GNF Publication 4/2022

HOUSEHOLD WASTE MANAGEMENT

in the Helsinki Metropolitan Area and Mikkeli Region

– operational models, practicalities and pilots

gnf
Green Net Finland

COOL4CITY

Publication is the final report of the Green City by Smart Waste Management (Cool4City) project

Co-funded by the European Union

Publications of Green Net Finland 4/2022
November 2022

gnf Green Net Finland

HSY

METSÄSAIRILA MIKKELI

Uutta elämää Group

Graphic design: Tiina Kuoppala, Graforma 2022, Photo images © Bigstock

Contents

Introduction and disclaimer

This report is an output of the Cool4City project. The project work was started in March 2021 and will be finalized till the end of 2022. Expected outcomes/results of the project:

- to facilitate the development of innovative waste management systems
- to develop environmental awareness and literacy of citizens
- to support environmental SMEs businesses development, social entrepreneurships and circular economy

First year of implementation was done in collaboration between St. Petersburg and Finnish partners. Since March 2022 the project has been implemented by Finnish partners only. This report is covering only Finnish part of the project, which include activities structured in the following working packages:

- Business models of waste management
  - Description of housing waste management systems, operational models and practicalities in Helsinki Metropolitan area
  - Description of housing waste management systems, operational models and practicalities in Mikkeli region
  - Get to know in practice – visits to Mikkeli and Helsinki
- Gathering information on EU waste management legislation and its adopting in Finland
- Pilot(s) within HSY in Helsinki Metropolitan area
  - Use of waste incineration IBAA in concrete elements
  - Information pilot in housing companies of the Helsinki Metropolitan area
- Piloting new models for recycling and source separation in the city of Mikkeli

The main objective of this report is to sum up the main results of the Finnish part of Cool4City. Delivered prior to this final report publications and other materials are utilized as the main source of this summing up report.

Work on this report was shared between project team as following:

Evilina Lutfi and **Susanna Nuolimaa-Fere**,
Green Net Finland *(design, editing, translations, proofreading, communication with outsourced expert on layout and graphic design and writing)*

Kirsi Karhu, **Sari Kemppainen** and **Hanna Tukiainen**,
Helsinki Region Environmental services HSY
(writing about HSY pilots)

Pauliina Kukka, Uutta elämää Group and
Soili Maunula, Metsäsairila Ltd. *(writing about Mikkeli pilots)*

List of abbreviations and concepts

Abbr	Name in English	Original name in Finnish
MWMO	municipal waste management organisation	kunnallinen jätelaitos
MSW	municipal solid waste	yhdyskuntajäte
LLC	limited liability company	osakeyhtiö – Oy
VAT	value added tax	arvonlisävero
L	litre	litra
IBAA	Incineration bottom ash aggregate	
	local collection point biowaste	aluekeräyspiste biojäte
	local collection point mixed waste	aluekeräyspiste sekajäte
	joint collection point	yhteis-/kimppakeräyspiste
	property-specific	kiinteistökohtainen
	summer home	kesämökki
	vacation home	vapaa-ajan asunto
	multi-compartment bin for packaging waste	monilokeroastia pakkausjätteelle
	deep collection container	syväkeräysastia

List of figures and tables

© Bigstock

1. Housing waste management systems in selected regions of Finland

Finnish part of the Cool4City is covering two regions of Finland – Helsinki Metropolitan area and the City of Mikkeli. Municipal waste management organisations (further – MWMOs) of those regions are part of the project consortium:

- Helsinki Region Environmental services HSY is MWMO of Helsinki Metropolitan area
- Metsäsairila LLC is MWMO of Mikkeli region in South Savo

Locations and operational areas of these two MWMOs are presented in Figure 1.

Two MWMOs of the Cool4City project – Helsinki Metropolitan area's HSY and Metsäsairila in South Savo area – are representing different types of organizations and operational areas. In the following sub-chapters 1.1 and 1.2 we will present some highlights on operational models and practicalities from these two MWMOs. In more detail these MWMOs are described in other publications produced by or collaboration with Cool4City project [1].

Figure 1. Locations and operation areas of HSY and Metsäsairila.

Housing waste management system in Finland from the point of view of waste collection and pre-sorting could be framed as a set of options, which consist of property-specific waste collection and other than property-specific options (Figure 2).

By **property-specific collection** we mean in this report that MWMO or transport subcontractor of MWMO emptying waste bins/containers, which are allocated on site of the waste holder property. By **joint use/block collection** we mean such an option, in which properties allocated close to each other have common waste collection point and have joint service agreement with MWMO.

If a waste holder/household is delivering waste to a sorting station, then we meet another option – **self-delivering by customer to waste sorting station**. Such option in which property is not connected to property-specific collection network (e.g. summer home) and property owner/holder is delivering (mixed) waste to organised by MWMO point (which in common use with other "out of collection network" properties) is named by waste **local collection point both for mixed and biowaste**.

When we take a look at housing waste management in our two selected regions of Finland from the financial point of view, then we meet such a pricing element as **basic fee**.

In the following chapters we will describe operations of waste sorting stations under municipal waste management organization (MWMO) responsibility. To these self-delivering sorting stations waste can be delivered by both households as well as companies. Usually MWMOs have one bigger waste treatment center, which are called eco-industrial centers or circular economy ecosystems and in these centers there is usually one such sorting station included.

This publication is focussing on housing waste only, there are different pricing categories on waste management for companies. In the following chapters we describe housing waste management systems, operational models and practicalities in the Helsinki Metropolitan area and Mikkeli region. Chapter 1.1 describes property-specific waste collection in the Helsinki Metropolitan area, which is part of the activities of HSY MWMO. Chapter 1.2 describes property-specific waste collection in Mikkeli region, which is part of the activities of Metsäsairila MWMO. Chapter 1.3 describes waste local collection points. Chapter 1.4 describes self-delivering sorting stations in both areas. Chapter 1.5 describes other services of HSY.

Figure 2. Other than property specific waste collection.

1.1 Property-specific waste collection in Helsinki Metropolitan (HSY) area

Operational area of HSY covers five municipalities – the cities of Helsinki, Espoo and Vantaa as well as two smaller municipalities Kirkkonummi and Kauniainen. HSY is serving about 1,2 million inhabitants of the area. HSY collects municipal solid waste and recyclable wastes from the properties, operating six waste sorting stations and one eco-industrial center. Such properties, which are not reasonably accessible by the waste tracks, are using local waste collection points or can use sorting stations for a fixed annual fee. Also such arrangements as joint use of waste containers or so called joint collection is available.

In this chapter we describe HSY's services fees for **property-specific waste collection and joined collection**. HSY's services fees for property-specific waste collection (in Finnish: kiinteistökohtainen keräys) have a long list of fees. The Figure 3 shows the selection of the surface waste bins used by HSY in the properties. And in Figure 4 there are collected some examples of the fees of emptying the waste bins by HSY in 2021 and in 2022. [3]. In more detail we described operational model and fees related to property-specific waste collection in the HSY operational area in another Cool4City publication – Case examples of municipal solid waste (MSW) management in Finland – from the point of view of municipal waste management organizations (MWMOs), housing properties and natural persons [2]

Figure 3. The selection of the surface waste bins used by HSY in the properties.

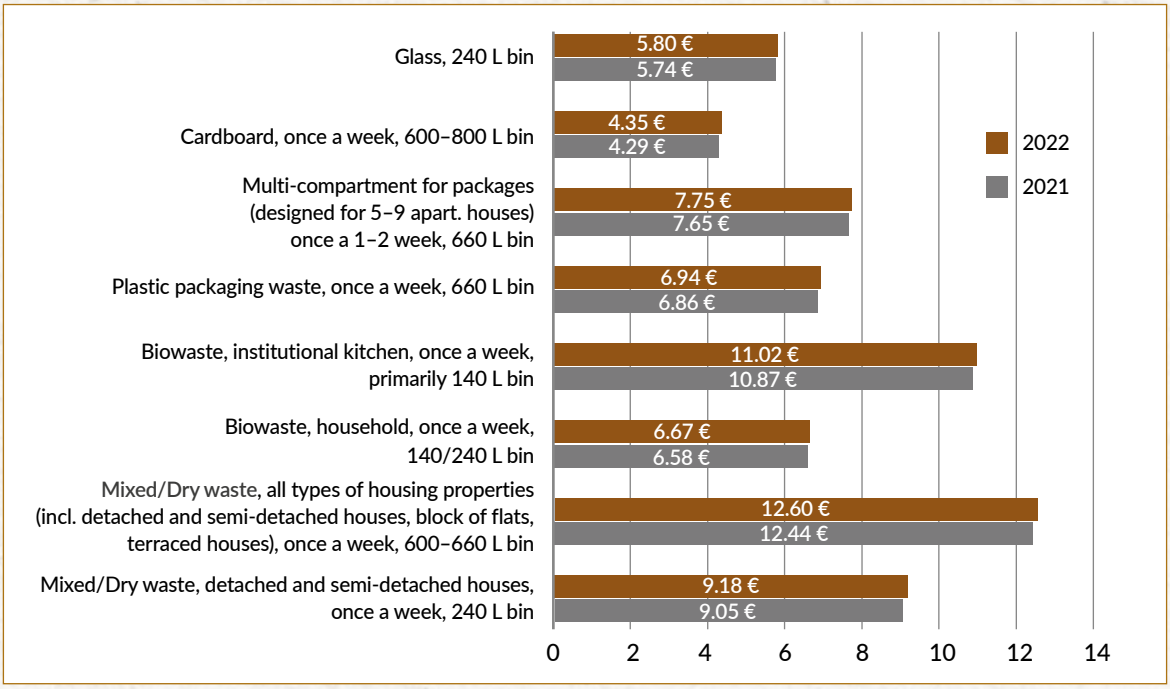

Figure 4. Examples of HSY fees for emptying the property-specific waste bins in 2021 and 2022.

