

Change(K)now!



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The Change(K)now! set of solutions for a mindset towards circular food delivery systems in the Baltic Sea Region – Evaluation report –

Interreg
Baltic Sea Region



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CIRCULAR ECONOMY

Change(K)now!

The Change(K)now! set of solutions for a mindset towards circular food delivery systems in the Baltic Sea Region

– Evaluation report –

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1. Introduction

1.1 Relevance

The consumption of food and beverages for immediate consumption or take-away is a major driver of packaging waste across Europe. In Germany alone, more than 281,000 tons of single-use packaging waste are generated annually in the take-away context¹, while average packaging waste in the EU amounts to 178 kg per inhabitant per year². Beyond waste volumes, plastic packaging causes substantial environmental and economic damage, including significant harm to marine ecosystems (EUR 13 billion) as well as negative impacts on tourism and coastal areas (EUR 630 million). Further, 50% of EU marine litter consists of single-use items.³ These figures illustrate that single-use packaging represents a systemic challenge with far-reaching ecological and socio-economic consequences.

Addressing this challenge requires more than incremental improvements, it calls for a fundamental transition towards circular systems. In particular, strategies focusing on prevention and reuse of packaging need to be significantly strengthened. Transitioning entire municipalities, and societies more broadly, towards circularity is a complex process that requires both system-level change and a shift in mindsets, practices, and routines.

The transition towards more circular food delivery systems is therefore a key priority at the European Union level. Achieving the EU's circularity targets requires the active involvement of multiple actors and adaptation to increasingly stringent regulatory requirements. Local authorities are expected to play a central role in this process, as they have the capacity to coordinate stakeholders, enable and invest in infrastructure, define rules and incentives for public and private operations, and act as sustainability hubs within their jurisdictions. At the same time, municipalities often lack practical knowledge on how to effectively steer circularity at the food system level and foster awareness and behavioral change. Similar knowledge gaps exist among businesses, while also consumer involvement is crucial for ensuring acceptance and long-term change.

From a sustainability transitions perspective⁴, the shift towards circular food delivery systems can be understood as a fundamental transformation of existing socio-technical systems. Such transitions affect technologies, policies, and regulations, markets, infrastructure, consumer practices, cultural norms, and knowledge simultaneously. They are complex, long-term processes involving diverse actors, including public authorities, businesses, civil society, and consumers, and unfold through interaction, learning, and gradual adjustment rather than linear, market-driven change. As sustainability represents a collective good, circular solutions often offer limited immediate individual benefits and may initially perform less well in terms of cost or convenience. Moreover, existing systems are stabilized by lock-in effects such as established infrastructures and habitual practices, which further complicate change. Against this backdrop, initiatives such as Change(K)now! aim to contribute to sustainability transitions by addressing both structural conditions as well as mindset and behavior change in the context of circular food systems.

¹ NABU (2018)

² Eurostat (2025)

³ Directorate-General for Environment (European Commission) (2019)

⁴ Based on Geels (2011)

1.2 Approach and process

The project Change(K)now! aims to tackle these issues by developing solutions that guide public and private actors through changes in mindset and behavior towards circular food delivery systems.

As a baseline, a strategic framework guidance for municipalities was published to guide municipalities in developing their own strategic and legal framework to facilitate circularity in food delivery systems. In regard to the practical implementation, three prototype solutions were developed to provide specific guidance and practical measures on how to increase circular practices in relation to institutional catering (Cluster I), Events (Cluster II) and Take-away (Cluster III).

Test and evaluation of strategic prototype solution

The strategic framework guidance was applied in six municipalities to develop strategic documents with the aim to increase circularity in food delivery. The case descriptions, challenges and lessons learned are elaborated in Chapter 3 based on feedback templates collected throughout the process. The experiences formed the basis for optimizing the prototype solution.

Pilot actions and their achievements are shortly summarized in the following publication:

D.2.1: Local roadmaps: From single-use to circular food delivery system

Test and evaluation of practical prototype solutions

The practical measures were tested in various cities across the Baltic Sea region through cluster pilots and evaluated in order to optimize and finalize the prototype solutions. The results are presented in Chapters 4 to 6.

Overview of cluster pilots:



Pilot actions and their achievements are shortly summarized in the following publications:

D.2.2: Best practice solutions for institutional catering operators – report from the pilots

D.2.3: Best practice solutions for food delivery operators “Eat-at-place” – report from the pilots

D.2.4: Best practice solutions for operators of food take-away and home delivery – report from the pilots

Evaluation approach

We assess the feasibility, acceptability, and replicability (incl. transferability and scalability) of the pilot cases and ultimately their potential to foster mindset and behavior change. Feasibility refers to how well the pilot could be implemented in practice. The analysis focuses on drivers and barriers encountered during implementation, including technical, financial, operational, and legal aspects. Acceptability captures how relevant target groups responded to the system and which conditions or characteristics were

perceived as enabling or constraining. Replicability indicates whether the tested system is suitable for further implementation, reflecting on suitable conditions or needs for adaptation. As the indicators are interdependent and closely linked, findings cannot always be exclusively assigned to a single indicator. Consequently, certain evaluation results are discussed from multiple perspectives.

To synthesize the findings, we derive cross-case implications for each Cluster which also includes a reflection on the pilots' sustainability, based on the available quantitative usage data (e.g., reduction in single-use items, increase in reusable items, return/loss rate, participation rate), as well as qualitative evaluation insights. Life-cycle assessments of specific reusable systems are not the focus of the project.

The evaluation process itself was divided into three phases: pre-assessment, monitoring and post-assessment and included (a) the organizational and system perspective and (b) the end-user perspective.

In the *pre-assessment* phase, we aimed to gain insights into the status quo, expectations and concerns from the perspective of selected involved system-level stakeholders.

The *monitoring* during the implementation included feedback on upcoming challenges and changes. This is complemented by collection of quantitative data (e.g., sales, return rate).

Post-assessment included detailed interviews with all relevant and available stakeholders. The goal was to understand the conditions for change, identify drivers and barriers, and reflect on the previously mentioned indicators. This also included a follow-up on the results from the pre-assessment and monitoring.

At the **end-user level**, we aimed to gain insights on how consumers perceive the tested system, their attitude towards circularity and (potential) change in behavior. To do so, we implemented quantitative surveys or short qualitative interviews depending on the particular pilot case.

An overview of collected data can be found in the respective cluster chapters.

The Change(K)now! set of solutions for a mindset towards circular food delivery systems in the BSR

The learnings gained by testing and evaluating parts of our prototype solutions through pilots fed into the optimized cluster solutions.

Strategic management and communication framework for circular food delivery systems in municipalities

Solutions for circular food delivery systems - Cluster I: Institutional catering

Solutions for circular food delivery systems - Cluster II: Events

Solutions for circular food delivery systems - Cluster III: Take Away and Food Delivery

The Strategic Cluster Solution provides municipalities with a step-by-step guide to developing a strategic framework adapted to local circumstances, capacities, and legal contexts. It targets three interconnected levels of strategic documents and further highlights the impact of public procurement, communication and collaboration as three central instruments for municipalities. The guide for the development process consists of four steps and each includes a series of activities necessary for its completion. Overall, the framework's purpose is to ensure that practical measures to reduce single-use food packaging are not ad hoc but are embedded in a long-term management and communication approach within local authorities.

The Cluster I Solution provides guidance on reducing single-use packaging in institutional catering systems such as schools, or hospitals. It combines circular procurement guidance with practical operational measures across the institutional food catering system, including food production, transport, serving, consumption, and additional services. The solution introduces a wide range of circular measures and

respective step-by-step actions to be taken. The document is aimed at municipalities and catering service providers to support the transition towards more circular public food systems.

The Cluster II Solution is intended to provide both a theoretical understanding of reusable systems at events and clear, practical guidance on decision-making and implementation for (tested) reusable measures. It is primarily aimed at event organizers and municipalities, but is also intended for stand operators and service providers. It outlines essential background information for relevant stakeholders, including the challenges and opportunities of reuse at events, the regulatory framework, and a system description structured around key system elements. Based on these elements, the solution offers practical decision-making guides and checklists to support implementation. In addition, it presents concrete measures for preventing and reducing food packaging waste. The solution also specifically describes the role and responsibility of municipalities in facilitating reuse at events.

The Cluster III Solution presents the “Integrated Circular Take-Away and Food Delivery Ecosystem” (ICTAFDE), a context-sensitive framework for reducing single-use packaging in take-away and food-delivery services through reusable packaging systems. The solution is structured around three thematic pillars: infrastructure and operational logistics, stakeholder coordination, governance, and incentive structures, and technology and system optimization. Building on these pillars, it provides recommendations for the transfer and scaling of reuse systems for municipalities, food businesses, delivery and logistics actors, and customers, while highlighting the key enabling conditions required for successful implementation.

1.3 Regulatory background

The transition towards circular food delivery systems is increasingly shaped by European legislation and policy initiatives promoting waste prevention, circularity, and reusable packaging systems. As shown in Table 1, several EU-level strategies and regulations form the broader regulatory framework relevant to reusable food packaging. Together, they create increasing pressure on municipalities, businesses, and other institutions to reduce dependency on single-use packaging and develop reusable alternatives.

Table 1. Exemplary overview on EU regulations concerning reuse for food packaging

Regulation / Initiative	What it is about	Project Relevance
European Green Deal	EU's overarching strategy for climate neutrality by 2050, covering energy, industry, agriculture, and waste.	Promotes reusable or recyclable packaging; aims for all packaging to be reusable or recyclable by 2030; supports refill and reuse initiatives.
Circular Economy Action Plan (2020)	EU plan to transform the economy from linear to circular, addressing the entire product lifecycle.	Prioritizes design for reuse, reduction of unnecessary packaging, and waste prevention; lays groundwork for legislative measures supporting reusable packaging.
Packaging and Packaging Waste Regulation (PPWR, EU 2025/40)	Sets EU-wide requirements for packaging lifecycle: waste reduction, recyclability, and recycled content.	Introduces mandatory reuse targets for different packaging types; requires businesses to offer refill/reuse options for food and beverages; strengthens design requirements for reuse.
Single-Use Plastics Directive (EU 2019/904)	Restricts certain single-use plastic products and extends producer responsibility.	Aims to reduce single-use packaging for food and drinks; indirectly encourages reusable and refillable packaging systems.
Waste Framework Directive (2008/98/EC)	Core EU waste law establishing the waste hierarchy and general waste management rules.	Encourages preparation of products and packaging for reuse before recycling or disposal; supports take-back and extended producer responsibility schemes.
Food Contact Materials Regulation (EC 1935/2004)	Sets safety rules for materials intended to contact food; prevents transfer of harmful substances.	Ensures hygiene and safety requirements for reusable food and drink packaging; defines conditions for repeated use.
Ecodesign for Sustainable Products Regulation (ESPR)	Establishes sustainability requirements for products (durability, repairability, recyclability).	Supports design for reuse and circularity, including packaging where relevant; encourages refillable solutions as part of sustainable product systems.

At the strategic level, the European Union has placed the circular economy and packaging waste reduction at the center of its sustainability agenda through the European Green Deal and the Circular Economy Action Plan (2020). Both initiatives emphasize waste prevention, reusable and recyclable packaging, and the reduction of unnecessary packaging. The Circular Economy Action Plan specifically identified packaging as one of the key sectors requiring systemic change and announced further legislative action to strengthen reusable systems.

