

# Modelling waste flows

## The Helsinki Region Environmental Services Authority introduces a novel monitoring tool for waste management

**H**elsinki Region Environmental Services Authority (HSY) is a municipal actor producing waste management and water treatment and distribution services for over one million inhabitants in the Helsinki region, Finland. HSY also provides information regarding land use, population statistics and air quality for residents and decision-makers. HSY organises waste management for residential properties and for public administration, supplying high quality drinking water for inhabitants.

### Wastes to resources

HSY has made significant investments to make sorting easy in the Helsinki region, collecting around 200,000 tonnes of mixed waste from households and public organisations every year. With the organic waste landfill ban, the disposal of mixed waste has ended and is nowadays taken to the waste-to-energy plant of Vantaa Energy. Introduction of the plant enables significant reduction of fossil fuel use and carbon dioxide emissions. In addition to mixed waste, around 50,000 tonnes of biowaste is collected separately. Biowaste is treated at the waste treatment centre of HSY, where a partial flow digestion process combining composting and anaerobic decaying technologies was introduced in 2015.

Waste containers for recyclable waste can be found either at the waste container storage area of housing companies or additional waste collection facilities usually located within or in the immediate vicinity of the residential areas. Recycling is promoted through a network of waste sorting stations and approximately 130 recycling points (Fig. 1), which are maintained in co-operation with Finnish Packaging Recycling RINKI Ltd and HSY.

The waste treatment centre is the biggest of its kind in the Nordic countries. The main operations of the centre include the treatment

of source-separated biowaste, the treatment of ash and slug from the waste-to-energy plant, the collection and utilisation of landfill gases, and the treatment of contaminated soil as well as landfill treatment. One waste sorting station is also located in the area. The waste treatment centre is going through a transition to a resource-efficient eco-industrial centre.

### Higher material efficiency with better material information

HSY contributes to environmental objectives in various forums and has set strategy-based environmental indicators which are regularly monitored. A monitoring system for the material flows of the waste and water treatment operations has been created, and the resulting information is collected in a material balance that is regularly updated.

Besides mixed waste and biowaste HSY receives over 200 megatonnes of other materials every year, most of which is water and wastewater. The material balance enables detailed information on the material flows and contributes to the improved performance of the operative processes and increased material efficiency.

The Ekomo area provides a platform for companies for developing industrial symbioses based on the material flows and energy resources of the region. Here, companies can utilise waste streams and renewable energy, gathering all kinds of players from the circular economy to collaborate with HSY, as well as with each other. The aim is to increase the upgrading value of materials as much as possible.

Ekomo's aim is to create a versatile piloting-friendly environment in the area where new innovations can be developed by piloting,

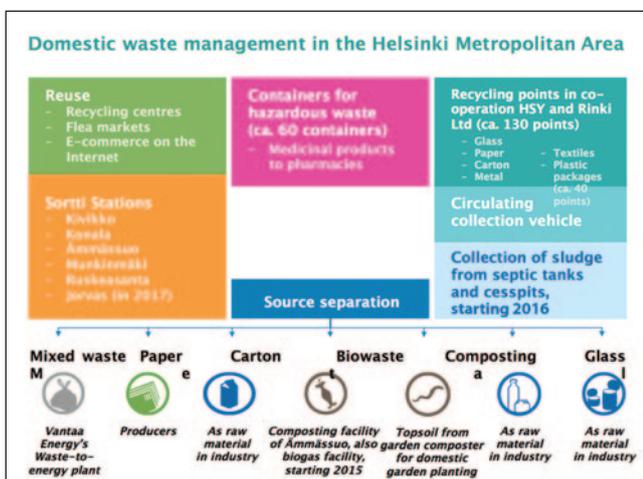


Fig. 1 Domestic waste management in the Helsinki metropolitan area



Fig. 2 The waste treatment centre of HSY is going through a transition into a resource-efficient Ekomo Eco-industrial centre