For smaller properties (5–9 apartments) HSY is providing multi-compartment waste bins (Figure 5). The four-compartment container has two larger compartments for plastic packaging and cardboard and two smaller compartments for small metal items and glass packaging.

Figure 5. The Multi-compartment waste bin of HSY. *(Photo: HSY/Tero Lassila)*

If a property sets a waste point with deep collection containers, then HSY applies different fees for collecting (Figure 6). [3] The overall price for collection of biowaste and mixed waste is combined from the fixed emptying fee and the variable treatment fee based on weight of waste at the moment of emptying of the container.

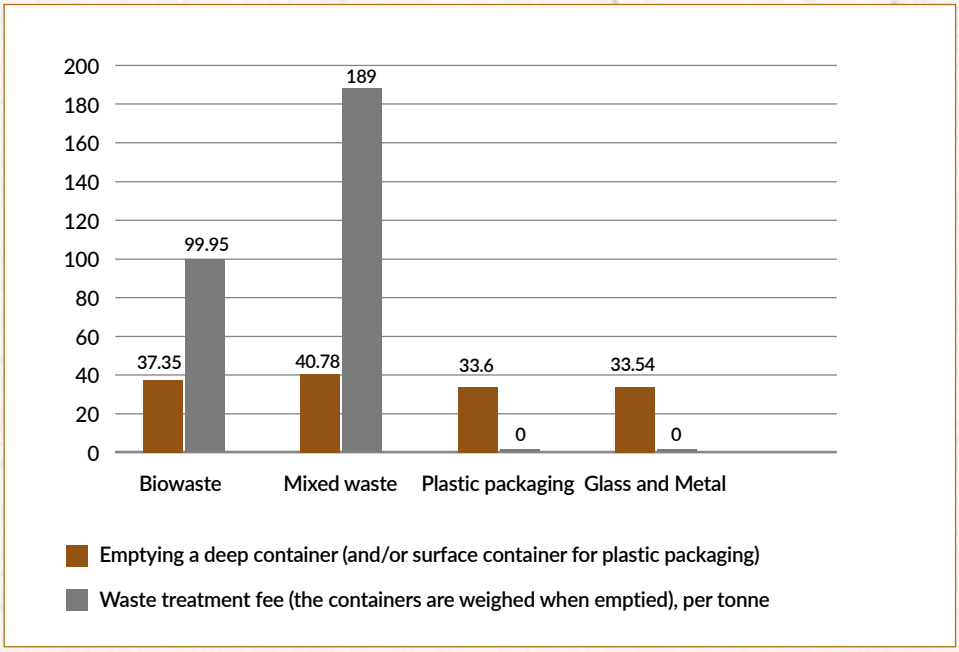

Figure 6. HSY fees for emptying and treatment of the waste collection from the deep collection containers.

For example, in the HSY case, properties adjacent to each other can make a contract with the MWMO to use a jointly owned waste container. In Finnish, such a joint collection is called *kimppakeräys* (English equivalent: *block collection*). Then, all the properties using the same container and its location are the parties of the contract. However, the contract on joint use must have a main contracting party, which acts as a contact person to HSY for container emptying and maintains the contact information on the waste container users, i.e. the joint owners in the contract. In such a case, if the waste container needs to be placed outside the property boundary, agreement on the placement of the container with the landowner should be done. The National Land Survey of Finland is keeping a register on land owners. [4]

Holiday home owners can also agree on the use of a jointly owned waste container with their closest neighbors, the road maintenance association, or another organization. It is a good option, for example, in situations where there is no road to the holiday home.

1.2 Property-specific waste collection in Mikkeli (Metsäsairila) region

Metsäsairila LLC is the MWMO of the City of Mikkeli. Metsäsairila is serving about 55 000 inhabitants, from which about 12 000 are from leisure time properties or summer cottages. Metsäsairila has a so-called basic fee cost category, which is collected from residential properties' owners (Table 1). [7] in addition to the waste collection/emptying fee. The total price of property-specific waste collection in the sparsely populated area (incl. Haukivuori and Suomenniemi settlements) consists of the emptying price (including the waste handling fee, Figure 7) and a possible deviation fee (Figure 9). Deviations from the basic pick-up route (depending on the round trip) are subject to a zone-by-zone deviation fee. There is no charge for a deviation of less than 500 m. [8]

Table 1. Basic fees of Metsäsairila in 2022.

Purpose of use	Basic fee [€/apartment/year (VAT 24%)
Permanent residence	31.00
Leisure home	18.60
An apartment in a housing company with at least 5 apartments	18.60
Apartment in a housing company with less than 5 apartments	31.00

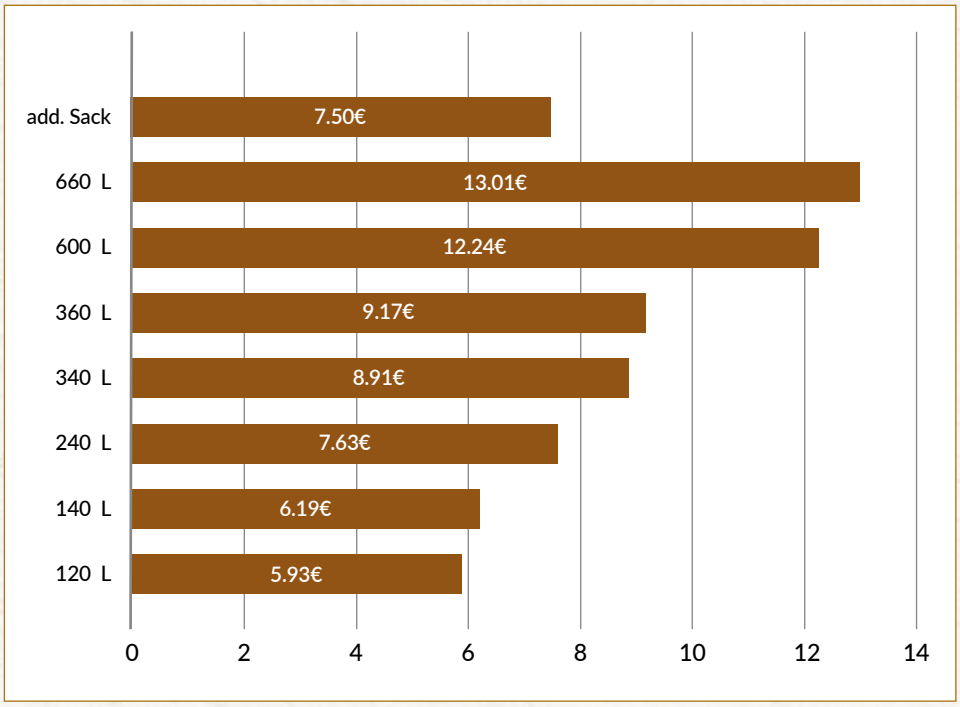

Figure 7. Mixed waste bin emptying fee (VAT incl.) in Metsäsairila's operational area in 2022.

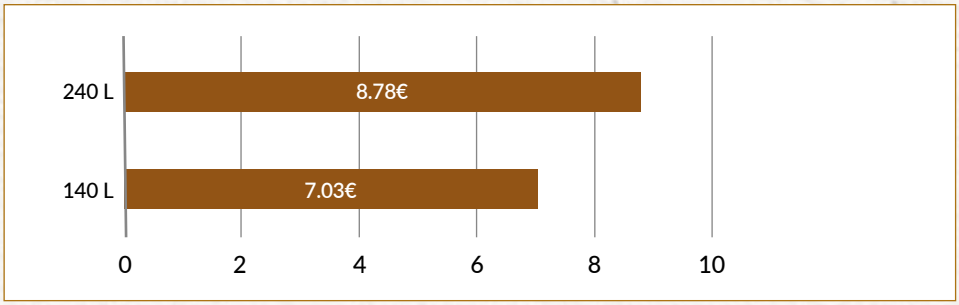

Figure 8. Biowaste bin emptying fee (VAT incl.) in Metsäsairila's operational area in 2022.