The most relevant recent regulatory development in relation to reusable food packaging is the Packaging and Packaging Waste Regulation (PPWR), which entered into force in 2025. The regulation strengthens obligations regarding packaging reduction, recyclability, recycled content, and reuse. Importantly, it introduces mandatory reuse targets for certain packaging sectors and includes provisions requiring food and beverage businesses to increasingly offer reusable or refillable alternatives. The PPWR thereby

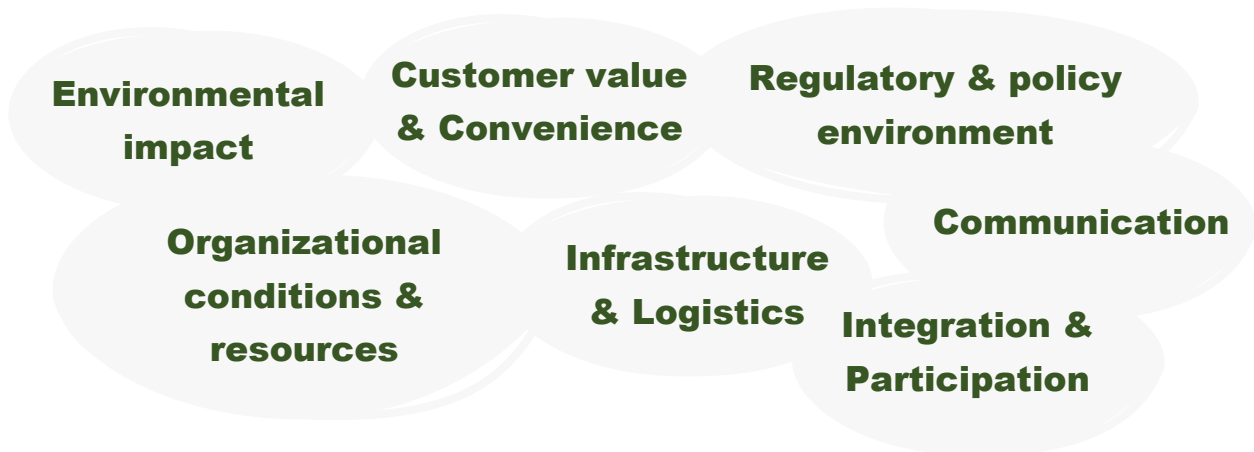
creates substantial long-term pressure for municipalities, event organizers, caterers, and take-away businesses to develop reusable packaging systems and supporting infrastructure.

Another important framework is the Single-Use Plastics Directive, which aims to reduce the environmental impact of certain single-use plastic products. The directive introduced restrictions and reduction measures for selected disposable items and strengthened extended producer responsibility schemes. While the directive does not mandate reusable systems directly, it has accelerated political and public discussions around reusable alternatives and strengthened the justification for local measures targeting single-use food and beverage packaging.

2. Pre-Study on Drivers and Barriers

As a first step, a small-scale study was conducted prior to the piloting phase to identify drivers and barriers to change towards circularity in food provision. An online survey was carried out among project partners, to openly collect perceived drivers and barriers in relation to the three main indicators: (1) feasibility, (2) acceptability, and (3) replicability, transferability, and scalability. The responses were structured and categorized by Kiel University and subsequently discussed, refined, and expanded during an in-person workshop with project partners.

The main influencing categories are as follows:



Feasibility

Table 2. Drivers and Barriers of Feasibility

Drivers	Barriers
Environmental Impact	
	• Lack of environmental benefits
Regulatory & policy environment	
• Public regulations • Suitable public conditions (e.g., hygiene restrictions) • Public funding	• Lack of supporting public regulations • Hygiene requirements (e.g., self-washing) • Food safety requirements • Data protection and safety regulations/ issues (hacking of QR codes)
Organizational conditions & resources	
• Stakeholder capabilities • Preparation time • Knowledge about best practice cases from pioneering businesses • Context-specific data available • Availability of expertise • Creativity • Good financial/ economic conditions • Anticipation and preparation of public regulations	• High workload (high share of manual work) • Additional workload for staff (not main priority) • Turnover of project managing staff • High consumer traffic • High complexity • Lack of flexibility of larger organizations • Need to educate and train staff • Cheaper single-use options • Investment needed • Limited financial resources • Unideal cooperation for one party • High interdisciplinarity (different levels of knowledge/ regulations) • Lack of resources

Drivers	Barriers
Infrastructure & Logistics	
• Suitable infrastructure (e.g., easy return) • Integration of partners with matching/ existing infrastructure (customers, stores, ...) • Supporting system conditions (e.g., Self-service) • Product availability of circular and environmentally friendly material	• New infrastructure needed • Lack of suitable suppliers of reusable cutlery • Efficient deposit ledger management system needed • Different service providers with different deposit system • Unsuitable supply chain • Lack of suitable technical option in the market
Integration & Participation	
• Stakeholder participation & (intrinsic) motivation • Integration on a strategic level • Understanding of consumer preferences • Integration of consumers into planning • Simplicity (ease to implement)	• Lack of participation of stakeholders • No integration into business model • Stakeholder resistance • Consumer skepticism • Employee attitudes • Other priorities • Lack of project portfolio and project process framework • Negative attitude towards a new system
Customer value & Convenience	
• No significant inconvenience for consumers (e.g., easy return) • User-friendly	• Inconvenience to use (e.g., different service providers with different deposit system) • Increase of price/ Cheaper single-use options • Transaction/ Deposit costs (e.g., initial investments for jars) • Pioneering consumers must invest in system/ solution • Negative attitude towards a new system • Concerns about data protection / Refusal of registration (e.g., consumers not willing to share their data for registration)
Communication	
• Good communication with stakeholders • Good communication with consumers (need for information and transparency)	• Lack of information about purpose

Acceptability

Table 3. Drivers and Barriers of Acceptability

Drivers	Barriers
Environmental Impact	
• Proof of environmental benefits • Link between environmental impact and health	• Low return rate
Regulatory & policy environment	
• Public funding • Public regulations • Circular economy policy in the region	• Lack of public funding • Absence of (mandatory) regulations • Lack of law enforcement
Organizational conditions & resources	
• Supportive (internal) organizational culture	• Higher costs • Lack of Incentives • High complexity
Infrastructure & Logistics	
• Functioning infrastructure • Availability • Start-ups, project-based initiatives	• Need for suitable system management: e.g., location and times of deposit, varying deposit systems • Expensive logistics • Low return rate
Integration & Participation	
• Ease of use for participating stakeholders • Involvement of stakeholders • Targeted to stakeholder needs	• Limited Stakeholder Engagement • Resistance to innovation of stakeholder • Resistance to innovation
Customer value & convenience	
• User-friendly/ Ease of use for consumers (Simplicity) • High density of pick up and return options • No/ low additional costs • Quick access • Addressing specific consumer needs/ market niche; Targeted to stakeholder needs • Extra benefit (hedonic, moral, social) • Link between environmental impact and health • Standardization of different options	• Consumer concerns about ease of use • Inconvenience of the system (e.g., inconvenient location and times of deposit, varying deposit systems) • Limited variety of portion size (e.g., jars) • Limited range of offered products as not everything can be sold in multi-use packaging (yet) • High deposit costs • Lack of Incentives • Lack of demand/ understanding by customers • Too many options available in the market • Dependent on income level & social groups • Potential health impact of plastic
Communication	
• Good communication • Environmental benefit & sense of responsibility • Communication about possible economic benefits • Reach of public communication campaigns • Well-understood benefits • Link between environmental impact and health • High positive recognition of option in society • Reputation / green image	• Unclear communication about reasoning • Insufficient public awareness • Hygiene & food safety concerns • Negative media coverage or public relations challenges

Replicability, Transferability & Scalability

Table 4. Drivers and Barriers of Replicability, Transferability & Scalability

Drivers	Barriers
Environmental Impact	
Value creation for consumers as well as businesses	Lack of environmental impact
Regulatory & policy environment	
- Public funding - Supporting legal conditions and public regulations (Local, National, EU)	- Lack of funding - Different restrictions in other countries/ areas - No guaranteed benefits unless incentivization through political instruments - Different tax systems
Organizational conditions & resources	
- Demonstrated cost savings - Funding - Simplicity - Scalability with help of technological advancements - Pool of consumer of original solution	- High costs - Lack of funding - Complexity of system or transition process - Additional workload - Resource constraints - Competing priorities (Overloaded/ overwhelmed with current duties) - Difference in company size (scaling from small to large or other way around) - Lack of flexibility - Differences in knowledge/ understanding of businesses/ municipalities (e.g., on EU directives etc.)
Infrastructure & Logistics	
- Similar and available infrastructure - Context independent infrastructure (e.g., QR code) - Scalability with help of technological advancements - Easy logistics and cleaning facilities for containers	- Varying infrastructure and conditions - Conditions may be different for business partners (e.g., supplier, courier, deposit stations) - Different waste management system
Integration & Participation	
Effective partnerships	- Resistance from stakeholders - Lack of education and awareness
Customer value & convenience	
- Target groups with similar preferences - Similar background of the society	- Target specific needs and requirements - Shift from highly environmentally involved consumers to mass market / conventional consumers - Different culture of the society - Conservative structure - Lack of simplicity - Changes are not comfortable
Communication	
- Education and awareness programs/ Understanding of the “why”/ Social acceptance - Information about solutions easily accessible and communicated - Detailed documentation - Demonstrated cost savings - Positive public relations - Social proof (first consumers as advocates) - Stakeholders as advocates - Best practice examples available for everyone - Networking (national, international)	- Different consumer awareness in other countries/ areas - Lack of networking B2B

3. Evaluation of Strategic Cluster: Framework for municipalities pilot cases

This chapter presents the evaluation of the strategic pilot cases implemented in Tallinn, Lahti, Anykščiai, Copenhagen, Liepāja, and Riga. As outlined in Table 5, the municipalities developed different types of strategic documents and governance approaches to support the transition towards circular food delivery systems, ranging from circular economy strategies and procurement frameworks to municipal regulations, operational guidance documents, and voluntary cooperation models.

Table 5. Strategic Cluster - Overview of pilot cases

City	Focus
Tallinn	Circular products and services and green public procurements in the Tallinn Circular Economy Development Plan 2035
Lahti	Strategic work plan and recommendations on circular food packaging
Anykščiai	Regulation on the Use of Reusable Containers in Public and Private Sector Catering Establishments
Copenhagen	Reusable packaging initiative in the Resource and Waste Strategy 2030
Liepāja	Regulations and guidelines on reusable tableware in beach cafés and parks
Riga	Regulation and guidelines for the use of cups during street sales at public events

The pilot cases demonstrate that municipalities can play a decisive role in enabling circular food delivery systems by creating favorable strategic, legal, and organizational conditions. While reusable systems are often discussed primarily from a technical or operational perspective, the cases highlight that long-term implementation strongly depends on public structures.

The strategic pilot cases further illustrate that municipalities operate under different legal and administrative conditions. Some municipalities focused on binding regulations and mandatory requirements, particularly in relation to public events and public space use, while others relied more strongly on voluntary agreements, procurement instruments, guidance documents, or pilot-based learning processes. The cases therefore underline the need for flexible and context-sensitive strategic approaches adapted to local governance structures, political priorities, and competences.

From a political perspective, the pilot cases significantly strengthened the visibility and institutional relevance of circular food delivery systems within municipal administrations. Several municipalities succeeded in embedding reuse-related objectives into broader circular economy, waste management, procurement, or sustainability strategies. In some cases, reusable systems were also directly integrated into binding municipal regulations, creating stronger long-term implementation conditions.

The pilot cases also generated important environmental and operational impacts. Municipalities developed frameworks aimed at reducing single-use packaging waste, strengthening reusable systems, and

supporting more circular procurement and service models. At the same time, the cases generated practical implementation knowledge regarding legal feasibility, procurement integration, stakeholder coordination, operational guidance, and communication strategies.

Socially, the cases demonstrated the importance of communication, participation, and stakeholder engagement for enabling mindset and behavior change. Municipalities achieved acceptance among businesses, service providers, and consumers not through regulation alone but focused on dialogue, awareness-building, practical guidance, and opportunities for co-creation and learning.

The following sections present the individual strategic pilot cases in detail including their approaches, success factors, communication and monitoring strategies, challenges, and lessons learned. The chapter concludes with overarching implications for municipalities developing strategic frameworks for circular food delivery systems.

3.1 Tallinn

Circular products and services and green public procurements in the Tallinn Circular Economy Development Plan 2035

Case description

The *City of Tallinn* has developed two dedicated sub-programmes within its Tallinn Circular Economy Development Plan 2035, focusing on (1) circular products and (2) green and circular public procurement. These sub-programmes are designed to provide a clear strategic direction for the transition towards reusable packaging systems across the city. Importantly, they complement existing regulations and guidelines governing the use of reusable packaging at public events, thereby strengthening policy coherence and implementation.

The overarching objective of the development plan is that, by 2035, the entire city administration will operate in accordance with circular economy principles. To achieve this, the document adopts a broad thematic scope, encompassing awareness-raising, public procurement practices, circular products and services, the food and bioeconomy, the built environment, and waste management. The plan addresses multiple stakeholder groups, including municipal employees, local businesses, residents, and tourists, reflecting a systemic approach to embedding circular economy practices throughout the urban ecosystem.

The document was adopted by City Council decision on 12 June 2025.



