



Waste Goes into the Pipe at Kruunuvuorenranta

At the new residential area in Kruunuvuorenranta in Helsinki, waste sorted at home travels from block or building-specific hatches along the main pipeline to a collection station, from which the waste trucks pick up the containers. The effective and safe system reduces the need for waste trucks operating in the area.

The innovative pipeline-based waste collection system used by Kruunuvuorenranta waste collection has been in operation since March 2017. In the first building area including Borgströminmäki and Gunillankallio, there are 14 properties within the system.

In total, 110 waste collection stations will be installed at Kruunuvuorenranta to serve the high-rise buildings. All the buildings will be included in the pipeline-based waste collection system. Once the urban area is completed, it will house approximately 13,000 residents.



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Household waste hatches can accommodate bags sized max 30 litres

The waste, which has been sorted at home, is collected with collection points located near the properties. At collection points, there are four separate hatches for bio-waste, paper, cardboard and mixed waste.



One bag sized max 30 litres can be inserted through the household waste hatch at a time. It is preferred that the bag is left a third empty. Larger cardboard packages are torn into smaller pieces. Long and large objects are not allowed to be put in the system.



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Waste bags from commercial buildings are collected with larger waste inlets

In Kruunuvuorenranta, commercial waste collection inlets for shops, offices and home care facilities are installed for bigger 150-liter bags. The formator technology developed and patented by MariMatic enables large waste bag to be placed into the system and transported in a pipe of 300 millimeter diameter.



In Kruunuvuorenranta, waste collection points for the use of shops and business premises are also installed. Formator formats the large waste bags to fit into the pipe network.



Sorted waste is transported for reuse

Waste is whooshed through the underground pipes to the shared waste transfer station in the Kruunuvuorenranta area, from which waste continue its journey on trucks. Bio-waste is transferred to Ämmässuo in Espoo to be produced into composted soil and mixed waste ends to the waste incinerator in Vantaa, to be produced to thermal and electrical energy. Paper and cardboard are transported to producers for reuse.



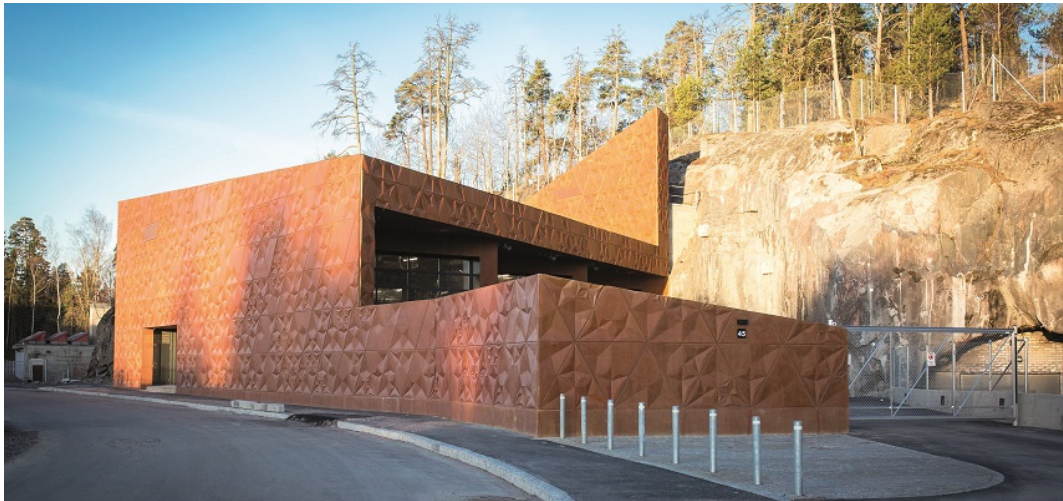
Waste ends up tightly compacted to the large containers in the shared waste transfer station in the Kruunuvuorenranta area.

The system is user-friendly and silent

“In the densely planned living areas where streets are narrow, the pipeline-based waste collection system reduces waste truck traffic in the area and improves its comfort and safety. In the closed system, the waste containers do not overflow either”, describes **Jarmo Mattila, Managing Director of Kruunuvuorenrannan jätteen putkikeräys Oy**, the company which operates the system.

The collection station of Kruunuvuorenranta won the 2017 Vuoden Betonijulkisivu (Concrete Facade of the Year) award and 2017 Vuoden Betonirakenne (Concrete Structure of the Year) award granted by Concrete Industry Ltd. and Confederation of Finnish Construction Industries.