Metsäsairila provides the possibility of separate collection of biowaste in the Haukivuori and Suomenniemi urban areas (fees presented in Figure 8). In a sparsely populated area, clients should ask Metsäsairila's customer service about the possibility of separate collection of biowaste.

Properties located in urban areas close to each other can agree on the use of a **joint biowaste container**, in which case emptying costs are also shared. For such kimppa bio-community co-owner must be appointed who manages the co-op. Kimppa acquires a collection container for the property.

The cost of biowaste collection consists of fees for emptying the collection container. The bill for emptying is either addressed to the co-host or directly to each partner. The collection container must be placed in a place suitable for collection. The organization and maintenance of the collection point is the responsibility of the property owner.

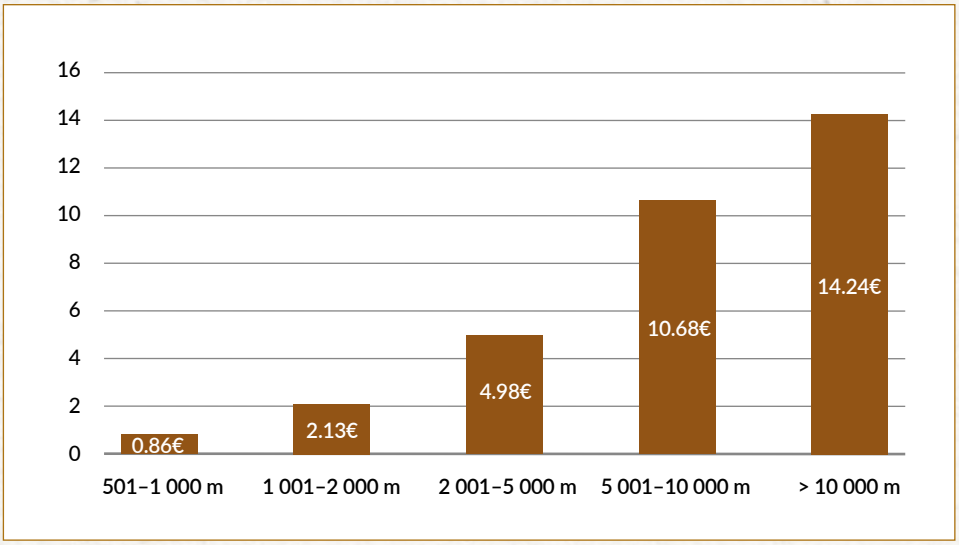

Figure 9. Deviation fees (VAT incl.) of Metsäsairila in 2022.

For the separate biowaste collection Metsäsairila is also providing such option as **local biowaste collection points**. Such points are located at **eco points** in Rantakylä, Orijärvi, Riuta, Kirjala, Urpola, Lähemäki and Kirkonvarkaus area, as well as Ristiina and Haukivuori. Both permanent and leisure residents from agglomerations and sparsely populated areas can join the local collection of biowaste. The annual biowaste collection fee is billed for use once a year. From the beginning of 2022, it is also possible to join biowaste collection for only half a year, either for the summer season (April 1 – September 30) or the winter season (October 1 – March 31). This way, for example, summer residents can use the service only in summer and the composter only in winter if the composter is frozen. The combined collection of biowaste is intended for biowaste generated in households. Garden waste or large quantities of apples is not allowed to be collected together with kitchen waste. Garden waste could be self-delivered free of charge to Metsäsairila's sorting and recycling center and small waste stations (see next Chapter 1.4).

1.3 Waste local collection points – practices in HSY and Metsäsairila

The **local collection point** option properties do not have a contract with MWMO on property-specific waste collection. E.g summer homes or all-year round in-use/ permanent living properties with no access or a difficult access by waste trucks are using this local collection point option. Each MWMO defines categories and fees for using the waste collection points. In Table 2 are presented HSY's and Metsäsairila's mixed waste local collection fees in 2022.

Table 2. Fees for using of waste local collection point, €/year, incl. 24% VAT, year 2022.

	HSY	Metsäsairila
Permanent dwelling to be used all year round	94.4	
Permanent dwelling, 2 people		89.48
Permanent dwelling, 3 people		149.72
Permanent dwelling, 4+ people		209.96
Permanent dwelling, 1 person		29.24
Holiday home or holiday apartment		61.19
Summer holiday homes/apartment to be used during the summer	35.53	

In the **HSY's operational area**, if the property cannot be reached by waste truck, the property owner can apply for the annual fee for HSY's mixed waste collection point. The points are located in Porkkala and in Långvik, Kirkkonummi and at all HSY Sortti Stations (in Finnish – *Sortti-asema*) (for more details about Sortti Stations see Chapter 1.4).

In **Mikkeli – Metsäsairila's operational area** – the thing goes with waste local collection points also in such a way that if the property is not accessible by a garbage truck, etc., waste management is handled by paying and using this point. In Metsäsairila's practice, it goes so-called automatically in areas where the garbage truck can not be driven and emptied. In other words, the customer does not have to request it himself, but the areas are already defined. According to the 2021 year's annual report, Metsäsairila has 82 such local collection points.

1.4 Self-delivering sorting stations in HSY and Metsäsairila

HSY's sorting stations for self-delivering by customers are *Sortti Stations* and Metsäsairila's station is *Kieppi*. In more detail Kieppi and Cool4City pilot on development of the operational model of it is described in Chapter (3.3.1). Generally in Finland, and particularly in the Helsinki Metropolitan area and Mikkeli region, such sorting stations are located in some distance from agglomerations, meaning the necessity of car use by customers for delivering waste to these stations. Opinion: more customers flowing to the sorting stations are usually connected with e.g. refurbishment projects, garden works of one-dwelling houses and small housing companies and starting of summer cottages period (mökkikausi).

Descriptions about HSY's Sortti Stations could be found in another publication prepared by Cool4City project [1]. Also, Cool4City project is organised get to know in practice visit to HSY's Ruskeasanta (one of the five Sortti Stations) in May 2022 and main insights of this visit are presented as a part of a blog (in Finnish) available on GNF's web-site [11]. We also listed main highlights from all Cool4City visits in Chapter 4. About textile waste separate collection on HSY's Ruskeasanta Sortti Station is also mentioned in Chapter 2.3 of this publication.

Get to know in practice visit to EcoSairila eco-industrial center and located in it Metsäsairila's Kieppi was organised by Cool4City project in June 2022. Main insights could be found in a blog (in Finnish). In Figure 10 are presented fees/prices for different waste fractions in HSY and *Kieppi* sorting stations.

E.g. bringing 150 L mixed waste sack to Kieppi costs 6€ and 200 L sack to Sortti costs 5.30€ in 2022. In HSY Sortti Stations, there are three main categories; Wood materials, plastic and textile; combustible waste, glass wool, drywall and pressure-treated wood; mineral material and non-combustible waste. In Kieppi there are three different price categories for mixed waste depending on the size of the delivered amount. Among others the garden waste and brush wood are free of charge in Kieppi for households.

Both HSY and Metsäsairila also have reuse-sorting possibility at their sorting stations. At HSY there is a collection point for Kierrätyskeskus and at Kieppi there is a collection point for Uutta elämää Group´s reuse sorting.

HELSINKI METROPOLITAN AREA
HSY SORTTI STATIONS

Sortti-hinnasto

Sortti prislista | Sortti pricelist 2022»

Hinnat sisältävät alv. 24 %
Priserna inkl. 24 % moms
Prices include VAT, 24%

	€/50 l	€/200 l	€/1 m³
Pinnoitettu puu Ytbehandlat trä | Coated wood Puiset kuormalavat Lastpallar av trä | Wood pallets Muovi Plast | Plastic Poistotekstiili Avlagda textiler | End-of-life-textiles	0,50	2	10
Palava sekajäte Brännbart blandavfall | Combustible mixed waste Kipsilevyt Gipsskivor | Gypsum plasterboards Eristevillat Isoleringsull | Insulation wool Painekyllästetty puu Tryckimpregnerat trä | Pressure impregnated wood	1,33	5,30	26,50
Kivimateriaalit Stenmaterial | Rock waste Palamaton jäte Obrännbart avfall | Non-combustible waste	3,28	13,10	65,50
Haravointijäte, risut, omenat* vieraslajit Rätsavfall, Kvistar, Äpplen, Främmande arter | Rake waste, twigs, apples, invasive alien species * Omenoiden vastaanotto vain syksyllä Mottagande av äpplen endast på hösten | Reception of apples only in Autumn			5 € Kuorma Last Load
Metalli, lasipakkaukset, paperi, kartonki, pahvi Metall, glasförpackningar, papper, kartong, papp | Metal, glass packages, paper, carton, cardboard Sähkölaitteet* El- och elektronikapparater | Electric and electronic equipment Kodin vaarallinen jäte* Farligt avfall från hushåll | Domestic hazardous waste			0 €

* Katso tuontirajoitukset | Se importbegränsningar | See reception restrictions:

HSY hsy.fi/sorttiasemat

Kieppi

Mikkeli Metsäsairila KIEPPI

PIENKUORMAT KIEPPI-HALLI

Jätelaji	€
Sekajäte 150 l/säkki	6,00
Sekajäte peräkärry tai pakettiauto, alle 2 m³	20,00
Sekajäte pakettiauto + peräkärry, yli 2 m³	40,00
Puujäte, peräkärry	6,00
Tiili ja betoni, < 150 mm, peräkärry	6,00
Tietosuojapaperi, 20 l (kaupan muovikassillinen)	10,00
Metalli, lasi, kartonki, paperi, autonrenkaat (myös vanteelliset), sähkö- ja elektroniikkaromu sekä kotitalouksien puutarhajäte, risut, vaaralliset jätteet (pl. asbesti) ja kyllästetty puu	veloituksetta

Figure 10. Prices in HSY and Metsäsairila sorting stations in 2022.