Success factors

- The support of the local government leadership played a key role in preparing the strategic document
- Their understanding of the need to prevent and reduce single-use packaging and tableware in the municipal institutions' catering, rental premises and public events facilitated the development of a specific action program for circular products and services
- The possibility of hiring an additional staff member also supported the document development process
- The interest in participating in the stakeholder events was very high; as the document is mostly targeted at the city authorities, the city employees were motivated to contribute to the document and the planned actions

Communication and monitoring strategies

Communication:

- Information about the guidelines will be shared at the meetings and training events for municipal employees and they are planned to be added to the list of documents a new employee must read when starting work in the city organization
- Guidelines/lists of the requirements will be prepared and shared with all city district administrations and the City Property Department

Monitoring:

- The implementation is monitored within the framework of the city's annual financial report
 - Every year, the city government submits to the city council, as part of the annual financial report, an overview of the achievement of objectives and targets set out in the circular economy plan, and the implementation of the planned activities
 - The circular economy plan is updated as necessary or a new one is prepared based on the city development strategy

Challenges and how they were addressed

- Problems and challenges primarily related to the content, measures, responsibilities, awareness, and budget
 - The lack of national regulation (e.g., on take-away food packaging) has limited the document's content to a certain extent
 - Implementation of the planned actions can be challenging. For example, setting up a new system to replace single-use cups with reusable ones (in water dispensers and coffee machines) requires budget and thinking through the washing, storing, and deposit of the cups (who pays, who washes, giving new tasks to someone etc.)
 - If private companies (restaurants) operate on city rental space, their contracts usually last for several years, therefore, it may be difficult to find the willingness and change the contract before it expires to replace single-use take-away dishes with reusable ones
- The challenges have been discussed at several meetings and discussions with the relevant employees to reach an agreement.
- The document with planned actions has not been adopted yet, so discussion continue...
- The challenges and possible solutions are mapped and planned to address the target groups.

3.2 Lahti

Strategic work plan and recommendations on circular food packaging

Case description

The *Regional Council of Päijät-Häme* initiated the development of a strategic roadmap and related recommendations to integrate sustainability considerations related to food packaging into municipal strategies and public procurement practices. The initiative was linked to the Lahti Circular Economy Roadmap, the environmental goals of Päijät-Hämeen Ateriapalvelut, and procurement criteria development.

The roadmap was initiated in response to the lack of strategic guidance on circular food packaging within institutional catering and public procurement. This was considered particularly relevant due to the significant packaging waste generated by the city's central production kitchen, which prepares around 15,000 meals per day. Additional motivations included the need for better knowledge on sustainable packaging solutions, stronger cooperation across the food supply chain, and alignment with upcoming EU packaging regulations.

The roadmap was developed through a multi-stakeholder process involving city departments, Päijät-Hämeen Ateriapalvelut (catering services), and Change(K)now! partners (Regional Council of Päijät-Häme, Smart & Lean Hub Ltd.), as well as wider food supply chain actors through workshops and meetings. Rather than creating a separate city-wide strategy, the identified objectives were integrated into existing procurement practices and pilot activities. Three implementation levels were defined: contractual arrangements, strategic environmental and circular economy objectives, and operational development through procurement criteria and pilots.



Success factors

- Establishment of a cross-departmental working group involving municipality, procurement, and catering actors
- Continuous stakeholder dialogue through meetings and workshops
- Early involvement of procurement experts
- Use of procurement as a practical entry point for advancing packaging sustainability
- Flexible and business-oriented approach instead of strict mandatory requirements
- Use of local packaging waste data and upcoming EU regulations to justify the need for action
- Combination of strategic discussions with operational-level pilot development

Communication and monitoring strategies

Communication:

- Regular working group meetings and stakeholder workshops
- SPRINT workshops to identify relevant stakeholders and development needs
- Training workshops involving procurement actors, catering services, and suppliers
- Internal communication through meetings, workshops, and email exchange
- Communication focused on practical implementation, feasibility, and operational development rather than broad public campaigns

Monitoring:

- Monitoring focused primarily on stakeholder engagement and operational progress rather than formal strategic indicators

Challenges and how they were addressed

- Strategic challenges
 - Packaging sustainability was not previously recognized as a strategic issue
 - Existing strategies were owned by multiple organizations, making alignment difficult
 - Municipal influence was limited mainly to procurement processes
 - Focus on procurement criteria, contracts, and operational-level measures
 - Use of packaging waste data and EU policy developments to justify action
 - Application of flexible recommendations instead of binding commitments
- Stakeholder management
 - Coordination across departments and supply chain actors was complex
 - Suppliers and food service actors expressed concerns regarding costs, logistics, and operational burden
 - Establishing a cross-departmental working group
 - Organizing workshops and regular dialogue formats
 - Involving suppliers and packaging companies directly in workshops and discussions
- Limited data and benchmarks on sustainable packaging solutions
 - Few examples from other municipalities
 - Conducting background studies and stakeholder discussions
 - Using pilot activities and operational learning processes to generate practical insights

Central lessons learned and recommendation from municipality

“Strategic change is difficult when sustainability topics have not previously been recognized and when strategies are owned by multiple organizations. Operational level development and procurement can be more effective entry points.”

Advice to other municipalities: “Start with pilots and operational development, use public procurement as a practical tool, build strong cross-departmental cooperation, and keep approaches flexible and business-oriented. Involve procurement experts early.

3.3 Anykščiai

Regulation on the Use of Reusable Containers in Public and Private Sector Catering Establishments

Case description

The *Municipality of Anykščiai* aimed to regulate and promote the use of reusable dishes in public and private catering establishments. The development process included the formation of a municipal working group and emphasized the collaboration with several stakeholder groups, including private catering establishments, and customers. The document was approved by the Anykščiai Municipal Council (decision No. 1-TS-301 dated November 28, 2024), demonstrating political commitment. It covered the following sections: general provisions, principles for using reusable dishes, deposit system, cooperation mechanisms, hygiene standards, and procedures for allocating dishes to establishments.



ANYKŠČIŲ RAJONO SAVIVALDYBĖS
TARYBA

SPRENDIMAS

DĖL PRITARIMO INTERREG BALTJOS JŪROS REGIONO PROJEKTO „MASTYSENOS POKYTIS NUO VIENKARTINIŲ PRIE ŽIEDINIŲ AR DAUGKARTINIO MAISTO PRISTATYMO PAKUOČIŲ BALTJOS JŪROS REGIONO MIESTUOSE („CHANGE (K)NOW“): DAUGKARTINIŲ INDŲ NAUDOJIMO VIEŠOJO IR PRIVATAUS SEKTORIAUS MAITINIMO ĮSTAIGOSE TVARKOS APRAŠUI

2024 m. lapkričio 28 d. Nr. 1-TS-301
Anykščiai

Success factors

- Securing political support and formal approval from the Municipal Council
- Creating a clear regulatory framework with defined roles and responsibilities
- Developing a practical deposit system that incentivizes container returns
- Establishing cooperation mechanisms between public and private sectors
- Including provisions for container quality control and hygiene standards
- Creating incentives for catering establishments to participate

Communication and monitoring strategies

Communication:

- Publishing information about participating establishments on the municipal website (www.anyksciai.lt)
- Requiring participating establishments to share information on their own websites
- Encouraging catering establishments to inform customers about environmental benefits of reusable containers
- Conducting informational campaigns on social media to promote sustainable consumption

Monitoring:

- Regular inspection of reusable containers for damage
- Requirements for establishments to wash and disinfect containers according to health institution recommendations
- Bilateral agreements between the municipality and participating establishments specifying obligations
- Return procedures for containers with condition assessment documentation
- Requirement for establishments to return containers if they cease participation

Challenges and how they were addressed

- Deciding what type of document to develop and how to integrate it into the existing municipal strategic documents
 - Dual approach: (1) developing a dedicated regulation – „Regulation on the Use of Reusable Containers in Public and Private Sector Catering Establishments”, approved by Council Decision No. 1-TS-301 (November 28, 2024) – and (2) integrating related actions into the Municipal 2025–2027 strategic action plan.
- Lack of national legislation and local regulatory authority over private sector
 - Establishing a formal legal framework at local level
 - Establishing a voluntary system instead of regulation based on bilateral agreements with each restaurant. This allowed the municipality to operate on a legally sound basis while avoiding mandatory requirements
 - Demonstrating benefits: the municipality emphasized concrete business benefits (e.g., customer loyalty, positive brand image, and national recognition) which encouraged voluntary participation
- Stakeholder management
 - Initial private sector skepticism: Restaurant and café owners were initially skeptical and resistant to the new system, significant effort and patience were required to overcome these mindset barriers
 - Building communication models from scratch: The municipality initially struggled to establish effective communication channels with the private sector, there were no ready-made templates or precedents to draw upon
 - Dependence on voluntary participation: Since the municipality has no direct regulatory authority over the private sector, all cooperation relied solely on the voluntary participation of restaurants which made coordination and negotiations more challenging
 - Fragmented interests: It proved challenging to standardize containers that would suit the needs of various types of cafés and restaurants, as different establishments had different portion sizes and operational characteristics
 - A project implementation working group was established, bringing together relevant departments and stakeholders.
 - Individual outreach to all catering establishments was conducted, and creative workshops (January 2025, 19 participants) were organized to co-develop the communication approach
 - Regular personal communication with restaurants proved more effective than mass messaging in ensuring cross-sector coordination
 - Additional multi-channel communication including municipality website articles, national radio interview, and LRT TV coverage

Central lessons learned and recommendation from municipality

“The most important lesson is that communication and relationship-building with the private sector are at the heart of any successful voluntary circular food delivery system. Technical solutions (reusable containers, deposit schemes) can be designed relatively quickly, but changing the mindset of businesses and customers requires sustained, personal, and ongoing effort. Starting simple – without complex tracking technology – allowed the system to launch quickly and build trust.”

3.4 Copenhagen

Reusable packaging initiative in the Resource and Waste Strategy 2030

Case description

The *Copenhagen municipality* focused on integrating reusable food packaging systems into the city's existing waste management and circular economy framework. The initiative was anchored within the Resource and Waste Strategy 2030, which serves as Copenhagen's binding municipal waste management plan.

The pilot addressed challenges related to reuse infrastructure, legal uncertainty, operational barriers, and implementation in settings such as schools and public events. A strong focus was placed on legal clarification and defining the municipality's role in facilitating reuse systems.

The process involved extensive cross-departmental collaboration between waste management, climate, procurement, legal, facility management, and event departments, as well as engagement with schools, businesses, and service providers. Pilot testing in real-life settings played a central role in building practical knowledge and stakeholder acceptance.



Success factors

- Strong political support due to alignment with existing climate and waste strategies and right timing
- Early involvement of procurement and legal experts (i.e., early legal clarification through an external legal assessment)
- Strong cross-departmental collaboration and clear role definitions
- Pilot testing in real-life settings to build practical knowledge, stakeholder trust, and political confidence
- Use of existing municipal networks and stakeholder relationships

Communication and monitoring strategies

Communication:

- Cross-departmental coordination meetings and stakeholder dialogue
- Use of existing municipal communication and stakeholder networks
- Targeted engagement of schools, businesses, event organizers, and service providers
- Pilot demonstrations were used to increase awareness and acceptance
- Communication focused on regulatory developments, operational feasibility, and practical benefits
- Ongoing dialogue with stakeholders

Monitoring:

- Annual monitoring through the Resource and Waste Strategy 2030 reporting system
- Tracking of waste reduction and reuse indicators
- Evaluation of pilot projects and operational testing
- Regular reporting of progress and pilot results to the Technical and Environmental Committee

Challenges and how they were addressed

- Legal situation
 - Unclear municipal mandate and division of responsibilities between public and private actors
 - Complexity of procurement and public space regulations
 - Lack of national legislation regarding reuse systems
 - Commissioning an external legal note
 - Close coordination between legal, procurement, and municipal departments
 - Aligning the initiative with EU policy developments and PPWR requirements
- Coordination, i.e., reuse systems involved multiple departments and external actors
 - Establishing interdepartmental collaboration structures
 - Defining roles and responsibilities early in the process
- Stakeholder management
 - Initial concerns regarding costs, operational complexity, and feasibility
 - Limited awareness and familiarity with reuse systems
 - Pilot testing in schools and at events
 - Continuous stakeholder dialogue and targeted communication
 - Clear communication of benefits and available support
- Limited experience for procuring reuse systems at municipal level
 - Early involvement of procurement specialists
 - Market dialogue and legal clarification
 - Integration of procurement into the broader strategic framework

Central lessons learned and recommendation from municipality

“Early legal clarification and strong cross-departmental collaboration are essential for turning circular food delivery ambitions into implementable measures. Testing solutions through pilots in real-life settings builds practical knowledge, stakeholder trust, and political confidence.”