“We wanted the prominently located building to be beautiful and to show a spectacular facade, and the City of Helsinki agreed”, says Mr Mattila.



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Waste slides in the composite pipe with smooth inner surface

A total of approximately 10 kilometres of the composite pipeline is to be installed in the Kruunuvuorenranta area. The pipe travels under the street along other technology and cables, such as district heating pipes.

“The pipeline is being built in line with the street construction progress”, says **System Development Manager Sami Kääpä from MariMatic Oy**, the company which is responsible for installation, maintenance and operation of the system. MariMatic is part of the Finnish MariGroup.

The plastic composite pipe is manufactured in Finland especially for pipeline-based waste collection for MariMatic. According to Mr. Kääpä, the inner surface of the pipe is very smooth, which results in very small friction for the waste travelling in the pipe when compared to a steel pipe. The plastic pipe is also free of corrosion and resistant to wear and chemicals.



Approximately 10 kilometres of the composite pipeline is to be installed in the Kruunuvuorenranta area. Through the pipe network, different waste sorts travel to the waste containers located in the waste transfer terminal.



Vacuum air to remove blockages

Currently, the longest transfer of waste in the pipeline at Kruunuvuorenranta is approximately 1.6 kilometres. In the systems under construction, maximum transfer distances can range from 2 to 4 kilometers.

“One waste type at a time, waste disappears into the pipe at the speed of approximately 70 km/h from all collection points in the area and it is transferred into separate containers at the waste transfer terminal. Paper is transferred last, so that the paper itself remain clean”, says Mr. Kääpä.



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Vacuum air in the pipe is created by using vacuum pumps, which are located at the waste transfer terminal. The airflow caused by the vacuum sucks the waste into the pipe and transports it to the containers at the waste transfer terminal. The transport air is obtained at the collection points.

According to Mr. Kääpä, the pipeline built underground is practically maintenance-free. Waste sorting by residents is a key element for the functionality of the system. To date, there has not been any problematic blockages in the collection pipe, however at some point they are bound to occur, he says. Blockages are eliminated by reversing airflow direction by blowing air into the pipe, causing the blockage to move.

“The pipeline also has inspection vaults, which allow the pipe and blockages to be accessed”, Mr Kääpä explains.



Maintenance of the system at collection points and at the collection station also include traditional basic industrial maintenance, such as replacing belts, adjusting valves and electrical sensors, maintaining hydraulics and replacing hoses”, says Mr Kääpä.

Suitable also for old residential areas

With the pneumatic vacuum conveying method, waste has been collected in Sweden since the 1960s and 1970s. According to Mr. Kääpä, the method was first introduced in laundry-transport systems, after which the use was enlarged to municipal waste collection and transport.

MariMatic has extensive experience in manufacturing and mechanics of Taifun industrial systems, primarily used for vacuum conveying of waste in the food industry. The company has provided around 1,000 vacuum conveying systems in over 40 countries for residential areas in the cities, commercial and service centers, commercial kitchens as well as food and marine industries.

According to Mr. Kääpä, the pipeline-based waste collection system can also be applied in old residential areas. For example in Bergen, Norway, the system operates throughout the city. In Odense, Denmark, MariMatic has installed pipelines in old areas amidst other infrastructure.

“Naturally, the installation is most efficient in new residential areas where it is completed along with street projects. It is most efficient in large cities with high population densities”, explains Mr Kääpä.

Positive feedback

The first pipeline-based waste collection system in Finland has been operating since the autumn of 2011 in Suurpelto, Espoo and and in Vuores, Tampere since 2012. In Jätkäsaari and Kalasatama in Helsinki it has been in use since 2013 and in Kivistö, Vantaa since 2015. In Tampere, it's being built in a new Ranta-Tampella area. In Helsinki, systems are being built in the shopping mall of Tripla and city center of Keski-Pasila. Plans are also underway for Hernesaari in Helsinki and in Espoo.

“There's a lot of activity throughout the country”, Mr Kääpä says.

MariMatic has delivered the systems in Kivistö, Vuores, Ranta-Tampella, Tripla and Kruunuvuorenranta. Mr Kääpä lists the good user experiences and resident feedback from Vuores.

“People soon started to sort waste and they have noticed how easy it is to use the system. They want waste management to work reliably and they know that you can't just shove whatever into the hatches”, Mr Kääpä mentions.

According to Mr Kääpä, the systems have usually performed well and there haven't been any major problems, with the exception of small operating errors when, for example, waste bags have been taken to wrong collection points.