© Bigstock

1.5 Examples of other services of MWMOs

1.5.1 Touring collection vehicles of HSY

HSY organizes a touring collection once a year. The vehicles accept three different types of waste from residents free of charge: domestic hazardous waste, electric and electronic devices as well as scrap metal. HSY delivers the waste for proper treatment.

What can you bring to the HSY touring collection vehicles?

- Hazardous waste (formerly problem waste)
  Hazardous waste includes, among other things, energy-saving light bulbs, paints, solvents, cleaning chemicals and batteries.
- Waste electrical and electronic equipment
  Electrical scrap includes, for example, refrigerators, freezers, televisions, coffee makers, washing machines, computers and electric mixers.
- Metalscrap
  Scrap metal includes, among other things, bicycles, wood-burning sauna stoves, hot water heaters as well as metal containers and cans.

What can you not bring to the HSY touring collection vehicles?

- Pressure impregnated wood: small quantities can be delivered to Sortti Stations or to a reception location of Kestopuu Oy. Larger quantities must be delivered to the Ämmässuo eco-industrial centre or directly to the terminal of Demolite Oy.
- Fireworks, emergency flares, explosives, ammunition and weapons must be delivered to the location indicated by the police, apart from emergency flares, which can be delivered to the stores selling them. Medications must be delivered to a pharmacy. Deliver gas cylinders to Sortti Stations or the Kivikko Hazardous Waste.
- Car tyres: See the collection points of Finnish Tyre Recycling Ltd.

Figure 11. Touring collection vehicle of HSY.
Source: https://www.hsy.fi/en/waste-and-recycling/touring-collection-vehicles/

1.5.2 Domestic hazardous waste collection containers

In addition to sorting stations (Sortti Stations), HSY accepts almost all hazardous waste from households free of charge at **hazardous waste collection containers**. The collection is for private individuals only. Figure 12 demonstrates what cannot be brought to the containers.

⚠ **What cannot be brought to the containers:**

car batteries -> lead-acid batteries for cars and motorcycles (Pd) to Sortti Stations and collection vehicles

medications -> free of charge to all pharmacies

gas cylinders -> reception only at Sortti Stations for safety reasons

electric and electronic waste -> free of charge to Sortti Stations

pressure impregnated wood -> to Sortti Stations, fee in accordance with the price list

waste containing asbestos -> to the Ämmässuo Sortti Station, fee in accordance with the price list

emergency flares or fireworks -> return to sellers or as indicated by the police

barrels of hazardous waste -> To Hazardous waste Station at Kivikko

Figure 12. Not aloud for domestic hazardous collection point waste.
https://www.hsy.fi/en/waste-and-recycling/domestic-hazardous-waste-collection-points/
(Accessed on 25.10.2022)

2. What changes in waste legislation bring into practice?

We already described the matter in publication New Waste Act and other legislative and regulation aspects of municipal solid waste (MSW) management in Finland prepared in Cool4City project [2]. For the purpose of this publication we will summarize those and narrow contect to cover only matters related to households/ residential properties.

2.1 Separate biowaste collection in all properties

Separate collection obligations for residential properties are **limited to agglomerations**. An agglomeration refers to all groups of buildings with at least 200 inhabitants, where the distance between the buildings is usually not more than 200 meters.

Obligations for separate biowaste collection for residential properties with less than 5 apartments are relevant for agglomerations with over 10 000 inhabitants and it should be started no later than in July 2024. Properties with more than 5 apartments are obligated by Finnish national waste decree to start separate biowaste collection latest July 2022. (Figure 13).

< 5 apartments	No later than July 2024	Terraced houses Block of flats One-dwelling house
> 5 apartments	No later than July 2022 *In agglomerations with > 10 000 inhabitans*	Terraced houses Block of flats

© Bigstock

Figure 13. Timelines of obligations of separate biowaste collection in different size residential properties.

In **HSY' operational area** the most significant change is expanding the separate collection of biowaste also to properties with 1–4 households, which will be done in phases during the next two years (2023–2024):

- Espoo, Kauniainen and Kirkkonummi on 1 July 2023,
- Vantaa on 1 January 2024, and
- Helsinki on 1 July 2024.

These phases gives the residents time to prepare and allows HSY to implement the extensive change in a controlled manner, securing the functioning of transports and customer service. [5]. HSY provides choice for its customers – traditional or ventilated collection bin and its emptying. As an option, properties located close to each other can also order joint use of waste containers for sorting other types of waste collected from properties, allowing them to share their waste management costs. Independent composting in an own composter designed for food waste is an alternative to separate collection of biowaste. Composting requires submitting a composting notification to HSY (see Chapter 2.2.2) but, in this case, the property does not need to order a separate biowaste collection container.

The obligation to collect biowaste separately does not apply to holiday homes located in HSY operational area. However, if holiday homes compost any food or toilet biowaste, they will also need to file a composting notification.

On small properties, the emptying intervals of mixed waste containers can be made more flexible when residents sort biowaste and packaging waste separately and when only small amounts of mixed waste are generated.

General change in HSY is that when the manually movable waste bins owned by the properties reach the end of their life cycle, they will be replaced with HSY's rental bins. This guarantees improved occupational safety, smooth running of emptying services and efficient replacement of broken bins, making the process effortless for the residents as well. [5]

The obligation to collect biowaste separately has existed in Mikkeli for years. For the time being with the legislative amendment, there will be a need to make a notification of composting (see Chapter 2.2.1) and the fact that the collection of biowaste from households will be transferred to the so-called "waste collection" on Metsäsairila responsibility (i.e. the emptyings are tendered through the operator Metsäsairila).

2.2 Notification on biowaste property-specific composting

From January 1, 2023, the Waste Act obliges municipal waste management authorities to maintain a register of self-handling of biowaste on properties. The holder of the waste has a legal obligation to provide information about small-scale biowaste processing on the property to the municipality's waste management authority. The municipality's waste management authority records the reported information in the register. The processing notification must be submitted to the waste management authority at least two (2) months after starting composting. When the processing of biowaste on the property ends, the holder of the waste must notify the waste management authority. The composting notice applies to all properties with less than five (5) apartments, including those that do not compost. [12]

2.2.1 Practice in Mikkeli

In the Mikkeli area, biowaste processing information is primarily reported to the electronic **OmaSairila** service maintained by Metsäsairila at oma.metsasairila.fi. Reporting biowaste processing information does not require logging in to the service in question.

When biowaste handling information has been reported to the OmaSairila service, there is no need to submit a separate composting notification to the waste management authority. Content of the form (available in Finnish only, translation made by authors) is presented in Table 3.

Table 3. Content of the form for property-specific composting notification in Mikkeli.

"NOTE! IF YOU MEMBER OF A GROUP COMPOSTOR, IT IS ENOUGH THAT ONLY THE OWNER OF THE GROUP MAKES THIS NOTIFICATION OF ALL PROPERTIES BELONGING TO IT.

This notification is required if food waste is composted on the property. Food waste refers to food residues, fruit and root peels, coffee grounds, fish and meat waste and other organic waste generated in the kitchen.

✿ **You do not need to submit this notification for composting garden waste.**

Information marked with * is mandatory.

Property information

Property ID

Type of building *: (options to select: one-dwelling house, terrace building, block of flats, two-dwellings house, summer or vacation home, other what?)

Number of apartments *

Compostor information:

☐ Homemade
Building material: ____

☐ Factory made
Model / Brand

☐ Indoor composter/Bokashi
Model / Brand

Compostor size / volume (litres) *

Structure:

☐ thermally insulated

☐ rodent proof

☐ not thermally insulated

☐ not rodent proof

More information about the composter / composting

Compostor operating information

Run

☐ Whole year

☐ Months of use: ____

Location

Compost may not be placed fifteen (15) meters closer to a household water well or water area, nor four (4) meters closer to the boundary of the plot without the neighbor's consent.