Advice to other municipalities: “Anchor circular food delivery objectives within existing strategies, involve legal and procurement experts from the start, and engage businesses early through dialogue and pilots. Start small, learn by doing, and use existing networks and peer examples to accelerate progress.”

3.5 Liepāja

Regulations and guidelines on reusable tableware in beach cafés and parks

Case description

Liepāja municipality focused on reducing single-use food packaging at public events and coastal catering locations through municipal regulations and guidance documents. The pilot introduced reusable cup requirements into municipal binding regulations for street trading and public catering, particularly for events and beach cafés.

The pilot addressed challenges related to plastic waste reduction, legal mandates, and the practical implementation of reusable systems in public spaces. Key measures included mandatory reusable cup deposit systems at events, requirements allowing customers to use their own cups, and planned amendments to beach café lease agreements regarding reusable cups.

The development process involved a broad municipal working group including environmental, legal, real estate, customer service, planning, and utility departments. The municipality also engaged with ministries, traders, consumer representatives, and other municipalities during the drafting process.

A major focus of the pilot was clarifying the municipality's legal authority to regulate single-use packaging. The approval process was extended due to discussions with national ministries regarding municipal powers and the legal status of mandatory reuse requirements. Despite these challenges, the municipality succeeded in adopting the regulations, which took effect in January 2026.

Liepājas valstspilsētas pašvaldības domes saistošie noteikumi Nr. 31

Liepājā 2024. gada 19. septembrī (prot. Nr. 9, 9. §)

Par kārtību, kādā tiek saskaņota ielu tirdzniecība, sabiedriskās ēdināšanas pakalpojumu sniegšana un noteikta pašvaldības nodeva par ielu tirdzniecību publiskās vietās Liepājas valstspilsētā

Izdoti saskaņā ar Ministru kabineta 2010. gada 12. maija noteikumu Nr. 440 "Noteikumi par tirdzniecības veidiem, kas saskaņojami ar pašvaldību, un tirdzniecības organizēšanas kārtību" 8. un 9. punktu, 15.8. un 19.7. apakšpunktu, likuma "Par nodokļiem un nodevām" 12. panta pirmās daļas 4. punktu un Ministru kabineta 2005. gada 28. jūnija noteikumu Nr. 480 "Noteikumi par kārtību, kādā pašvaldība var uzlikt pašvaldības nodevas" 9. un 16.¹ punktu. (Liepājas valstspilsētas pašvaldības domes 22.05.2025. saistošo noteikumu Nr. 9 redakcijā)

Success factors

- Strong cross-departmental working group with legal, environmental, and operational expertise
- Early involvement of municipal lawyers and administrative departments
- Persistent legal justification of municipal authority to regulate single-use packaging
- Continuous dialogue with ministries, traders, and other stakeholders
- Strong linkage between reuse measures and broader waste reduction goals
- Integration of reuse requirements directly into binding municipal regulations
- Public consultations and seminars for caterers and traders

Communication and monitoring strategies

Communication:

- Continuous communication with ministries and political decision-makers
- Public consultations during the drafting process
- Communication through municipal websites, social media, and public media
- Seminars and discussions with caterers and traders
- Ongoing dialogue with businesses, consumer representatives, and municipalities
- Communication focused on upcoming EU requirements and practical implementation

Monitoring:

- Planned development of a reusable cup implementation scheme for public events
- Inclusion of reuse requirements within street trading permits
- Planned written guidance for event organizers on implementing deposit systems
- Ongoing coordination meetings between municipal departments and stakeholders

Challenges and how they were addressed

- Legal situation
 - Uncertainty regarding municipal authority to impose reuse requirements
 - Concerns from national ministries regarding mandatory restrictions
 - Complex approval process and extended timelines
 - Strong legal support and involvement of municipal lawyers
 - Continuous negotiations with ministries
 - Use of legal justification linked to waste reduction and circular economy goals
- Stakeholder management
 - Concerns from traders regarding costs and additional operational burden
 - Uncertainty regarding responsibilities and practical implementation
 - Early dialogue and stakeholder engagement
 - Seminars and active communication with traders and caterers
 - Temporary coverage of pilot costs through project funding
- Coordination, i.e., need to align multiple municipal departments and external stakeholders
 - Establishment of a broad municipal working group
 - Regular coordination meetings and shared drafting process
- Lack of sufficient knowledge and data
 - Lack of data on impacts of transitioning to reusable systems
 - Limited practical experience with reuse implementation
 - Exchange with other municipalities and ministries
 - Pilot testing and operational learning processes
 - Development of practical implementation guidance for future events

Central lessons learned and recommendation from municipality

“In order for the strategic document development process to be successful, it is necessary to involve municipal lawyers and other structural units at the very beginning. Discussions and negotiations with all parties involved in the public and private sectors should also be held at an early stage.”

3.6 Riga

Regulation and guidelines for the use of cups during street sales at public events

Case description

Riga municipality focused on supporting the implementation of reusable cup systems at public events following the introduction of municipal regulations banning disposable cups during street trading at events. The regulation “On the Procedure for Coordinating and Organising Street Trading” took effect in January 2025, however, enforcing these regulations has proven challenging, as there were no practical guidelines available to support the involved parties throughout the process. The municipality therefore developed guidance documents for event organizers, street vendors, and service providers that provide practical support for implementing reusable cup systems.

The development process was coordinated through a working group within the Department of Housing and Environment, consisting of the Head of the Waste Management Unit, an expert from the Waste Management Unit, the Head of the Projects Unit, and the Change(K)now! project manager. Testing at Riga City Birthday (see 5.5) provided practical insights.

Rīgas domes saistošie noteikumi Nr. RD-24-286-sn

Rīgā 2024. gada 28. jūnijā (prot. Nr. 123, 8. §)

Par kārtību, kādā tiek saskaņota un organizēta ielu tirdzniecība

Izdoti saskaņā ar Pašvaldību likuma 44. panta otro daļu,
Alkoholisko dzērienu aprites likuma 8. panta pirmo daļu un
Ministru kabineta 2010. gada 12. maija noteikumu Nr. 440
"Noteikumi par tirdzniecības veidiem, kas saskaņojami ar pašvaldību,
un tirdzniecības organizēšanas kārtību"
8., 9. punktu, 15.8. un 19.7. apakšpunktu

Success factors

- Strong political backing through existing municipal regulations
- Pilot testing at major public event generated practical insights
- Collaboration with other Change(K)now! partner cities
- Focus on practical and implementation-oriented guidance
- Existing familiarity with deposit systems through the Latvian national deposit system

Communication and monitoring strategies

Communication:

- Stakeholder consultations with vendors, event organizers, and service providers
- Planned publication of guidelines on the municipal website
- Promotion through municipal social media channels
- Planned online workshops introducing the guidelines

Monitoring:

- Planned integration of guidelines into permit and tendering processes
- Ongoing communication with event planners and municipal stakeholders
- Pilot-based learning and iterative revision of guidance materials

Challenges and how they were addressed

- Overarching challenges of enforcing the regulations
 - Lack of practical guidance for vendors and event organizers
 - Different system models created uncertainty and inefficiencies
 - Development of detailed implementation guidelines with step-by-step instructions
- Insufficient knowledge and data available
 - Limited impact and cost analyses for reusable cup systems
 - Lack of sector-wide operational experience
 - Conducting pilot tests at major public events
 - Collecting stakeholder feedback through surveys
 - Using experiences from other municipalities and project partners
- Coordination of multiple actors including vendors, organizers, service providers, and municipal departments
 - Established a dedicated municipal working group
 - Integrated stakeholder consultations
- Operational difficulties of reusable systems in general
 - For example, queue management, return logistics, and refund processes during events
 - Using pilot experiences to identify practical improvements
 - Including operational guidance and system models within the guidelines

3.7 Implications for strategic frameworks

The strategic pilot cases demonstrate that municipalities can play a central role in accelerating the transition towards circular food delivery systems by creating enabling strategic, regulatory, and operational conditions. At the same time, the experiences show that there is no single universal approach for developing strategic frameworks, but rather requires a flexible and context-sensitive approach.

One central finding across cases is the importance of embedding circular food delivery objectives within existing municipal strategies and structures whenever possible. Particularly the cases from Copenhagen, Tallinn, and Lahti illustrate that integrating reuse-related objectives into broader circular economy, waste management, procurement, or sustainability strategies can strengthen political legitimacy, improve cross-departmental alignment, and facilitate implementation. At the same time, the cases also show that municipalities require clear and explicit objectives related to circular food delivery systems in order to ensure that the topic remains operational and visible within broader policy frameworks.

The pilot cases further demonstrate that strategic frameworks should combine multiple governance levels and instruments. Municipal strategies and action plans alone were generally insufficient to create implementation-ready conditions. Successful approaches linked strategic objectives with operational guidance documents, procurement practices, pilot projects, and, where possible, binding local regulations. Particularly Tallinn, Liepāja, and Riga showed that regulations can create strong incentives and clarity for stakeholders, especially in public event settings. However, the cases also highlighted that local regulatory authority is often limited, particularly in relation to private-sector food delivery systems. Consequently, municipalities frequently need to combine regulatory instruments with voluntary agreements, incentives, communication measures, and stakeholder collaboration.

Public procurement emerged as an important strategic instrument across cases. The Lahti and Copenhagen cases in particular illustrated that procurement can function as an effective operational entry point for circular food delivery systems, especially where municipalities have limited direct regulatory influence. Procurement criteria and agreements allow municipalities to translate strategic ambitions into practical requirements and create stable demand for circular solutions. The findings therefore confirm the Strategic Framework Solution's emphasis on procurement as a cross-cutting implementation instrument rather than merely an operational activity.

Another key finding concerns the importance of cross-departmental collaboration and stakeholder involvement throughout the development process. All pilot municipalities highlighted that circular food delivery systems affect multiple municipal departments and external actors simultaneously, including procurement, waste management, legal departments, environmental units, event management, schools, caterers, businesses, and service providers. Consequently, strategic framework development requires strong coordination structures, clearly defined responsibilities, and continuous communication. Early involvement of legal and procurement experts proved particularly important for clarifying implementation possibilities and avoiding later barriers.

The pilot cases also show that communication and participation are not supplementary activities but central prerequisites for successful implementation. Municipalities that actively engaged stakeholders through workshops, consultations, pilot testing, and continuous dialogue were overall successful in building acceptance and practical feasibility. Especially in contexts where municipalities lacked direct regulatory authority, such as the voluntary take-away system in Anykščiai, relationship-building and trust creation became decisive success factors. The findings further indicate that communication should not only focus on environmental benefits, but also address operational feasibility, economic concerns, and practical implementation guidance.

Across cases, pilot testing and practical experimentation played a crucial role in supporting strategic development. Real-life pilots allowed municipalities to generate practical knowledge, identify operational barriers, build stakeholder trust, and strengthen political confidence. The findings therefore sug-

gest that strategic framework development should not be understood as a purely administrative or regulatory process, but rather as an iterative learning process combining strategic planning with operational experimentation and continuous adjustment.

At the same time, the cases revealed several recurring barriers and limitations. These included unclear legal competences, fragmented governance structures, limited financial and personnel resources, lack of data and benchmarks, operational complexity, and resistance from stakeholders concerned about costs or additional workload. The experiences demonstrate that municipalities need to start with realistic approaches adapted to their local capacities rather than attempting comprehensive system change immediately.

The experiences from the pilot municipalities confirm that transitioning towards circular food delivery systems requires not only technical solutions, but also governance structures that enable coordination, learning, behavioral change, and long-term institutional commitment.

4. Evaluation of Cluster I: Institutional catering pilot cases

This chapter presents the evaluation of the institutional catering pilot cases implemented in Hamburg, Tallinn, Copenhagen, and Lahti. The pilot cases focused on reducing single-use food packaging in institutional food provision settings such as schools, hospitals, and public procurement systems. As shown in Table 6, the tested approaches ranged from reusable systems in school canteens and packaging-free cafeterias to reusable transport packaging in hospitals and procurement criteria for sustainable food packaging. The pilot cases further differed regarding their scale, operational conditions, and stakeholder constellations, allowing for insights across a broad range of institutional contexts.