The systems are building-specific and the hatches open with residence-specific - RFID keys. The residents of a specific building have access to a specific collection point. This initially caused confusion also at Kruunuvuorenranta.



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A lot of data from the system

According to Jarmo Mattila, the experiences to date at Kruunuvuorenranta are positive. The system has performed well and the feedback from residents has been positive. There has been minor malfunction in operation, for example when visiting wrong collection points.

“In 2016, we conducted a system usage study in Kalasatama and Jätkäsaari. According to the study, recycling works really well. Paper is recycled more than 97 per cent, cardboard over 97 per cent and biowaste around 82 per cent”, says Mr Mattila.

According to Mr Mattila, the system enables collection of large volume of valuable data. For example, it revealed that on Saturdays, depositing waste bags increases after 7 a.m. and that the majority of people visit collection points between 10 a.m. and noon. The activity starts to dwindle towards the evening. This can benefit HSY (Helsinki Region Environmental Services Authority), for example, when planning their routes of waste transport in other areas.



The city established three companies

As decided by the City Council, The City of Helsinki established three non-profit companies for building and operating the pipeline-based waste collection system – Jätkäsaaren jätteen putkikeräys Oy, Kalasataman jätteen putkikeräys Oy and Kruunuvuorenrannan jätteen putkikeräys Oy. Mr. Jarmo Mattila acts as Managing Director of all the three companies. In addition to him, there is only one employee.

The land owned by the city in these areas has been zoned to allow construction of the systems. The terms for providing lots require all residents to join the system. The voting stock of the companies is owned by the City and the non-voting stock is owned by the housing cooperatives in the area.

The investment cost for the system in Kruunuvuorenranta is approximately 60 euros per square meter of building permit area, which equates to about one per cent of the total cost of the building. The cost estimate of the system is approximately EUR 28 million.

According to Mr Mattila, the waste management costs to residents are initially slightly higher than regarding traditional waste management, however they will level out to be the same once half of the Kruunuvuorenranta area is finished. When the entire area is completed and all residents have joined the system, the cost will be slightly lower compared to traditional waste collection.

“The immaterial values, such as less waste containers, cleanliness, safety and cosyness are obtained in addition to the reduced cost”, stresses Mr Mattila.



Waste hatches installed in the wall of a building.

Original text: Jouni Suolanen
Images: MariMatic Oy

More information

[User experiences of automatic waste collection in Vuores area in Finland | MetroTaifun references](#)

[MariMatic's Waste System Enables Weight-Based Invoicing for Vallastaden](#)



Pipeline-based waste collection reduces waste truck traffic

When only 10 per cent of the Kruunuvuorenranta area is finalized, waste trucks collect waste approximately once a week. Mr. Jarmo Mattila, Managing Director of Kruunuvuorenrantaan jätteen putkikeräys Oy, estimates mixed waste to be collected once – twice a week after the entire area has been completed in around 2028.

“Presently, we collect different types of waste from three to four containers a month, mainly mixed waste. The drain interval will extend while the area is built further. Waste generation also varies over time”, says **Service Manager Tero Salo from HSY.**

“The biowaste container must occasionally be collected and emptied when only partly full, because the container cannot be fully loaded due to excessive weight. Generally, bio-waste should not be stored in the container for too long”, says Mr Salo.

HSY's truck collects the waste container that compacts the waste, one waste type at a time. The container is taken to be emptied and then replaced at the collection station.

According to Mr Salo, there have not been any major technical challenges with the transports. Drivers are familiarized with the new system and detaching the container, which is considered well instructed and a rather simple procedure.

Waste trucks empty the waste bins in recycling rooms as usual. Large-sized mixed waste and cardboard are transported in separate waste trucks. Glass and metal containers are emptied into separate chambers of one truck.

At Kruunuvuorenranta, more waste is directed through pipeline collection to the containers than by transporting from the recycling rooms, adds Mr Salo.

“Pipeline-based waste collection systems somewhat reduce waste truck traffic on narrow streets. Collecting of containers from waste collection stations is easier and simpler compared to collecting numerous waste bins from many separate waste rooms. Waste trucks are still needed in the Kruunuvuorenranta area, however less than before”, says Mr Salo.

According to Mr. Salo, challenges causing further actions arise mainly in case a new type of waste is to be collected in the area of the pipeline-based waste collection system.



Waste ends up tightly compacted to the large containers, which are then picked up by waste trucks.