☐ The distance from the nearest neighbor's border is more than 4 m

☐ Distance from the nearest neighbor's border less than 4 m
(neighbor's consent required)

Neighbor's consent

☐ In demand

☐ Not asked

Property information

- Name of the contact *****
- Telephone number +358... *****,
- Email address *****
- Address of the property where composting takes place: ZIP code, Postal district *****
- Name of property owner, if not the same as above
- Address of the property owner, if not the same as above

More information

IF YOU ARE THE HOST OF A GROUP COMPOSTOR, PLEASE REPORT THE ADDRESSES OF PROPERTIES CONNECTED TO THIS COMPOSTOR AND THE NAME OF THE CONTACT PERSON.

If the OmaSairila service is not available, a composting report can be submitted to the waste management authority using a composting notification form via City of Mikkeli e-service (see screenshot in Figure 14).

Figure 14. Screenshot of composting notification form (Kompostointi-ilmoitus / biojätteen käsittely kiinteistöllä) on the City of Mikkeli e-service portal.
Source: https://www.mikkeli.fi/sisalto/palvelut/asuminen/jatehuolto/hakemuslomakkeet

2.2.2 Practice in Helsinki area – HSY

In HSY operational area composting notification could be done in Finnish via HSY e-service, Figure 15. [6]

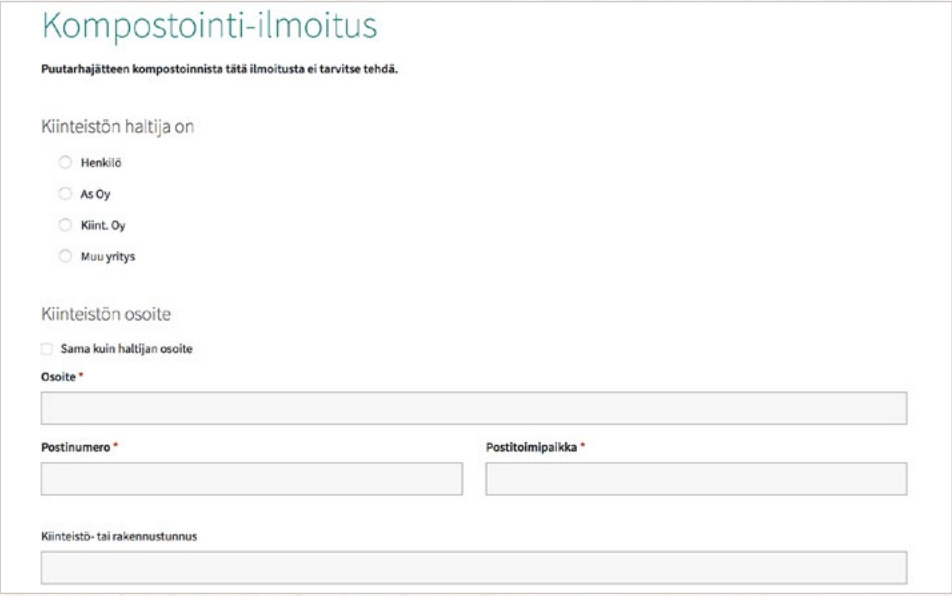

Figure 15. Screenshot of composting notification of HSY.

For composting garden waste you do not need to submit the notification.

HSY should be notified of composting if:

- there are five or more apartments participating in the composting (until new regulations from 1.11.2022)
- composting toilet waste
- applying for the emptying interval of the mixed waste container to be extended (to eight weeks)

The form itself is only in Finnish, but HSY is providing general information on the subject also in English via https://www.hsy.fi/en/waste-and-recycling/composting-on-properties/ (accessed on 17.8.2022). In Table 4 is presented information needed for filling the form.

Table 4. Content of HSY's form of composting notification (kompostointi-ilmoitus) as on 17.8.2022.

Kiinteistön haltija on:	**The owner of the property is:**
Henkilö	**Person**
As Oy	**Housing Company Ltd.**
Kiint. Oy	**Real Estate Ltd.**
Muu yritys	**Another type of enterprise/company**
Kiinteistön osoite	**Property address**
Sama kuin haltijan osoite	**Same as holder address**
Osoite *	**Address ***
Postinumero *	**ZIP code ***
Postitoimipaikka *	**Postal district ***
Kiinteistö- tai rakennustunnus	**Property or building code**
Jätepalvelutunnus	**Waste service code**
Rakennustyyppi *	**Building type ***
Omakotitalo	**Detached/one-dwelling house**
Kerrostalo	**Block of flats**
Vapaa-ajan asunto	**Holiday/summer home**
Paritalo	**Semi-detached/two-dwellings house**
Rivitalo	**Terraced house**
Muu, mikä?	**Else, what?**
Asukasmäärä *	**Number of inhabitants ***
Mikäli haluat muuttaa tyhjennysväliä, ole yhteydessä asiakaspalveluun p. 09 1561 2110	**If you want to change the emptying interval, contact customer service on 09 1561 2110**
Kompostorin tiedot	**Compostor information**
Mitä kompostoidaan *	**What is composted ***

Talousjätettä	**Household waste**
Käymäläjätettä	**Toilet waste**
Etäisyys lähimmästä naapurin rajasta (metriä) *	**Distance from the nearest neighbor's border (meters) ***
Kompostorien lukumäärä (kpl) *	**Number of composters (pcs) ***
Kompostoreiden tilavuus yhteensä (litraa) *	**Total volume of composters (litres) ***
Kompostorin käyttökuukausien lukumäärä *	**Number of months of use of the composter ***
Kompostorin rakenne (oltava haittaeläimiltä suojattu) *	**Structure of the composter (must be protected from pests) ***
Tehdasvalmisteinen	**Factory made**
Omatekoinen	**Homemade**
Lämpöeristetty	**Thermally insulated**
Lämpöeristämätön	**Not thermally insulated**
Mahdollisia lisätietoja rakenteesta, ilmanvaihdosta tms. seikasta	**Possible additional information about the structure, ventilation, etc (max. 1000 characters)**
Jätteen käsittelystä vastaava henkilö	**The person responsible for handling waste**
Etunimi *	**First name ***
Sukunimi *	**Last name ***
Puhelinnumero *	**Telephone number ***
Sähköpostiosoite	**Email address**
Asiakkaalla on laissa väestötietojärjestelmästä ja Väestörekisterikeskuksen varmennepalveluista (21.8.2009/661) määritelty turvakielto.	**The customer has a security ban defined in the Act on the Population Information System and the Certificate Services of the Population Register Center (21 August 2009/661).**
Ilmoittajan tiedot	**Information of the notificator**
Ilmoittaja on sama kuin käsittelystä vastaava henkilö	**The informant is the same as the person responsible for processing**
Etunimi *	**First name ***
Sukunimi *	**Last name ***
Sähköpostiosoite vahvistusviestiä varten	**Email address for confirmation message**
Puhelinnumero *	**Telephone number ***

Information marked with * is mandatory.

2.3 Textile waste generally and HSY example

Recycling of textile waste is one of the relevant topics in Finland to the moment of writing of this report. Obligative (according to Waste Act) textile waste separate collection should be started in Finland in July 1 2023. Finnish MWMO:s are making preparations to implementation.

HSY is organizing **textile waste collection points in Sortti Stations** (Figure 16). End-of-life textiles are unusable clothing and household textiles that can be used as material. They are collected at Sortti Stations subject to a charge [3]:

m^3/1000 litres	200 litres (refuse sack)	50 litres (box)
€10.00	€2.00	€0.50

Figure 16. Textile fraction separate collection point on HSY Ruskeasanta Sortti Station.
(Photo: Evilina Lutfi 11.5.2022)

There has also been a pilot for textile waste sorting until the end of 2022 clothing and textiles that are in good condition are suitable for reuse as they are. The collection of end-of-life textiles expanded in the Helsinki Metropolitan Area at the beginning of January 2022 when HSY launched a free collection trial in nine shopping centers in Helsinki Metropolitan area. Dry and plastic bagged items can be delivered to the sorting. In the spring 2022 already 20 tons of textile material was collected in this pilot.

3. HSY's and Metsäsairila's pilots in Cool4City project

During the Cool4City project, at HSY there were two different types of pilots carried out. For households there was an information pilot where participants got more information about waste recycling (see Chapter 3.1) and another pilot was production of concrete elements/blocks from the side stream of the waste-to-energy plant (see Chapter 3.2). In the Mikkeli region, Metsäsairila and Uutta elämää Group conducted pilots such as a new operating model development for reuse-recycling-station (see Chapter 3.3.1), survey on awareness about this station (see Chapter 3.3.2) and regional collection of reusable goods by routing vehicle (see Chapter 3.3.3)

3.1 HSY's information pilot for households

3.1.1 Background and objectives

HSY has stated a strategic goal in order to achieve a 60 % recycling rate in the capital region until 2025. The share of biowaste of the mixed waste is still 39%, based on the sorting tests conducted by HSY in 2019.