Table 6. Cluster I - Overview of pilot cases

City	Institution	Time frame	Approach tested
Hamburg	Vocational school	Start: January 2025	Pool system for reusables in school canteen
	Vocational school	Start: June 2025	Pool system for reusables in school canteen
	Secondary school	October 2025	Educational lesson on reusables
Tallinn	2 Secondary Schools	November 2024	Packaging-free cafeteria
	2 Hospitals	Start: February 2025	Reusable (bulk) packaging for food transportation & serving
Copenhagen	5 Schools	Start: September 2025	Reusable service packaging and bulks
Lahti	Public procurement	January 2025 – June 2025	Criteria for sustainable food packaging from a public procurement perspective

Overall, institutional catering offers favorable conditions for advancing circular food delivery systems. Institutional settings are characterized by comparatively stable consumption patterns, recurring user groups, centralized food provision structures, and existing organizational responsibilities, which can facilitate the implementation of reusable systems. At the same time, operational routines, workload considerations, procurement structures, and user convenience remain critical determinants to be considered for successful implementation.

From a political perspective, the pilot cases contributed to increasing the strategic relevance of reusable food packaging within public institutions and municipalities. In several cases, they strengthened cooperation between municipalities, schools, caterers, and procurement actors, while also generating practical knowledge for future policy integration and scaling. The Lahti case particularly highlighted the role of procurement as a strategic lever for circularity in institutional catering.

From an environmental perspective, the pilot cases demonstrated substantial potential for reducing single-use packaging waste. Particularly the Tallinn hospital case illustrated how comparatively simple operational adjustments can eliminate large volumes of disposable packaging. Similarly, the school cases showed that making reusable systems the only option is the most effective way to reduce single-use packaging.

The pilot cases also generated important social and educational impacts. Schools emerged not only as operational testing environments, but also as learning spaces for mindset and behavior change. Students became directly exposed to reusable systems in their daily routines, while educational activities increased awareness of packaging waste and circularity. At the same time, the pilot cases highlighted that behavioral adaptation requires time, communication, and repeated exposure. Resistance and skepticism often decreased once reusable systems became normalized in practice.

From a technical and operational perspective, the cases demonstrated that reusable systems are generally feasible within institutional settings, although implementation often requires adjustments to workflows, logistics, washing capacities, and serving procedures. The findings underline the importance of simplicity, compatibility with existing routines, and gradual implementation processes.

Economically, the cases revealed both opportunities and limitations. While reusable systems can reduce packaging waste and, in some cases, create long-term cost savings, financial feasibility remains a major challenge, particularly for smaller operators such as school canteens. Consequently, financial support mechanisms, procurement integration, and organizational commitment emerged as critical enabling conditions.

The following sections provide detailed evaluations of the individual pilot cases, based on the data listed in Table 7. To conclude, implications across cases will be derived at the end of the chapter.

Table 7. Cluster I - Overview of collected data

Location	Data collected
Tallinn – Schools	– Interview Baltic Restaurants & Tallinn Strategic Management Office (Pre & Post) – Interviews with school administration (Pre & Post) – Interviews with canteen management (Pre & Post) – Feedback from students at one school (Post)
Tallinn – Hospitals	– Interview Baltic Restaurants & Tallinn municipality (Pre & Post) – Interview with hospital head of catering (Post)
Copenhagen – Schools	– Interview with Copenhagen municipality (Pre & Post) – Interview with EAT Meal coordinator (Post) – Interview with EAT Central kitchen worker (Post) – Interviews with EAT booth workers at schools (n = 3) (Pre & Post) – Interviews with teachers (n = 2) (Post) – Feedback from students (from 5 groups at 3 schools; Pre-primary to 4th grade) (Post)
Hamburg – Vocational schools	<i>School 1</i> – Interview with Ökomarkt (Pre & Post) – Interview with Canteen manager School 1 (Pre & Post) – Student surveys (Pre n = 175 & Post n = 114) – Feedback from student “climate coaches” (Pre) – Feedback in classroom discussion (Post) – Interviews with two teacher sustainability coordinators (Post) – Sales data <i>School 2</i> – Interview with Ökomarkt (Pre & Post) – Interview with Canteen manager School 2 (Pre & Post) – Interview with canteen staff member (Pre) – Student surveys (Pre n = 41 & Post n = 14) – Interview with teacher sustainability coordinator (Post)

Location	Data collected
	– Interview with teacher canteen coordinator (Post) – Sales data
Hamburg – Secondary school	– Interview with Ökomarkt (Pre & Post) – Survey among participating students (n = 11)
Lahti – Procurement	– Feedback from Smart & Lean Hub – Interview production kitchen manager (Pre) – Interview Lahti municipality - procurement department (Pre) – Stakeholder feedback (Post) – Test run observations

4.1 Hamburg

Reuse at two vocational school canteens

Case description

The two pilot cases were initiated by Ökomarkt and implemented in canteens at vocational schools. These canteens primarily offer hot meals during the lunch break, complemented by beverages and snacks throughout the school day. The central objective was to familiarize students with reusable systems and increase their awareness of the topic. The practical approach at the schools was to introduce a reusable system for hot beverages, which had previously been served predominantly in single-use paper cups. In both schools, a pooling system (*RECUP*) was tested, allowing students to return the cups not only at the canteen but also at numerous partner locations across the city. This city-wide return infrastructure was intended to enhance convenience and thereby supporting system adoption among students.



School 1 (BS32) <i>Start: January 2025</i>		School 2 (BS30) <i>Start: June 2025</i>
- Status quo: Single-use paper cups or own cups - Pilot: Reusable cup/bowl system with deposit for hot beverages and selected food - o First 2 weeks: Both reusable and single-use option (20ct extra); then onwards: only reusable option - Operator: RECUP - o Monthly subscription fee - o Deposit: 1€ cup + 1€ lid; 5€ bowl incl. lid - Communication: - o 1 day info stand at start & after 4 months - o Canteen staff at point-of-sale - o Short info in selected classes		- Status quo: Single-use paper cups (50ct), Porcelain cups (2€ deposit) or own cup - Pilot: Reusable cup system with deposit for hot beverages - o No single-use - o Option of own cup or porcelain cup remained - o Also offered at student kiosk - Operator: RECUP - o Monthly subscription fee - o Deposit: 1€ cup + 1€ lid - Communication: - o 1 day info stand at start - o Canteen staff at point-of-sale

Statistics:

Hot beverages sold:

	School 1		School 2	
Reference phase	Jan – Mar 2024	2600	Jul – Nov 2024	2097
Test phase	Jan – Mar 2025	2100	Jul – Nov 2025	2094
Difference		- 19%		- 0,1%
Additional info	- 75% of Recups returned at school		- 70% of Recup items returned at school	
	- 50% buy coffee with lid		- 39% of beverages are sold in porcelain cups (34% in 2024)	

Feasibility

Canteen manager perspective:

- Overall positive resume (Process of trial and error)
- Membership fee (+additional shipping costs of cups) seen as too expensive for small canteens
 - No financial flexibility (e.g., pressure for low prices, many closed days without income)
 - Financial support (from school) crucial for canteens
 - Own system with porcelain cups would be even more expensive
 - Deposit not high enough to cover costs of lost cups
- Test phase with single-use and reusable option in school 1 quickly showed that voluntary usage is not successful → Switch to only reusables necessary to reach high participation rates
- (Initial) decrease in sales after introduction noticeable
- Introduction of reusable packaging for food not successful and discontinued
 - Deposit too high in relation to price and not suitable for offered food (i.e., size, design)
- Sustainability impact compensates difficulties and potential decreased sales for canteen managers (otherwise incentive to participate not given, as high economic risk)
- Implementation itself not problematic
 - Handling of reusables (e.g., washing) not too much additional effort – manageable
 - Full switch easier to get used to
- System needs communicative support: not immediately clear for students
 - Difficult for canteen staff to handle on their own – support appreciated/ needed (e.g., ready-to-use materials or integration of topic in school)
- Cups partly found in garbage: cooperation with cleaners established to sort them out at school 2
- Optimistic, that system will become “new normal” for new students
- Both schools decided to keep the system in long-term

“And I'm still trying to get the schools to pay the fee for me, because then it's great. Then I have no problem with it at all. Otherwise, you really have to start calculating whether it's worth it in the end.”
(Canteen manager)

“Well, I think they'll come back eventually because the craving for coffee will be too strong. And there's no cheaper coffee around here than ours.” (Canteen manager)

School perspective:

- Climate protection as omnipresent topic: School as role model willing to participate
 - Reusables already discussed topic beforehand
 - Sustainability in general part of teaching contents
- Support from “outside” organization helpful to get things started
- Topic should be communicated more proactively to reach students

“But we've been talking all along about how we need to reduce single-use plastic here somehow. (...) So if we as a school can do our part, then that's it.” (School sustainability coordinator)

Acceptability

Students:

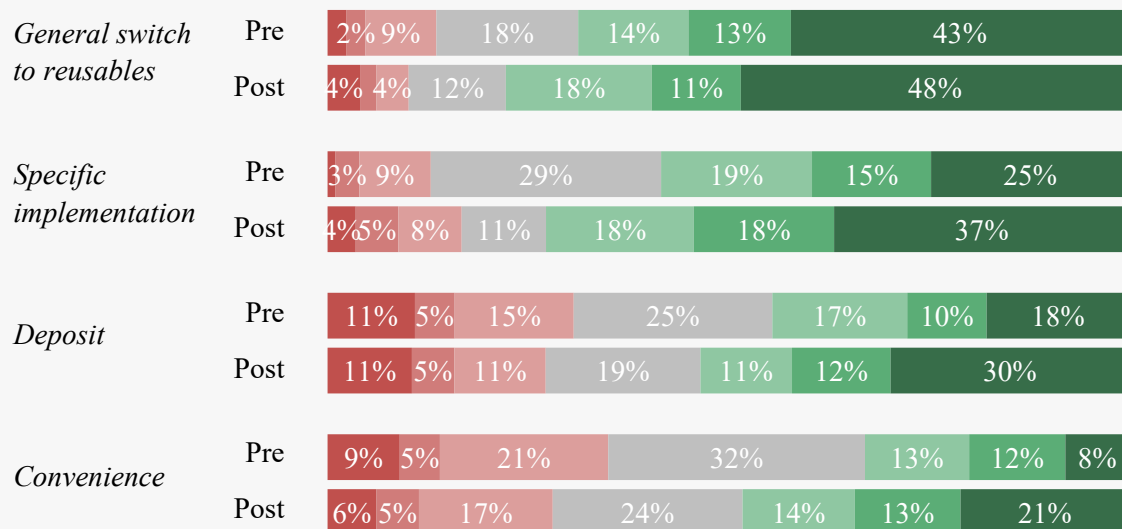
- General attitude can be described as “tolerated” rather than actively supported
- Initial skepticism was common in both schools
- Reusables needed to be the exclusive option to ensure usage
- Central barriers:
 - Lack of understanding and unfamiliarity
 - Misperception that reusables are more expensive (Deposit seen as actual costs)
 - Additional effort (time, transport, cognitive load)
 - No return at late school hours
 - Hygiene and material discomforts
- Price competitiveness remains a decisive factor: Cheap prices in canteen convincing “despite” barriers
- Continuous exposure supports normalization
 - Adaptation occurs over time, but not uniformly
 - Adjustment process expected, reusables likely to become normal for future students

“Ultimately, [the students] all want to do something for the environment. But when there is such a minimal change, it is met with such extreme resistance. I must say, quite honestly, that surprised me a lot.”
(Canteen manager)

Insights from school 1:

- In discussions before implementation, students expressed strong disapproval and a clear preference for optional reusable cups and self-motivated choice for sustainable alternative
- After implementation, shift from fundamental criticism to functional criticism → tolerance

Survey also showed clear positive shift in assessment of system from first to second time point:



Basis: Pre: n = 175; Post: n = 114

“I would probably forget the items, otherwise I could just bring my coffee mug from home. If you buy a new Recup every time, it gets expensive, to be honest.”

“I would use my own Tupperware rather than buying extra containers for a deposit.”

“The deposit system is a little annoying, as sometimes you can't return the cups after school because the cafeteria is closed.”

“You have to carry it with you until you can return it. Not everyone accepts reusable items.”

“Everything speaks in favor of it :) Nobody buys things in the canteen to eat outside of school. That's why it would be nonsensical not to offer reusable cups.”

“Good idea, which perhaps needs to be explained more clearly to the students. This will ensure that everyone knows what it is.”

