

## **Smart Waste Container**

### **Harku County, Estonia**

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#### **1. What is the future urban challenge that would need a solution to?**

##### **Please describe the challenge of your city / county neighboring a city?**

In Harku municipality, as in many others, waste separation remains a significant challenge. Residents are not always aware which item goes into which container, and incorrect sorting generates additional costs while reducing recycling efficiency. The problem is aggravated by population growth in settlements near Tallinn.

Since 2024, separate collection of bio-waste has become mandatory, and due to the national waste reform, recycling targets have become much stricter. This means the municipality needs solutions that help residents sort waste conveniently and correctly, raise awareness, and enable compliance with legally binding targets.

##### **Which category your challenge is primarily in: safe city, happy city, and climate resilient city?**

This challenge mainly falls into the Climate-Resilient City category, as inadequate waste sorting directly impacts the achievement of circular economy goals and the reduction of environmental footprint. At the same time, it also supports the Happy City principle, since an interactive solution can educate and engage residents.

It is also important that consistent interventions shape behavioral patterns. If smart waste containers provide continuous feedback and create a positive experience, correct sorting habits will become ingrained over time, eventually becoming a natural part of everyday life. This reduces errors, extends into households, and strengthens community responsibility toward the environment.

##### **Why is it important for your city to solve it? How big priority it is for you and why?**

The European Union's waste policy sets increasingly ambitious targets for municipalities regarding waste separation and recycling. If waste is sorted incorrectly, the municipality faces

extra costs, and the environment is burdened. Properly separated waste reduces landfill volumes, supports circular economy objectives, and saves money.

With the waste reform, it is particularly important that municipalities fulfill the requirements for collecting bio-waste and reducing mixed municipal waste. A smart waste container helps ensure that collected waste is of higher quality, and that targets are achieved cost-effectively. If residents' sorting behavior does not improve, the amount of mixed waste will not decrease, making it impossible to meet the targets. This could lead to higher landfill costs, fines, or loss of subsidies, placing financial and social strain on the municipality.

**Is this a unique challenge/problem of your city, why or is this by your knowledge a challenge/problem that many cities have – which kind of other cities?**

This is not unique to Harku – it is a universal challenge in nearly all municipalities, both urban and rural. The issue is particularly pressing in rapidly growing areas where residents' awareness and waste habits vary widely. Current public packaging containers are inconvenient, anonymous, and poorly controlled, leading to low-quality sorting. The waste reform foresees the integration of packaging collection into organized municipal waste systems, which requires new, user-friendly solutions to increase participation and ensure better control over waste streams.

## **2. Innovation.**

**How have you solved that issue so far? Why aren't the present solutions good enough? Are there legal obstacles, which ones?**

So far, the solution has been traditional separate containers, where residents must sort waste correctly themselves. The problem lies in knowledge and habits – waste is often placed in the wrong container. Traditional containers also cannot provide data on their fill level, making waste collection inefficient.

Under the new waste reform, existing systems are no longer sufficient – municipalities must ensure mandatory collection of bio-waste and integrate packaging collection into organized waste management. This creates a need for modular solutions that can adapt to rapidly changing legislation and support circular economy targets.

**What should be the main features, characteristics of the future solution to be potentially best for that challenge or problem?**

- Automated sorting: residents insert waste into one opening, and the container directs it to the correct section, including mandatory separate collection of bio-waste.
- Smartness and machine learning: the container recognizes the waste type and directs it correctly, improving recycling quality.
- Data-driven management: the container collects information on waste types, volumes, and sorting errors, enabling the municipality to comply with reporting obligations and optimize waste collection logistics.
- Interactivity and education: the container provides immediate feedback (via screen or voice) about the type of waste and why it was sorted in that way. It can also support motivational campaigns (e.g., QR-code point systems).
- Sustainability: reduces mixed waste and increases recycling, supporting waste reform targets.
- Automated notification system: sends alerts when nearing capacity, so collection occurs only when needed, reducing transport costs and CO<sub>2</sub> emissions.
- Modularity: allows adding new waste types in the future (e.g., textiles, electronics) to adapt to the next stages of waste reform.

**3. Expected impact of your pilot solution.**

**What is the expected impact to your city environment you expect to see if the challenge gets solved?**

More waste is properly separated, less municipal waste ends up in landfills, and recycling quality improves. Collection efficiency rises through fill-level monitoring, reducing transport volumes and CO<sub>2</sub> footprint. The solution helps meet waste reform targets step by step.

**What is the expected impact to your citizens you expect to see if the challenge gets solved?**

Residents' awareness of sorting will grow. The solution makes sorting easy, even for those who previously struggled with the system. A smart and educational approach increases satisfaction and sense of community. It also helps replace the habit of using anonymous and uncontrolled public containers.

**What is the expected impact to your city governance you expect to see if the challenge gets solved?**

The municipality can more easily meet EU waste targets, reduce costs from incorrect sorting, and position itself as an innovative authority oriented toward circular economy. Waste collection and transport costs will decrease, EU circular economy goals can be achieved more efficiently, and Harku will be recognized as a proactive, sustainability-oriented municipality.

#### **4. Piloting**

**Why would you be interested to become a piloting partner of a proposed solution to the challenge you are describing here? Describe shortly your capability to participate.**

Harku is a fast-developing area with a growing population each year. We are interested in piloting the solution in public places (such as bus stops, village centers, and apartment building areas) where waste tends to accumulate most and sorting is more challenging. Smart waste containers can also be piloted at public events to reduce the mixing of generated waste.

The municipality has the capacity to provide suitable pilot locations, gather feedback from residents, and analyze the impact of the solution on waste-sorting quality and the optimization of waste collection logistics. Schools and kindergartens can also be involved to support the educational dimension of the waste reform and help shape long-term sorting habits among younger generations.

In addition, the data collected during the pilot would provide a strong basis for monitoring compliance with reform objectives and for making better procurement and infrastructure development decisions in the future.