To achieve the goal, measures on communication and advisory are needed among other steering methods. New ideas were planned to be tested in the project. The campaign encouraged residents to sort biowaste in particular, and the aim was to get residents to sort more actively and thus get more biowaste to be utilized as material.

3.1.2 Implemented activities in the resident activist pilot

Lifecycle of the HSY pilot was August 2021– September 2022. **Pilot planning began in August 2021**, brainstorming for pilot planning in October–November 2021. A workshop in October 2021 was held within the organization to brainstorm the pilot theme. The ideas that came up were reviewed and voted on by the HSY's project group. The help of resident activists in housing companies was chosen to be piloted, in order to increase the sorting activity in the households.

The **communication of the resident activity pilot began at the beginning of 2022**, when the pilot was announced on HSY's Facebook and Instagram accounts and the residents were encouraged to participate in the pilot. With moderate communication, **53 resident activists** were brought on board. We actively communicated with resident activists in **spring 2022**. **Biowaste bags (five per each resident) and an information letter were distributed to the resident activists, a short sorting guidance was held, and an initial survey was conducted**.

In late spring and summer, resident activists were provided with up-to-date information related to recycling, for example, about a hazardous waste collection truck tour, where the residents can bring hazardous waste free of charge.

The feedback received has been almost exclusively enthusiastic and positive. We had a kick-off meeting for the resident activists. The meeting included a short training on waste sorting. There were approximately thirty participants in addition to the project manager and HSY's environmental expert.

The pilot was conducted in **March – September 2022**. During the pilot the resident activists were informed about the latest sorting issues. The pilot involved 53 housing companies, eight (8) of which had deep collection containers for biowaste and mixed waste. Participating housing companies were located in Helsinki, Espoo, Vantaa and Kauniainen.

As part of the pilot, we developed a visual element, to be attached on the lid of the mixed waste containers in the waste rooms. Informative and "eye-catching" **campaign sticker** (Figure 17) was designed to increase the sorting activity of residents and thus to reduce the amount of biowaste in the mixed waste.

Figure 17. Campaign sticker used in the HSY information pilot for households.

The pilot investigated changes in waste volumes by waste weighting during the activities of resident activists and the experiences gained from resident activists. Mixed waste and biowaste containers are weighed each time they were emptied, so weighing information was obtained about changes in the collection volumes.

3.1.3 Results of the pilot – changes in waste volumes and feedback from the residents activists

Changes of volumes of biowaste and mixed waste

The best results were visible in May 2022, about a month after the pilot implementation was started. The longer-term effects were visible in September 2022. As a result of the campaign, the collection of biowaste was increased and collection of mixed waste was decreased.

The collection volumes of biowaste had increased by 20% in May 2022, compared to April of 2021. In September 2022, the collection volumes of biowaste were still 8% higher than in September 2021.

Similarly, the amount of mixed waste had decreased during the project. Immediately after the spring 2022 campaign activities, the amount of mixed waste has decreased by 7%. After a few months in September 2022, the amount of mixed waste has still been 5% lower compared to September 2021 (Table 5).

Table 5. Changes in waste weight in the pilot housing companies.

	Change March 2021 vs. 2022 (%)	Change September 2021 vs. 2022 (%)
Mixed waste	– 7%	– 5%
Biowaste	+ 20%	+ 8%

Feedback from the resident activists in the pilot

At the end of the campaign, a final survey was conducted for the resident activists in September 2022. 41 resident activists of 53 or 75% of the participants responded to the survey. The participants were satisfied with the pilot and could recommend it to their friends, if it is implemented again. The length of the pilot of six months was considered appropriate. 66% of the respondents had received positive feedback from their residents during the pilot and no negative feedback at all.

Table 6. Results of survey for resident activists.

Results of survey for resident activists	[%]
Great, I would recommend the campaign	53.7
Ok, positive feelings about the campaign	31.7
It was ok, no special feelings	14.6
I didn´t feel comfortable participating	0
Other	0

The residents activists of the housing company also followed the development of sorting themselves. About 80% of them thought that the residents of their own housing company had improved sorting their waste in their own property. (Table 7).

Table 7. Resident activists' opinions about improvement of sorting during the campaign.

Recidents activists´opinions about the improvement of sorting during the campaign	Share [%]
Yes, residents started to sort better and continued it nicely in autumn	7.3
Yes, residents started to sort better, but the enthusiasm decreased after summer	12.2
May be small improvement	61.0
No, resident did not improve sorting	4.9
Other	14.6

The resident activists communicated via different channels with their neighbors, e.g. Facebook account of the housing company, WhatsApp, information board of the housing company, general meeting of the company, information letter on biowaste collection bag (Table 8).

Table 8. The resident activists communicated with their neighbors in several different ways during the pilot.

Channel of communication	Share [%]
Information letter on biowaste collection bag	92.7
Information board	39.0
Information sharing in housing companies Facebook	36.6
General meeting of the housing company	26.8
Other way	14.6
Information sharing in housing companies WhatsApp	9.8
Information training organized by Reuse Center of Helsinki Metropolitan Area	2.4

3.1.4 Conclusions

Resident activity has a positive impact on the increase in the sorting of biowaste and the reduction in the amount of mixed waste in housing companies, where resident activists have encouraged residents to sort biowaste. Based on both the weighing results and the residents' own experiences, sorting activity increased in housing companies, as a consequence of the pilot.

The **resident activists** model is a cost-effective way to encourage residents to sort. Resident activists work in their own housing companies. The resident activist also encourages sorting from the "inside" of the housing company, i.e. the message reaches the residents better when using the internal channels of the housing company.

The amount of five biowaste bags as an initiative package distributed to residents is rather small. It is worth considering a bigger amount in similar cases. The cost impact here is small, but the availability of sorting bags can be an important incentive for some inhabitants to continue sorting.

3.2 HSY's pilot on production of concrete elements from side stream of waste-to-energy plant

3.2.1 Background and implementation of the pilot

One of HSY's tasks in the Cool4City project was to carry out experiments/pilot for the use of **concrete elements** made from the municipal solid waste incineration bottom ash aggregate (IBAA) of Vantaa Energy's waste-to-energy plant. Vantaa Energy's waste-to-energy plant is the largest in Finland, treating municipal mixed waste of approximately 1.4 million people, about 370 000 tonnes annually. The plant produces 7 500 tons of ash and 72 000 tons of IBAA every year.

A laboratory scale experiment has been carried out, in which a suitable mixture ratio for IBAA for the production is investigated. A report on Renotech Oy's IBAA concrete test has been completed in October 2021.

Based on the results of laboratory scale tests, a total of 50 concrete building blocks have been manufactured and created into walls in Ämmässuo eco-industrial center in Espoo in summer 2021 (Figure 20). Social media posts were made and they received a lot of positive attention.

3.2.2 Testing and results

In the following two chapters we describe laboratory testing conducted in Renotech in Turku and elements´casting tests in Takkacenter in Espoo.

3.2.2.1 Laboratory testing

HSY delivered samples of IBAA to Renotech in Turku for laboratory testing, which were tested in phase 1 of the project (0–2 mm and 2–5 mm mineral elements of IBAA and crushed concrete). In these tests carried out in the laboratory, a suitable ratio (cement + water + aggregate + additives) was sought, so that it is possible to cast concrete blocks of sufficient strength without problems from the concrete mass made with recycled aggregates. The goal was to find a functional mass that utilized as much as possible of the fine mineral matter (0–2 mm) of HSY's waste incineration IBAA. It was agreed to use crushed concrete, gravel/sand and the coarser mineral fractions of IBAA from waste incineration as the base material of the concrete. Description of Implemented laboratory tests are collected into Table 9.

Table 9. Description of laboratory tests in HSY pilot.

Item	Description
Prism tests	Mixtures of 3 kilograms cast into 4x4x16 cm molds. Monitoring: Heat development, strength development, fluidity, gas formation
Heat development	Following thermal development of masses by semi-adiabatic, as well as isothermal method.
Aggregates	Sieve curves, moisture content bulk and solid densities
Strength development	Monitor initial strength (1–3d) and final strength (> 28d) with compressive strength tests

Observations from elements´ laboratory tests that were made before the element´s actual preparation.

- In heat development, it was found that all IBAA filler experiments accelerate cement.
- For blast furnace IBAA-based companies, the best demolition rate is approx. 5 MPa. In a week, though, already 30 MPa.
- Some of the samples show hydrogen cracks, but the desired control measures, such as water and lime broth treatment, do not significantly help.
- The water volumes are high to provide sufficient flexibility and the amount of water varies
- The flexibility must be adjusted on a batch-by-batch basis by optimizing the amount of water

3.2.2.2 Casting test

Based on the proportional tests, a few different binder combinations were selected, which were used to carry out the actual casting work at the Takkacenter premises in Marttila with a 500-liter mixer (Figure 18). The aggregates and different binder combinations were mixed and cast into molds. So-called Lego molds were used as molds, with sizes of 1 200 x 600 x 600 mm. In a day, 4–7 molds were made. Tests are collected into Tables 9–10.