Replicability, Transferability & Scalability

Overall:

- Suitable system for school canteens to increase circularity
- Easily replicable at other schools (low entrance barriers/ easy implementation itself)
- Financial support for canteens central factor

“(…) you definitely need to know someone at school, or at least have someone who is willing or wants to make a change.” (Ökomarkt)

Success factors/ Learnings for future implementation:

- First and most important hurdle is to convince school and canteen
 - Need for people within the school system who are willing to tackle the issue, feel responsible for it and push for implementation
 - Sustainability impact convincing factor for schools (e.g., climate schools)
 - Marketing possibility for schools/ decision makers
- Reusable system adds an additional financial burden for canteens
 - Financial support from school highly relevant
 - Sustainability impact main motivation, but not sufficient for widespread adoption at other canteens
- School and canteen have to cooperate to successfully implement reusable system (financing & communication towards students)
- Second hurdle: Convincing the students
 - Topic should be communicated more proactively to reach students
 - Students have to be well informed and understand system and benefits
- Options for (improved) communication
 - Continuous effort from canteen staff at point of sale
 - Educational work in school and class context (relevance, understanding, reduction of misconceptions)
 - Visualizations (at canteen and in classrooms)
 - Informative events (e.g., kick-off event, project week)
- Optional offer and self-motivated choice for reusables not sufficient → reusable cups need to be exclusive option

Options for scaling:

- Educational work for schools
- Integrate reusables in school canteen in guidelines at authority/ administrative level

“We want to do something for the environment. Since politicians are not taking this into account in their discussions, we will do it ourselves.” (Canteen manager)

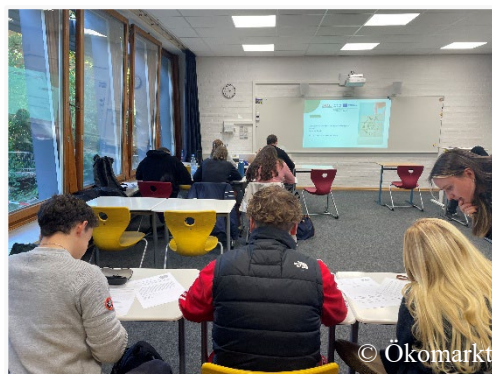
“The more often they come into contact with something like this, the more they naturally engage with it. If they know about Recup from school and then see it in the next café they visit, there's really no reason not to use a cup like this again.” (School sustainability coordinator)

“The school board would have the option of obliging these caterers to offer reusable systems as part of the model contract. Whether it would then prohibit single-use systems altogether and so on is something that can be discussed. And with this model contract, a structural anchoring would then be possible.” (Ökomarkt)

Educational unit on reusables in secondary school

Case description

In order to foster a mindset and behavior change of students towards more circularity in relation to food packaging, Ökomarkt tested an interactive educational unit at a secondary school (Fritz-Schumacher-Schule). The aim was to increase awareness and knowledge amongst students and to identify individual barriers or ideas for reusable alternatives. The unit consisted of an informative presentation combined with a quiz, group work assignments, a questionnaire and a joint reflection and discussion of practical implementation options. Moreover, the feedback serves as basis for further measures at the school.



Feasibility

- Implementation itself successful
- Central precondition: Motivated school and teacher willing to integrate topic into classes
- Engagement and interest from students made lessons more impactful
- Opportunity for schools to get feedback/ ideas from students
- Seen as meaningful option to prepare students as well as consider their opinions for related measures in school
- Main challenges during implementation: Limited time
 - Some points had to be left out, no time for a concluding discussion about reusables
 - Not enough time for students to elaborate during the presentation of their group assignment
- Disadvantage: Only few students reached per lesson
- Impact: Engagement at school and implementation of lesson ultimately led to integration of reusables at school event and at school kiosk

Acceptability

- Student engaged actively in the lesson and showed genuine interest
- Students understood single-use problem and are convinced of positive impact of reuse
- Feedback from questionnaire (n = 11):

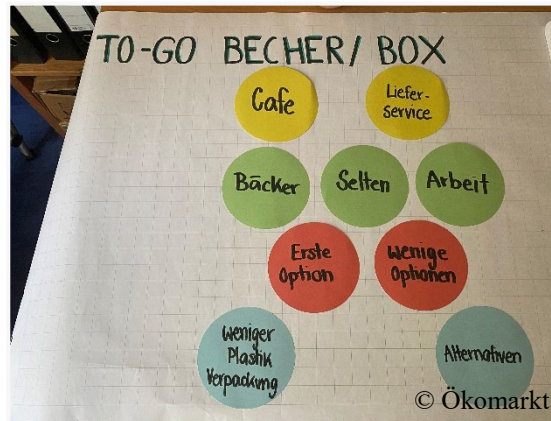
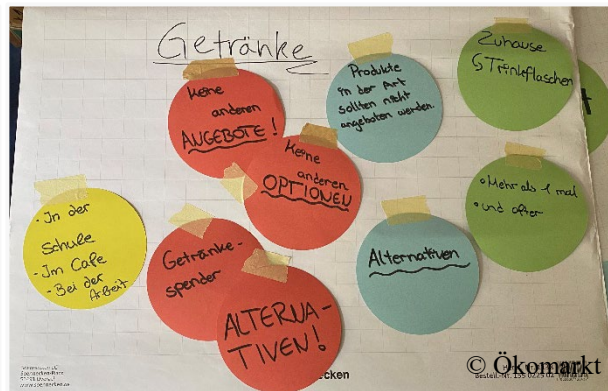
“More of this, please!”

Item (Scale 1 to 7)	Mean
The lesson was interesting.	6.6
The lesson motivated me to continue exploring the topic.	6.2
I believe that the use of single-use packaging for food and beverages causes many environmental problems.	6.5
The switch to reusables has a positive impact on the environment.	6.2

- Students reported not much coffee consumption so far, however interested in reusable system for own cafeteria and would be willing to try it out

Replicability, Transferability & Scalability

- Session could easily be repeated by teachers or in other educational contexts
- Materials could be shared on database for teaching materials and used by teachers who are interested in integrating the topic
- Suitable opportunity to discuss upcoming or accompany practical actions (e.g., introduction of reusable system in canteen)
- Engagement at school and implementation of lesson ultimately led to integration of reusables at school event and at school kiosk
- Applicable, regardless of the school's level in relation to reuse
- Main requirement: Support from school that is willing to provide time/room for lesson
- Success factor: Session should be designed interactively, close to real-life situation of students and show practical options
- Option for scaling: Integration into curriculum at school
- Session adjustable for larger audiences (e.g., project week in schools, etc.)



4.2 Tallinn

Packaging-free school cafeterias

Case description

Tallinn municipality in cooperation with the caterer *Baltic Restaurants* aimed to implement a packaging-free month at the cafeterias at (1) *German high school* and (2) *Läägna high school* as basis to establish long-term reduced single-use packaging. They tried to eliminate all plastic packaging for food prepared on-site and only allowed paper as single-use option if needed. Specifically, salads, pokebowls, desserts, smoothies, etc. were served in glass bowls/bottles, sandwiches were served in paper-wrapping and cookies and rice waffles were served without packaging or on paper. As most food is consumed in the immediate vicinity of the cafeteria, the reusable packaging was expected to be returned directly. Students were reminded of this verbally by the staff as well as visually by signs at the cafeteria. Further, an educational training for students was implemented. The cafeteria staff were instructed about the new procedures, which was complemented by a guidance video.



Feasibility

- Mixed expectations from school: Sustainability impact (reducing packaging) seen as positive, but uncertainty about its practicality
 - High concerns and resistance from staff before start:
 - Extra workload and inconvenience
 - Dissatisfaction of end-user (students/teacher)
 - Take-away in short breaks inconvenient with reusables/ without packaging
 - Practicalities of implementation:
 - how to serve food without plastic packaging
 - whether dishes would be sufficient
 - how to keep products fresh
 - In test phase, implementation overall operationally feasible, however, with challenges
 - Cafeteria staff at school 1 reacted negatively and had difficulties to adapt
 - At school 2 staff adapted quickly and managed the change well
 - Instructional videos considered as helpful
 - Full switch for all offered products seen as difficult to manage
 - Different (cultural) background from staff at both schools might have influenced acceptance
 - Operational difficulties occurred, but staff was able to find adjustments for most issues
 - Sandwiches dried out more quickly in paper, so they prepared sandwiches in smaller batches and one example sandwich was displayed half-way wrapped
 - Changed salad ingredients and preparation procedure
 - Cookies now had to be cooked on site
- “The packaging-free direction is positive both educationally and in terms of the environment.” (School 2 director)
- “Honestly, this pilot is causing stress.” (Cafeteria 2 manager)
- “I’m not sure if everything will go smoothly and how we’ll manage with serving.” (Cafeteria 1 manager)
- “At first, we were afraid, but then customers and children got used to the change, everyone adapted. Somehow, the time passed very quickly, and even the staff got used to serving differently very fast [...] and it was actually exciting and quite interesting.” (Cafeteria 2 manager)

Feasibility *(continued)*

- Take-away more relevant at school 1 which led to more negative assessment in general
 - Take-away consumption seen as inconvenient without (single-use) packaging
 - Baltic Restaurants provided guidance on possible adaptations
- School 1 reported decrease in sales in test period
 - Convenience-related barriers seen as likely explanation
- Financial considerations:
 - Investment for additional glass bowls/ bottles
 - Investment for large bulk glasses for cookies and rice waffles
 - Paper-wrapping for sandwiches slightly cheaper than plastic containers
 - Increased workload for staff
- Slightly reduced costs due to lower packaging needs
- Minor increase in food waste (i.e., one unsellable display sandwich per day as no longer in see-through plastic packaging)
- One month considered as too short to fully adapt to new system
- Activities partly continued in both schools
 - Paper-wrapping for sandwiches: Return to plastic for triangular ones, others continued in paper-wrapping
 - Glass bowls: Both schools continued for salads, pancakes, fruit salads and desserts, however one school discontinued for pokebowls, as sales decreased there significantly

“I think the biggest problem was that food couldn’t be taken away when served on a ceramic plate.” *(Cafeteria 1 manager)*

Acceptability

- Students were generally neutral but accepting
- Educational event with background information on reasons for change helped acceptance at school 2
- At school 1, students (and teachers) want take-away options; banning them entirely created resistance

Student interviews at school 2 (11-15 years; n = 8):

- Awareness: Most students noticed change (few did not)
- Attitude: Those who noticed mostly felt neutral to positive
 - Majority prefers less packaged food
- Sustainability as key benefit of reusables
- Concerns/ Benefits of plastic packaging:
 - Hygiene
 - Convenience

“I believe that among the middle and older school students, there are definitely those who understand environmental issues and see the reduction of packaging as a positive trend.”
(School 2 administration)

“I think it was fine. I don’t really mind – both ways are okay for me.”

“I also think there should be less packaging, but the food should still be placed in a way that prevents anyone from sneezing on it or touching it before purchase.”

“I like it when I can choose whether to buy food in plastic packaging or on a regular plate/bowl.”

Replicability, Transferability & Scalability

Overall:

- Test month possible option as part of school-wide thematic focus on reuse and packaging waste
 - Experiences and learnings can be used as basis for long-term implementation
- A key learning in both schools: gradual implementation increases staff acceptance and reduces resistance
 - Step by step approach helpful to find practical and accepted ways of serving the food
- One month was too short for full adaptation by staff and lasting behavioral impact among students
- What works well is dependent on local conditions (e.g., preference for take-away)
- Practical learnings for packaging-free serving can be adapted to other canteens

“I believe it would be good if this option was introduced gradually. The reaction to change from staff can be quite emotional and possibly negative at first. I can speak from experience that there is initial resistance and a negative feeling.”

(Cafeteria 2 manager)

Reusable packaging for food transportation at hospitals

Case description

Baltic Restaurants as caterer of two large hospitals in Tallinn with support from *Tallinn municipality* aimed to increase the circularity of their food delivery. The specific approach of this pilot case was to transition the transport packaging for sandwiches at the hospitals from individual single-use containers to bulk, reusable containers. This shift required a corresponding adaptation of the serving process. Instead of being served directly as delivered in individual disposable packaging, sandwiches are now placed by hospital service kitchen staff onto ceramic plates and then served to patients. The used plates are subsequently collected and washed on-site at the hospital. A full description of the adopted system process is provided in the workflow overview.



