitoring of the waste management system based on updated information. Data collected should be available for processing and analyses in a few weeks and the monitoring system should be continuously improved not only for the quality and amount of data collected but also for the time needed to obtain data to be processed.

Data collected and analysed can be used for internal purposes (e.g. evaluating the potential implementation of a new waste management measure, driving improvement of the waste management system) and for providing the required transparency to citizens. In fact, an annual waste management report can be published, providing an overview of the operation of the existing facilities and of the quantities of all collected, processed and recycled waste streams.

Additionally, in the coming years, advanced waste monitoring and web-based tools will be able to gather data on the waste streams collected at single household level and share them with citizens (called know-as-you-throw). The information could be used, apart from for defining the variable part of the PAYT (if present) tariff, to inform residents of their specific waste generation, increasing environmental awareness, promoting waste prevention and helping them in improving separate collection at source.

Environmental benefits

Improved waste monitoring does not lead directly to any environmental benefit. However, detailed knowledge of the quantities and quality of the waste streams collected and treated can lead to a better waste management system with a consequent improved environmental performance (e.g. higher recycling rates). In fact, on the basis of exact quantities of the different waste streams, the efficiency of measures adopted in the waste management system can be determined and optimised, e.g. the management capacity of treatment plants can be improved, the collection of the different waste fractions can be optimised and a more accurate post calculation of fees can be achieved.

Side effects

Due to the improved waste monitoring, there are no known significant environmental cross-media effects.

Applicability

Detailed waste monitoring is applicable to all local authorities and waste management companies managing municipal solid waste. For organisations starting the process, waste monitoring may focus first on the most relevant waste fractions and then it can be extended to all fractions, step by step.

Economics

No detailed information about the costs for establishing and running improved waste monitoring is available. Economics is affected by the level of monitoring adopted, the frequency, the number of fractions monitored, the human resources involved, and the tools used for data analysis.

Driving forces for implementation

The legal requirements at EU and national level concerning recycling rates and the rates for diversion of organic waste away from landfills as well as the need to determine the efficiency and effectiveness of waste management systems are the driving forces for improved waste monitoring.

Reference organisations

Many cities and counties throughout Europe, (for example Copenhagen, Hamburg, Barcelona, Bristol, Milano, Val di Non, Aschaffenburg, Schweinfurt and Lombardy) have detailed waste monitoring of waste fractions. In the specific case of Lombardy, the Regional Waste Monitoring Centre (O.R.So - Osservatorio Rifiuti Sovraregionale) of the Regional Agency for Environmental Protection of Lombardy (Agenzia Regionale per la Protezione dell'Ambiente della Lombardia) has set up a system to systematically collect data on single waste streams; this system is subject to continuous improvement. <http://www2.arpalombardia.it/siti/arpalombardia/imprese/rifiuti/Pagine/ORSO.aspx>

In the case of Val di Non (Italy), regular (four times per year) and comprehensive waste monitoring (quantification of separate amount of fractions collected and composition analysis of residual waste) is carried out in the local area (Comunità Val di Non, 2017). Some results are publicly available at <http://www.comunitavaldinon.tn.it/Aree-Tematiche/Gestione-rifiuti/Statistiche-raccolta-differenziata>

Another relevant reference organisation is ORDIF (Île-de-France Regional Waste Management Observatory) which every year issues a dashboard summarising the main figures related to waste management in the Paris region (prevention, collection, treatment, costs, environmental impact, etc.) extracted from its various studies and surveys. The dashboard has proved to be a comprehensive and practical reference document for regional waste stakeholders. The dashboard is available here: <http://www.ordif.com/public/document.srv?id=18805>.

The Swedish waste management company Avfall Sverige, a public organisation managing the waste collection and treatment of the vast majority of household waste in Sweden, has also developed a detailed monitoring system, which can be easily consulted online, via a website (Avfall web). The online system allows the user to check the waste management data of specific municipalities and waste treatment facilities. A number of indicators (e.g. waste generation per capita, waste sent to energy recovery) can be freely consulted and results compared thanks to an easy interface (Svensson, 2015, personal comm.).

In terms of methodology, the Regions for Recycling project (R4R, 2014) can be considered a reference. In this EU-funded project, due to the difficulties of comparing data from different territories across Europe (see also http://www.regions4recycling.eu/upload/public/Reports/R4R_Data_comparison_main_findings.pdf), 13 EU partners together defined a common method to monitor, present and compare waste management data and recycling performances. The method is based on several elements (R4R, 2017):

- a common scope for municipal waste;
- a common indicator called 'DREC' (Destination REcycling) that only includes homogeneous waste fractions sent and accepted by the recycling sector (i.e. no significant contamination is included);
- a framework for detailing 'external factors' (i.e. factors having an impact on waste management performances over which the territory has little to no influence), acting as parameters allowing the identification of comparable territories;
- a framework for 'local instruments' detailing all the different policy instruments at the disposal of public authorities to organise and improve waste management/recycling;
- an online tool allowing any territory to input its own data according to the R4R method and to benchmark it against other territories.

In terms of advanced waste monitoring systems and web-based tools able to gather data on the waste streams collected at single household level and share information with residents (know-as-you-throw), there are currently some examples of municipalities experimenting with them within the framework of a PAYT system or without the adoption of PAYT. Relevant references are the municipality of Brive-La-Gaillarde (FR) <http://incitation.sirtom-region-brive.net/> or webtools such as <http://garbagesportello.harnekinfo.it/ElencoAziende.aspx> where each user can access their real-time waste production, or the app <http://www.riciclaro.it/cosa-fa-riciclaro/>.

Literature

Comunità Val di Non, 2017. Personal communication on the monitoring of the waste management system on 25/07/2017.

Landkreis Aschaffenburg (County of Aschaffenburg) (2014). Abfallwirtschaftsbericht 2013 (Waste Management Report 2013) (in German). http://opus.kobv.de/zlb/volltexte/2014/24230/pdf/AWB_2013.pdf last access September 2017.

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Regions for Recycling (R4R) (2017). Regions For Recycling EU-funded project website: <http://www.regions4recycling.eu/home>, last access September 2017

Svensson (2015)