Figure 18. Preparation of the concrete elements in Takkacenter. *(Photo: HSY / Kirsi Karhu)*

Table 10. Concrete proportioning in the HSY pilot.

Proportions	Amount kg/m³	Type of material
Cement	350 – 390	Blended cements (see Tables 2 and 3) Geopolymers Mg cements
MSWI IBAA (IBAA)	700 – 900	0–2 mm and 2–5 mm
Natural Sand	700 – 900	0–8 mm
Water	280 – 350	Tap water
Total	2 150 – 2 250	Slightly less than normal concrete due to excess water

Table 11. Cement proportioning in the HSY pilot

Cement recipes	Kg/lego	Sacks/buckets
Binder	175	7 sacks
0–2 mm	120 (18–22 kg water)	1 bucket / 120 ltrs
2–5 mm	200 (6–10 kg water)	1,5 bucket / 160 ltrs
0–8 mm	470 (1,8–2,8 kg water)	3 bucket / 360 ltrs
added water	105–130	105–130 ltrs
Total	1 070–1 095 kg	450–550 mass ltrs

The casting went successfully, although it took more time than planned, especially in the first days. The greatest difficulties were caused by environmental conditions (approx. +30 °C temperature), as a result of which the masses were susceptible to stiffening. In the cast elements, cracking caused by hydrogen gas was noticeable on some of the pieces.

A considerable amount of information was collected from the casting tests. The temperature, strength development and fresh mass properties of the concrete elements were monitored from a few hours to months after casting. In addition, random sampling of environmental testing (shaking test) was carried out on different masses to monitor the utilization of possible crushing after use.

Figure 19. Readymade elements of HSY pilot. *(Photo: HSY/ Kirsi Karhu)*

The finished elements were transported from Marttila to Ämmässuo, where the usability of the elements was tested under practical conditions in retaining walls (h = 3 m, L = 10–15 m). The elements are still in use and have worked as expected. There were a few cracks in the beginning during the dismantling and transportation, but the elements have lasted well in use.

Figure 20. Elements of HSY pilot in use at Ämmässuo eco-industrial center.
(Photo: HSY / Kirsi Karhu)

3.2.3 Conclusion and further activities

Concrete elements can be cast from the mineral material of IBAA from waste incineration. The challenge is the fragility of the material, the water absorption capacity and the resulting control of the fluidity of the masses. Fluidity can be controlled by typical concrete technical means by adding water or additives.

The strength of the concrete elements can be adjusted by increasing or decreasing the amount of binder. The desired strength class of approx. 30 MPa is reached when the concrete recipe contains approx. 350–400 kg/m^3 of binder. Of the aggregates, 50% were mineral fractions of IBAA in different grain sizes and 50% natural aggregate. The need for cement can be reduced by dripping especially 0–2 mm fraction from the concrete mass.

HSY will use the lessons learned from the tests in its own further piloting, which has been started in September 2022. The aim is to test how the elements can be manufactured in field conditions and to compile information on costs and the work resource required. The mixing is carried out with a mixing equipment, owned by HSY, which is mainly used to stabilize ash classified as hazardous waste. The elements made in this pilot project will continue to be used in order to gain experience in the long-term durability of the elements.

3.3 Cool4City pilots in Mikkeli region

Cool4City project partners from Mikkeli region in South Savo – MWMO Metsäsairila LLC and Mikkeli Reuse Center/Uutta elämää Group (further – MS and UEG) – have been implementing pilots in close collaboration.

Mentioned in pilot descriptions in the following Chapters 3.3.1 and 3.3.3 sites related to Metsäsairila and Uutta elämää Group are:

Kieppi sorting hall (described also in Chapter 1.4), located about 8 km from the center of Mikkeli; in connection to this operated by Metsäsairila sorting station is also points and intermediate storage facilities of the Uutta elämää Group.

Uutta elämää Group's store as well as cleaning and handling workshops/facilities, located close to the center of Mikkeli.

3.3.1 Developing of operational model for Kieppi

The Cool4City project developed an operating model for receiving and sorting goods in South Savo. The reception of recyclable goods and materials is handled by MWMO Metsäsairila LLC and Mikkeli Reuse Center/Uutta elämää Group in Kieppi (Figure 21), a joint recycling and sorting center. The development work focuses on:

- reception and sorting,
- transport and storage, and
- increasing the environmental awareness of the residents of the municipality.

The development of a co-operation model between Metsäsairila and Uutta elämää Group also at the center. The piloting phase of Kieppi's operations lasted for a year, from February 2021 to February 2022.

Figure 21. The Kieppi sorting hall is located in the Metsäsairila area, about eight kilometers from the center of Mikkeli. *(Photo: Jonne Vaahtera)*

At the beginning of the Kieppi hall-building, the Uutta elämää Group accepts goods and materials that are suitable for reuse as such free of charge (Figure 22).

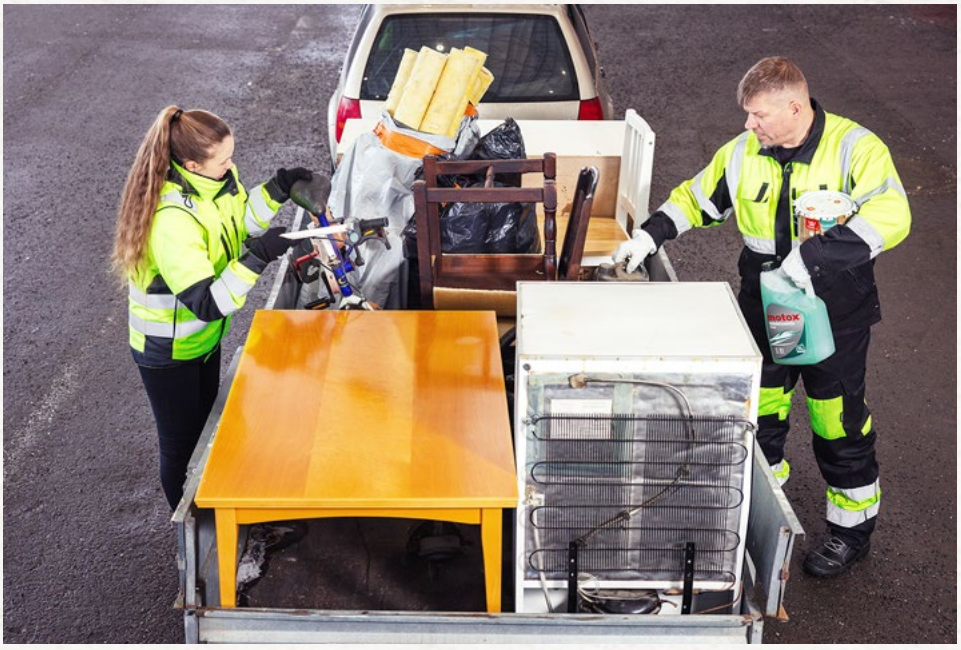

Figure 22. Working at Kieppi requires a keen eye to see the possibilities of further utilization of materials and goods. *(Photo: Pihla Liukkonen)*

The service life of usable goods is extended at the association's second location (close to the center of Mikkeli) through maintenance and repairs, and the age of the materials is extended by using them in the manufacture of recycled products (see Chapter 3.3.3).

Metsäsairila, on the other hand, is responsible for the processing of materials on the other side of the hall that cannot be reused as such. Reception hall Kieppi aims to maximize the circulation of products and materials and the value tied to them in the economy for as long as possible.

The launch of Kieppi's operations began with the planning of processes for receiving goods. Uutta elämää Group's point of view is that the co-operation model enhances the recovery of materials and requires employees to have more knowledge of the material, among other things. The idea is that anything that is not suitable for Uutta elämää Group's operations can still be left in Kieppi by the customer and it can be received by Metsäsairila, usually for either recycling or energy recovery. In some fractions, a fee is taken for reception (see Chapter 1.4). The duties at Kieppi include customer service and advice, receiving loads, assessing recyclability, sorting, maintaining the area and packing materials for transport. The operating model is based on the fact that the places where goods and materials are left are clearly marked, so that customers can unload their loads to the right places themselves. The Uutta elämää Group assesses, for example, the condition of the furniture before receiving it, as there must be a purpose and a market for all the goods received. The association's storage facilities are also limited.