Statistics

- ~ 600 sandwiches served per day
→ ~ 18.000 single-use container per month saved
- Additional washing needed:
 - ~ 30 Bulk boxes per day
 - ~ 600 ceramic plates per day



System process

1. The caterer prepares the breakfast sandwiches in their central kitchen
2. Sandwiches are packed in large reusable plastic containers with lids for transport
3. Sandwiches are transported to the hospital serving kitchen
4. In the hospital serving kitchen, each sandwich is placed on a ceramic plate
5. Sandwiches are delivered to the patients
6. Collection of plates from patients
7. Plates are washed in the hospital serving kitchen
8. Transport containers are returned to the driver, who takes the containers back to the caterer's central kitchen
9. Transport containers are washed in the central kitchen and used again the following day

Feasibility

Overall: Positive, successful

“Support from the management was the key issue there”
(Tallinn municipality)

Drivers:

- Intensive communication with hospital management before and during implementation
 - Hospital management support was crucial for adoption (Top-Down communication proved successful)
- Institutional alignment: Pilot fits hospital’s broader direction away from disposables after COVID
 - Also aligned with upcoming regulatory pressures: change is not only desirable but inevitable
- Other meals are already served on plates and the service kitchen staff was already used to it in general
- Easier workflow for central kitchen staff
- Economic benefit: Clear costs saving for caterer from reduced packaging needed
 - Reduction in waste disposal for hospital
- Environmental benefit: Large reduction of unnecessary packaging waste
 - Reduction in volume for transportation also allowed for a smaller car

“We made a hospital-wide decision to eliminate disposable food containers”
(Hospital head of catering)

Barrier/ Challenges:

- Increase in workload for hospital service kitchen
- Certain resistance of service kitchen staff based on
 - Convenience of disposables
 - Additional workload (Placing of sandwiches on plates & washing of plates)
 - Washing is not technically difficult but very repetitive and large in scale (thousands of dishware items daily)
- Caregivers previously used single-use containers to store leftover sandwiches for later consumption, however found alternative and now store leftovers in a large container instead

“We used to have a horrible mountain of packaging here every morning.”
(Hospital head of catering)

“The biggest challenge has indeed been for the [service] kitchens. They got more work.” (Hospital head of catering)

Acceptability

Service kitchen staff:

- Process: started with hospital management (top-down), then engaged kitchen staff directly to explain and build acceptance
- Initial resistance → needed convincing
- Preference for disposables (easier, no dishwashing)
- Some openly complained that the change brought extra work
- Change felt imposed (“order is an order”)
- COVID normalized disposables (at one point all meals served in disposables)
 - Staff was used to convenience of single-use

“There were some heated discussions (...). Some staff were quite upset with me.”
(Hospital head of catering)

Patients:

- Not significantly affected by change
- Ceramic plates generally more pleasant for food consumption

Replicability, Transferability & Scalability

- Management support was crucial for implementation: A top-down approach in communication proved to be successful
- Clear economic benefit for caterer
- Necessary condition: Availability of plates and the option for washing at site
- Hospitals will continue with the system
 - Already gradually changed all meals from single-use to reusable plates (sandwiches as last step)
 - Recognizes need to address further single-use challenges (e.g., vending machine cups)
 - Sees pilot as aligned with upcoming regulatory pressures: change is not only desirable but inevitable
 - Hygiene vs sustainability: Certain items (i.e., portioned butter and sugar) are kept in single-use packaging for hygiene
 - Raises future concerns: EU packaging regulations may create difficulties when prohibiting small portion packaging

“It is always a much easier to continue the system that is existing. And, all changes are complicated and need communication, but everything is possible.” (*Baltic Restaurants*)

“Schools, kindergartens, nursing homes – anywhere food is delivered, the use of plastic containers could be reviewed and potentially replaced.” (*Hospital head of catering*)

4.3 Copenhagen

Reusable packaging for lunch at schools



Case description

The *Municipality of Copenhagen* is piloting a reusable packaging system across five schools within the *EAT* school food programme, with the intention of scaling the model to more *EAT* schools following the test phase. The test currently includes ~ 600 meals per day, while scaling could include up to 50 schools and a total of 6,000 meals per day.

The overarching objective of the pilot is to develop, validate, and document a scalable model for circular institutional catering. A key feature of the system is the integration of RFID-enabled packaging, designed to improve data availability and enable more informed, evidence-based decision-making.

The pilot encompasses the procurement and deployment of reusable containers equipped with RFID tags, alongside the development of the necessary tracking infrastructure and data collection systems. Implementation was carried out in close coordination with *EAT* kitchens, including staff training on the handling, distribution, and return processes associated with reusable packaging. At the operational level, the pilot involves the rollout of the system in selected schools, combined with targeted communication efforts to ensure that students understand how to use and return the containers correctly. System performance is continuously monitored through the collection of data on usage patterns, return rates, and operational efficiency. In parallel, the municipality maintains an ongoing dialogue with involved stakeholders, using early insights to iteratively adjust logistics and workflows.

System process

1. *Preparation at EAT central kitchen:* Staff prepare the food and pack it in reusable bulks.
2. *Transportation:* The bulks and the service packaging are transported to the school during the night by an external transportation company.
3. *Preparation at EAT booth:* EAT booth staff, supported by students, prepare and finalize the food to be served in the reusable service packaging.
4. *Meal pickup and return at EAT booth:* Two representatives from each class from grade 0 to 6 pick up the food in large thermos boxes. Pupils from grade 7 to 9 pick up the food individually. The food is consumed in the classrooms. After they have eaten their food, the students empty leftovers and return the packaging to the EAT booth.
5. *Return to EAT central kitchen:* EAT booth staff prepare the service packaging and bulks for transportation. The packaging is picked up by the external transport company and returned to the central kitchen.
6. *Washing at EAT central kitchen:* The bulks and the service packaging is cleaned.
7. The cycle continues at step number one.

Feasibility

Municipality perspective:

Planning & preparation:

- Project was initiated by Technology, Development and Resources department, which functioned as key expert during planning
- Coordination across multiple departments and locations increased organizational complexity but simultaneously ensured successful implementation
- Gaining commitment was initially challenging but improved once the project's purpose and impact became clear
- The implementation was preceded by an extensive preparation phase, including the evaluation of various system options, i.e., washing processes and packaging
 - Packaging options were tested especially for menu fit, usability for children, and washability
 - Increased sustainability inherently planned into system design
- On-site Staff, especially in central kitchen and school booths, were closely involved in planning due to their operational role

Implementation:

- Test started with five schools, as full rollout at all schools was considered unsuitable
 - Would have strained operations and staff and consequently decreased acceptance
 - Step-by-step introduction gives opportunity to adapt and learn from initial experiences
- RFID scanning was introduced as relatively simple and inexpensive possibility to track packaging flows
 - However, technical issues (connectivity and security approval) delayed implementation
- The reusable system was integrated into a new central kitchen facility:
 - Separate washing line in order to prevent contamination with other kitchen areas
 - Washing line set up for plastic packaging, however planned drying module not yet integrated
 - Need for separate drying which takes up space and increase work efforts
 - Will be added to allow scaling
- Initially, only younger grades were integrated into system to ensure return (as they are not allowed to leave premises), however, older grades expressed interest and were included as well
- Financial impact in test phase overall neutral, but expected to be positive once scaled
 - Initially, decrease expenses for single-use packaging is invested in increased working hours

EAT and schools perspective:

Central kitchen:

- Washing of containers as additional tasks is covered through additional staff/ working hours
 - Change in routines but overall manageable and no increased individual workload
 - Dishwasher not yet equipped with drying function
 - Containers need to be dried on racks which takes up time and space
 - Washing itself works well overall
 - Containers sometimes only washed after the weekend which can lead to stains on the containers
 - Permanent washing team would be needed if expanded to more schools
- 

Feasibility *(continued)*

Booths at school:

- Initially, responsibilities were not understood clearly which underlines the need for training and active integration of staff in process
- Workload overall perceived as increased compared to single-use (i.e., return handling)
- Overall supportive, as long as washing is handled in central kitchen
- Some students do not hand in containers on time
- Students that help in the booths don't like handling dirty containers

Implementation in schools:

- Neutral to positive reactions and feedback: Works well overall
- Good education in relation to sustainability
- Challenges:
 - Thermo boxes for pickup not always suited
 - Wasted space or containers do not all fit in and two are needed
 - Have to remind students to empty leftovers
 - Students sometimes have to be reminded to return containers (they naturally rather go on breaks/ home)

“Just get to it!” (*Teacher*)

Packaging related:

- Overall good quality and staff/ schools satisfied
- Food seen as more appealing in reusable than single-use containers
- Lids sometimes difficult to get off/on, especially for very young children
- Containers sometime get stench when not cleaned on the same day
- Lids can become loose with hot contents

Acceptability

EAT staff and teacher perspective:

- Overall neutral to positive reactions from included EAT staff and teachers
- Gradual implementation intended to maintain acceptance and cooperation of staff
 - Gives opportunity to adapt to new routines
- Teacher appreciate educational aspect

“If it works, then it makes sense.” (*EAT Central kitchen staff*)

“If it can be done better, it needs to be done better.” (*Teacher*)

Students' perspective:

- Overall positive reactions from students and most want to continue with reusable packaging
- Eating experience rated as neutral to positive
- Mixed reactions towards needing to return the containers
- For few students it is difficult to open or close the lids but majority has no problems
 - Booth staff or teachers gives guidance on how to best handle the lids
- A few students don't like handling the used and dirty containers (e.g., sorting into thermo boxes)
 - Could be made easier for students to sort containers (e.g., separate boxes for bowls, lids, cutlery)
- Older grades expressed interest in joining the system and were integrated as well

Replicability, Transferability & Scalability

- Intended to be scaled to all 50 EAT schools step by step
 - Needed requirements:
 - Final installation of RFID scanners
 - Installation of drying module in washing line at central kitchen
 - Few operational adaptations, e.g., permanent washing team at central kitchen
- System suitable to be replicated at other schools as well
- Well-suited for transferring and adapting certain parts of the system to local conditions, e.g., tracking, washing approach, packaging type

4.4 Lahti

Sustainable procurement criteria

Case description

The core objective of the pilot case was to redesign, rethink, and promote the reuse of food packaging by embedding sustainability criteria into Green Public Procurement processes. The pilot case targeted upstream actors in the food provision system in institutional catering. It focused on food product suppliers, wholesalers and logistics operators, as well as public authorities responsible for procurement policy and practices at local and national levels. To do so, a set of 21 procurement criteria for food packaging in public catering was developed by *Smart & Lean Hub* with support from the *Regional Council of Päijät-Häme* and subsequently assessed and refined through an iterative process. This process involved multi-stakeholder consultations, bringing together national-level actors, institutional kitchens, food producers, wholesalers, and other local stakeholders to ensure that the criteria were practical and aligned with market realities. The resulting set of nine sustainability-related criteria was then tested in practice at *Apilakatu production kitchen*. Based on the insights gained during this testing phase, the criteria were further refined and validated to enhance their applicability and their potential for broader implementation within public procurement processes.



The nine sustainability-related criteria out of total 21 procurement criteria:

1. Bio-based materials: The food packaging must be made from renewable raw materials, such as wood fiber, bamboo, or bio-based plastics.
2. Fossil-based plastics reduction: The aim is to reduce fossil-based plastics like polyethylene (PE), polypropylene (PP), polyvinyl chloride (PVC), polystyrene (PS) and polyethylene terephthalate (PET).
3. Reusable packaging: Promoting the use of reusable packaging to reduce single-use packaging and material consumption.
4. Lighter packaging: Using lighter packaging to decrease material consumption.
5. Minimize unnecessary packaging: The empty space in packaging should be no more than 50%, and the package volume should be minimized.
6. Recyclability: Packaging must be fully recyclable or compostable.
7. Use of recycled materials: Favoring packaging made from recycled materials.
8. Single-material packaging: Using single-material packaging to simplify recycling.
9. Ease of waste management: Ensuring food packaging is suitable for local recycling systems and includes clear sorting instructions.

Feasibility

Self-reflection of criteria developers:

- Technical: The criteria are based on existing standards and certifications (e.g., OK Compost, FSC, ISCC, EN 13432, REACH, etc.), which are widely recognized and applied in the industry
 - This ensures that the criteria are technically feasible and can be verified through existing methods
- Operational: The criteria are designed to be integrated into the public procurement process, which is a common practice in the institutional catering sector.
 - The verification methods (e.g., supplier contracts, audits, reporting) are standard practices in procurement
- Resources: The criteria require suppliers to provide documentation and certifications, which are already part of their operations.
 - The monitoring system proposed (e.g., tracking packaging waste) is also straightforward and does not require significant additional resources.