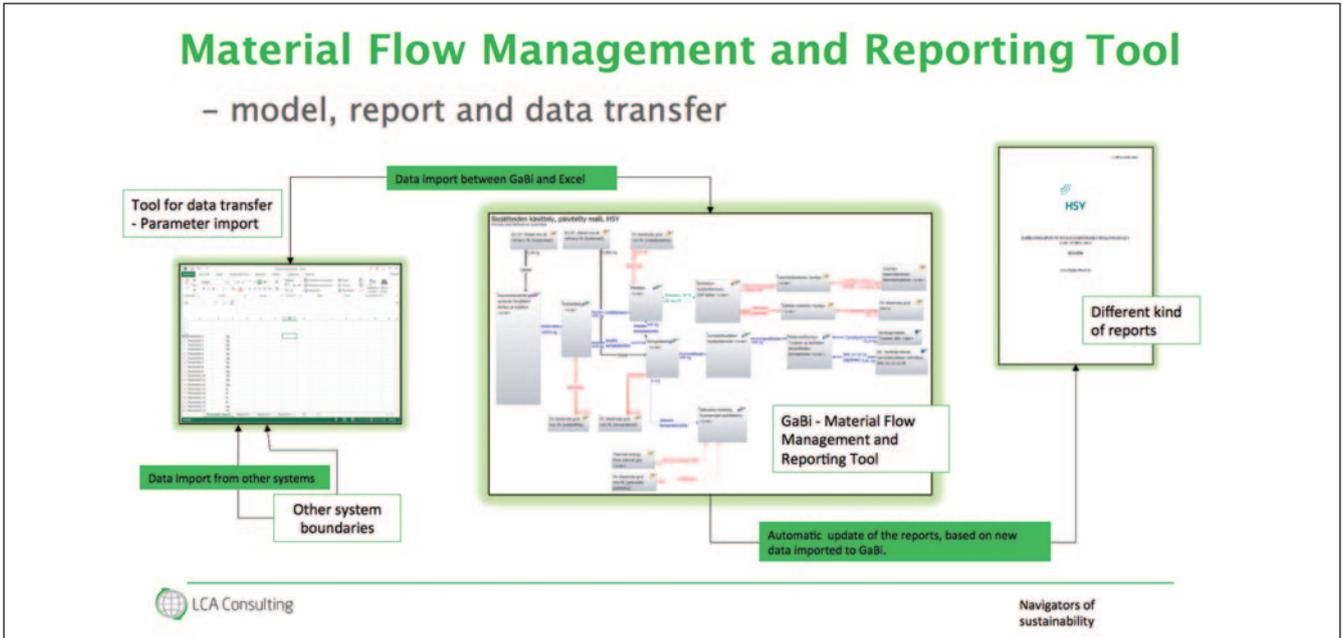


Fig. 3 The GaBi-based monitoring tool developed for material balance calculation of HSY

testing and processing, among others, industrial material and side flows, as well as biowaste.

The Ekomo area also provides a platform to implement R&D activities together with research institutes and universities, for example.

At HSY's five sorting stations households and enterprises can bring waste that is unsuitable for conventional waste collection at their own facilities. The recyclable materials that can be brought include, for instance, sorted renovation and construction waste, impregnated wood, gypsum, garden waste and brushwood, as well as electric and electronic equipment. Wastes such as domestic hazardous waste, metal, glass packages, cartons and cardboard, paper and electrical and electronic equipment can be brought free of charge, whereas bringing mixed waste, for example, is subject to a charge. The charge policy is to promote recycling and to reduce waste.

**A new tool for monitoring**

To provide up-to-date information on the material flows a novel GaBi-based monitoring tool (Fig. 3) has recently been developed as part of the overall material balance of HSY. The tool calculates numerous material utilisation efficiencies and balances, including all waste management processes at the waste treatment centre, sorting stations and waste-to-energy plant. At the waste treatment centre utilisation efficiencies are calculated for each material flow. Material, water and energy balances are calculated for the whole waste treatment centre. Monthly and yearly reports of material balances and efficiencies can be created and updated easily with this monitoring tool. In addition, treatment-specific reports can be produced for all treatment processes at the centre.

In addition, environmental impacts caused by waste treatment as well as avoided impacts due to waste material utilisation can be calculated. Moreover, the tool enables the calculation of nutrient recycling efficiencies, which is important from the circular economy point of view.

This novel monitoring tool provides valuable information on utilisation efficiencies, as well as other important indicators. It

provides information for present waste management operation and provides valuable information for enhancing waste treatment processes in order to achieve environmental and material efficiency objectives today and in the future.

According to its strategic goals, which the tool helps to achieve, HSY is going to play an important role in improving the material and energy efficiency of the region and in utilising the material flows. HSY's vision by 2020 is to provide responsible, effective and evolving water services, waste management and regional environmental information services for the needs of the growing population - benefitting both residents and the environment.

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