At the beginning, Kieppi had two foremen and about 10 recycling workers working in three shifts on the Uutta elämää Group side. As the operating model developed, the need for personnel decreased, and the operations of Kieppi's Uutta Elämää Group are currently managed by two foremen and approximately 4–6 recycling workers in two shifts. In addition to this, Kieppi also has places for rehabilitative work activities. On the Metsäsairila side, Kieppi employs 1–3 employees, depending on the situation, to help sort the waste and monetize the verses to be paid.

Kieppi has **carried out regular occupational safety and health risk assessments**. Movement and forklift traffic in the hall have been carefully planned, as the three-lane hall occasionally has a lot of traffic. Varying weather conditions (cold, hot, drafts), noise and possible air pollutants have also been identified as occupational health risks. The hazards have been brought to such a level by means of personal protective equipment that they do not cause any harm to health or safety. In Kieppi there are hearing protectors, respirators and workwear, that is coloured and takes into account the weather conditions, in use.

When the new operating model is launched, the creation of rules and guidelines for personnel and customers will also play an essential role. Instructions have been drawn up on:

- general operating methods,
- general safety and occupational safety
- the definition of recyclability.

The induction material has been developed to be more versatile, but material knowledge requires even more training and development.

3.3.2 Survey on Kieppi's awareness

Kieppi's awareness was investigated with the help of a survey conducted as a thesis. [13]. The survey was aimed at the residents of the municipality of South Savo and SMEs, and it was carried out as an internet survey. A total of 454 responses to the survey were received. The responses to the survey showed that there is still room for improvement in awareness. However, the operating model was considered necessary and the majority of the respondents considered recycling and sorting important.

3.3.3 Regional collection of reusable goods by routing vehicle of Uutta elämää Group

As we already noticed in previous Chapters 1.4 and 3.3.1, Kieppi sorting hall is located about eight kilometers from the center of city of Mikkeli, which necessitated the need to develop a service to collect recyclable goods from local residents having no access to a car. Cool4City pilots of area collection by routing vehicle was developed and organized in the summer and autumn of 2021 and 2022. Regional collections were organized to facilitate local residents' recycling and inform them about the possibilities of the circular economy. Collections were announced in newspapers and on social media.

Figure 23. Van for collection of reusable goods in Mikkeli region. *(Photo: Jonne Vaahtera)*

The Toimintakeskus/Uutta elämää Group association's vans (Figure 23) drove along the planned route though almost all residential areas in Mikkeli, and sparsely populated areas like Otava, Ristiina, Hirvensalmi and Anttola, collecting recyclable goods. Goods were collected directly in the two vans by four part-time employees. Recyclable goods were taken to Uutta elämää Group's service and repair unit to be cleaned, serviced and repaired. After processing, recycled goods were transferred to the Uutta elämää *Myymälä* store (Figure 24): entrance to the Uutta elämää's store).

Figure 24. The Uutta elämää Group's store is located near the center in Mikkeli.
(Photo: Jonne Vaahtera)

Municipalities were asked about the necessity of the service and areas for improvement. The regional collection pilot received a lot of positive feedback in the survey. There were still gaps in the service's awareness. [10]

4. Get to know in practice – visits in Mikkeli and HSY

Cool4City organized three get to know in practice visits in Mikkeli in Dec 2021 and June 2022 and to HSY in May 2022. The visits were organized in cooperation with another project, Cata3Pult. Based on the visits five blogs were written and published at GNF website [11]

Main highlights from the visits:

- At HSY Ruskeasanta sorting station the recycling of plastics is well organized and good guidance for customers provided (see Figure 25) as well as the separate collection of textile is well organized and the pricing for this is reasonable (see Chapter 2.3 and Figure 16).
- The HSY pilot concrete elements at Ämmässuo eco-industrial center are in use (see Chapter 3.2.2) and they replace virgin material concrete material elements.
- Arrangement of logistics in Mikkeli's Kieppi sorting hall supporting taking goods suitable for reuse and upcycling out of recyclable waste, so enhancing the circular economy. Once you enter the hall, you can see the guiding board (see Figure 26), leave the reusable goods and get service from the staff of Kieppi. This is free of charge for the customers and serves well the idea of circular economy – and Uutta elämää Group receives material for the upcycling and repairing activities. Uutta elämää Group facilities are well organized and the hygienic point of view is taken seriously. They really produce remarkable economic value.
- At both sorting stations – Kieppi in Mikkeli and HSY Ruskeasanta – are well taken in consideration of the customer convenience of delivering goods and materials and the pricing is suitable (see Figure 10 in Chapter 1.4)

Figure 25. HSY Ruskeasanta Sortti Station – general view (on the left side), guiding board of plastic container and payment automaton (on the right side). *(Photo: Evilina Lutfi, 11.5.2022)*

Figure 26. Guiding board directly at the entrance to the Kieppi (on the left) and general inside and outside view (on the right side). *(Photo: Evilina Lutfi, 7.6.2022)*

5. Conclusions and future considerations

This publication is focused on business models of municipal waste management in selected region of Finland, Helsinki Metropolitan area and Mikkeli region.

The publication described housing waste management systems, operational models and practicalities in selected regions. Writers of this publication represent regional waste management operators. As source materials for the content, there were visits to waste management facilities – sorting stations and treatment centers as well as exciting information about the systems available open source internet materials.

To raise waste recycling is important because the gap between nowaday situation in recycling and the EU and Finnish targets is big. The possible success in this reduction depends also on activities in housing properties. EU and Finnish waste legislation is becoming stricter and directed to reach targets in waste recycling. This publication described the main highlights related to households. This publication is showing how differently activities are organized in practice in two regions of Finland. Before systemic change on a regional level could be achieved, different experiments and pilots are needed to seek better understanding of how to establish activities on a regular basis.

This publication describes implemented pilots, their results and outcomes in the Helsinki Metropolitan area and Mikkeli region.

Further development of the created and tested pilot on **operational model of Kieppi sorting hall** in Mikkeli as well as **co-operation model** between municipal waste management organisation Metsäsairila and reuse enhancing association Uutta elämää Group will be continued after the project. Special attention will be paid to **customer experience and awareness**. The development of these is monitored through surveys. Pilot on **reusable goods regional routing collection will transform to permanent activity** of Uusi elämä Group. Regional collections are examined from the perspective of the quantity of goods received and customer satisfaction. The collections are made as easy to use as possible and meet the needs of customers. Collection methods are constantly being developed, and investments in the marketing of regional collections will continue to be made.

The results of **HSY's resident activists pilot**, which encourages sorting, have been promising. Based on the results of the Cool4City project, HSY will **examine how it would be possible to implement and develop the operating method as part of the communication and advisory activities in the future**.

Based on the HSY pilot, **concrete elements can be cast from the mineral material of the IBAA from waste incineration**. The desired strength class is reached in the pilot and the concrete recipe to meet this strength is identified. **HSY will utilize the lessons learned from the IBAA concrete tests in its own further piloting** of elements manufacturing in field conditions and to compile information on costs and the required work resource. The elements made in Cool4City project will continue to be used in order to **gain experience in the long-term durability of the elements**.

Achieving recycling rates targets requires a lot of engagement and cooperation of municipal waste management organizations, waste management and circular economy businesses and households. Using pilots and experiments can help to find new practices to achieve goals.

© Bigstock

References

Materials produced by (in collaboration with) Cool4City project:

1. Case examples of municipal solid waste (MSW) management in Finland – from the point of view of municipal waste management organizations (MWMOs), housing properties and natural persons
2. New Waste Act and other legislative and regulation aspects of municipal solid waste (MSW) management in Finland

---

HSY web-site:

3. https://www.hsy.fi/en/hsy/pricelists/
   (Accessed on 17.8.2022)
4. https://www.hsy.fi/en/waste-and-recycling/joint-use-of-waste-containers/
   (Accessed on 17.8.2022)
5. https://www.hsy.fi/en/environmental-information/news/biowaste-collection-expands-to-all-residential-properties/
   (Accessed on 26.10.2022)
6. https://lomakkeet.hsy.fi/lomake/fi/kompostointi-ilmoitus
   (Accessed on 17.8.2022)

Metsäsairila web-site:

7. https://www.metsasairila.fi/hinnat/perusmaksu.html
   (Accessed on 18.10.2022)
8. https://www.metsasairila.fi/hinnat/jateastian-tyhjennysmaksut.html
   (Accessed on 18.10.2022)
9. https://www.metsasairila.fi/biojate.html
   (Accessed on 18.10.2022)

Uutta elämää Group web-site:

10. https://www.uuttaelamaa.fi/aluekeraykset
    (Accessed on 19.8.2022)

Green Net Finland web-site:

11. https://gnf.fi/fi/ajankohtaista/blogi/

Other sources:

12. https://www.mikkeli.fi/sisalto/palvelut/asuminen/jatehuolto/hakemuslomakkeet/kompostointi-ilmoitus
    (Accessed on 17.8.2022)
13. Tuomisto, Salla (2021); Kiepin tunnettuuden tutkiminen; https://www.theseus.fi/handle/10024/511216

gnf
Green Net Finland