Conclusions after test run:

- The criteria are clear and understandable: All nine criteria tested (1.1–1.9) are clearly described and understandable to the parties involved in the procurement
- Market supply varies: There are clear and existing options for some criteria (e.g., EcoFishBox in criterion 1.2), but GN containers made from fully renewable raw materials (1.1), for example, are not yet available on the market
- The cost implications are not significant: Most of the criteria do not or should not cause additional costs, or prices are expected to remain the same or even decrease
 - There are some exceptions (e.g., pineapple in a vacuum bag is 20% more expensive than in a can)
- Verification and contract drafting necessary: There are generally means of verifying the criteria, and the necessary conditions can be added to contract
- Reusability and recyclability are already well-established practices: Several solutions are already in use, such as reusable transport boxes and waste management systems
- There are gaps in knowledge or technical barriers in some areas: For example, there is insufficient information on market readiness for recycled materials (1.7) or reducing empty space (1.5)
- More innovation and cooperation are needed: Meeting many of the criteria requires new product solutions and close cooperation with suppliers

Key conditions enabling implementation:

- Cost neutrality: New criteria must not increase procurement costs unless matched by municipal budget increases
- Material innovation: Availability of bio-based, recyclable, or low-impact materials must increase, especially in formats compatible with institutional kitchens
- Policy literacy: All stakeholders must be better informed of relevant and emerging policies (e.g., PPWR, GPP, Green Deal) and how they shape procurement
- Collaborative governance: Close cooperation and dialogue across the value chain (procurement units, suppliers, logistics) is essential
 - Market dialogues have proven useful in this context

Acceptability

- A wide range of national, regional, and local actors participated in the assessment of the criteria to ensure acceptance
- The presentation of the criteria strengthens acceptance further by increasing transparency, providing justification, and offering educational material

Replicability, Transferability & Scalability

Strategies for scaling up or transferring the procurement criteria:

- Capacity building of institutional catering actors and operators on sustainable policies, laws, regulations and tools, such as procurement criteria, to make practices more environmentally friendly
- Influencing national policy makers (e.g., Ministry of Environment, Ministry of Agriculture and Forestry) to put more pressure on the implementation of the Green Public Procurement and Packaging and Packaging Waste Regulation at the national level
- Influencing the corporate governance of the City of Lahti to provide both targets and resources for its subsidiary to become more sustainable
- Influencing food product suppliers to enhance their packaging practices
- Influencing packaging material experts and innovators, particularly fibre-based, to develop more environmentally friendly and sustainable materials that are still cost-efficient
- Influencing packaging designers to provide new packaging solutions for food product suppliers and wholesalers

4.5 Implications for institutional catering

Institutional catering settings provide favorable conditions for advancing circular food delivery systems, as they are characterized by stable consumption patterns, recurring user groups, centralized food provision structures, and clearly defined organizational responsibilities. These conditions create comparatively strong opportunities for introducing reusable systems and gradually normalizing circular practices in everyday routines. Still, the pilot cases also show that successful implementation depends strongly on operational feasibility, organizational commitment, communication, and user convenience.

A central finding across the pilot cases is that reusable systems are most successful when they are integrated as the standard option rather than offered merely as a voluntary alternative. Particularly the Hamburg school cases demonstrated that optional reusable systems achieved only limited uptake, while participation increased significantly once reusable cups became the only available option. Similarly, the Tallinn school case showed that reducing or eliminating disposable packaging was feasible when operational procedures were consistently adapted to the new system. The findings therefore indicate that convenience, habits, and default settings strongly shape user behavior within institutional catering environments. Where single-use and reusable options coexist permanently, users often continue to choose the more familiar and convenient disposable option.

At the same time, the pilot cases underline that operational simplicity is critical for long-term feasibility and acceptance. Reusable systems must integrate smoothly into existing workflows and should not create excessive additional workload for kitchen staff, canteen operators, teachers, or administrators. Across cases, implementation was most successful where systems remained relatively low-threshold and practical. The findings further show that operational challenges can often be solved through practical adjustments and iterative learning processes. Staff frequently expressed skepticism prior to implementation, particularly regarding workload and user reactions. However, many concerns decreased once routines became established and operational adaptations were introduced.

The Tallinn hospital pilot particularly demonstrated the high potential of reuse in centralized institutional food systems. Compared to more consumer-oriented settings, hospitals and large-scale catering operations benefit from highly controlled logistics, professional washing infrastructure, and predictable operational processes. The case illustrated that comparatively simple adjustments to transport and serving systems can substantially reduce disposable packaging without fundamentally changing the overall catering structure. This indicates that back-end logistics and transport packaging represent highly promising starting points for circular transition within institutional catering.

The cases further highlight the strategic importance of procurement as an enabling mechanism for circularity. The Lahti case in particular demonstrated that public procurement can serve as an effective entry point for integrating sustainability criteria into institutional food systems. Procurement criteria can help create long-term planning security, stimulate market development for reusable solutions, and ensure that circularity becomes integrated into contracts, supply chains, and operational routines. The findings therefore suggest that procurement should not be treated merely as an administrative function, but as a central governance instrument for circular transition.

Another important finding concerns the role of institutions as spaces for education, awareness-building, and long-term behavioral change. Schools in particular emerged not only as operational testing environments, but also as social learning environments where students are repeatedly exposed to reusable systems in everyday life. The Hamburg educational case and the practical school implementations showed that both operational measures and educational activities can strengthen understanding, acceptance, and normalization of reuse. Repeated exposure was found to be especially important, as initial resistance and skepticism among students often decreased over time once reusable systems became part of everyday routines.

Beyond repeated exposure, communication is essential for overcoming resistance and misunderstandings. Across several cases, users initially perceived reusable systems as inconvenient, more expensive, or unnecessarily complicated. In Hamburg, for example, some students misunderstood the deposit as an

additional cost rather than a temporary payment, while others were uncertain about return procedures or hygiene aspects. Clear communication, visible guidance, direct interaction at the point of sale, and educational activities therefore proved highly important for increasing acceptance and reducing uncertainty. The findings further suggest that communication should not focus exclusively on environmental benefits, but also emphasize practical functionality.

The pilot cases additionally highlight the importance of organizational commitment and internal champions. Successful implementation often depended on motivated individuals within schools, municipalities, catering organizations, or project teams who actively coordinated implementation, addressed challenges, and maintained communication between stakeholders. Particularly in school settings, cooperation between school leadership, teachers, canteen operators, and external organizations proved crucial. Without internal support structures and clearly assigned responsibilities, implementation processes were slowed down considerably.

Financial feasibility nevertheless remains a major challenge for many institutional catering actors. School canteens in particular often operate under strong financial pressure and limited flexibility. The Hamburg cases showed that additional subscription fees, investments, and operational risks can become significant barriers, even when the systems themselves are operationally feasible. Consequently, long-term implementation may require financial support mechanisms, integration into procurement structures, or policy-based incentives. At the same time, the cases suggest that environmental motivation alone is often insufficient for long-term implementation unless systems are also economically manageable for operators.

From a sustainability point of view, the pilot cases suggest considerable sustainability potential for reusable systems in institutional catering settings. They demonstrated a substantial reduction in waste by replacing single-use packaging with reusable alternatives or serving food with less packaging or without packaging. They represent overall feasible and accepted options for scaling and therefore multiplying the local effects. Particularly in schools and hospitals, comparatively simple operational changes substantially reduced single-use packaging waste. The Tallinn hospital cases illustrated how reusable transport and serving solutions can replace large volumes of disposable packaging, while the school cases highlighted that making reusable systems the exclusive option is most effective in achieving meaningful reductions in single-use consumption. Repeated daily exposure within institutional settings supported normalization processes among students and staff and contributed to longer-term mindset and behavior change.

To conclude, institutional catering systems should not be understood as isolated interventions, but rather as organizational transition processes that require gradual adaptation, learning, and coordination. Successful implementation was typically characterized by iterative adjustment, stakeholder dialogue, and willingness to adapt operational procedures over time. Piloting therefore played an important role as protected learning environments in which organizations could experiment with reusable systems, identify barriers, and gradually optimize implementation. Overall, the pilot cases suggest that institutional catering represents one of the most promising entry points for accelerating the transition towards circular food delivery systems. The relatively controlled operational conditions, recurring user groups, and educational potential create favorable conditions for implementing and normalizing reusable practices. This ultimately demonstrates that institutional catering can contribute not only to packaging waste reduction, but also to broader mindset and behavior change by embedding circular practices into everyday institutional routines and learning environments.

5. Evaluation of Cluster II: Eat-at-place and events pilot cases

This chapter evaluates the pilot cases implemented within Cluster II, focusing on reusable systems in event and eat-at-place settings in Tallinn, Copenhagen, Hamburg, Liepāja, and Riga. As summarized in Table 8, the pilot cases covered a diverse range of event contexts, sizes and reusable system approaches, including centralized and decentralized systems, and varying return infrastructures.

Table 8. Cluster II - Overview of pilot cases

City	Event	Date	Visitors	Approach tested
Tallinn	Song & Dance Festival	28 June – 6 July 2025	~ 100,000 visitors; ~ 40,000 performers	Multi-service provider reuse system covering performer catering, visitor food courts, & food deliveries to accommodation schools
	Copenhagen Sprint	21–22 June 2025	~ 10,000 per day	Reuse system with digital reverse vending machines for food and beverage packaging
Copenhagen	Copenhagen Street Days	5–7 September 2025	~ 8,000 – 10,000 per day	
Hamburg	UEFA EURO Fan Zone	14 June – 14 July 2024	~ 614,000 in total, up to 50,000 daily	Shared reusable system for food and beverages with central return station
	HAMBURG PORT ANNI-VERSARY	9–11 May 2025	~ 1.2 million	Return machine for reusable cups in one event location
	Hamburg Sunset Series	16 July 2025	~ 700 participants	Reusable cups for route refreshments
Liepāja	Kopums / MAD Liepāja Youth Festival	16–17 August 2025	~ 16,000	Shared reusable system for cups
Riga	The Riga City festival	16 August 2025	~ 60,000	Decentralized reusable system for cups

Events represent highly relevant but also challenging environments for circular food delivery systems. They are characterized by temporary infrastructures, fluctuating visitor flows, high time pressure, and large-scale consumption of food and beverages within short periods of time. At the same time, events offer strong potential for allowing reusable systems to reach large audiences and normalize circular consumption practices in public spaces.

Across the pilot cases, municipalities played a particularly important enabling role. Several cities introduced or tested regulatory measures requiring reusable tableware or cups at events, while simultaneously supporting implementation through guidance, stakeholder coordination, and communication activities. The cases therefore demonstrate how municipalities can act not only as regulators, but also as facilitators and coordinators of circular transition processes.

From an environmental perspective, the pilot cases showed significant potential for reducing single-use waste volumes at events, particularly where reusable systems became mandatory solutions. The findings indicate that high participation and return rates can be achieved when systems are designed to be convenient, clearly communicated, and operationally integrated into event workflows.

The cases further generated important social impacts by increasing public visibility of reusable systems and exposing visitors to new consumption routines. Repeated interaction with deposit systems contributed to growing familiarity and acceptance among end-users. However, the cases also showed that convenience, simplicity, and communication remain central prerequisites for user participation. Staff at food stalls and points of sale emerged as particularly important gatekeepers influencing system uptake.

Technically and operationally, the cases demonstrated that reusable systems at events are feasible, but require substantial coordination and preparation. Key operational challenges included washing logistics, storage, transport, return infrastructure, queue management, and coordination between organizers, service providers, and vendors. Standardization and interoperability were repeatedly identified as important success factors.

Economically, the pilot cases revealed that reusable systems can create both costs and opportunities for involved stakeholders. While additional operational efforts and investments remain barriers, municipalities and organizers increasingly view reusable systems as necessary future infrastructure in light of evolving EU regulation and growing sustainability expectations. In several cases, pilot funding and municipal support helped reduce implementation risks and facilitate stakeholder participation.

The following sections present the individual pilot case evaluations based on the data presented in Table 9 and discuss the cross-cases implications of reusable systems in event and eat-at-place contexts.

Table 9. Cluster II - Overview of collected data

Location	Data collected
Tallinn – Song & Dance Festival	– Interview with Tallinn Strategic Management Office (Pre & Post) – Interview with head of volunteers – Feedback from visitors, stand operators and service provider on site – Quantitative data on usage and waste volume at event – Quantitative data on usage for food delivery
Copenhagen – Sprint & Street Days	– Interview with Copenhagen municipality (Pre & Post) – Report from service provider (NewLoop) – Interview with Sprint event organizer – Interview with stand operators' representative – Short interviews with stand operator staff (n = 6 at Sprint, n = 8 at Street Days) – Short interviews with visitors (n = 15 at Sprint, n = 29 at Street Days) & observations – Quantitative data (use and environmental impact) and informative documents (Guides)
Hamburg – UEFA EURO Fan Zone	– Interviews with sustainability lead (BUKEA) – Interview with service provider (sustable) – Participation at „More than a match – Circular Economy in the Fan Zone“ ○ Group discussion - bergmanngruppe, BUKEA, sustable, green volunteer ○ „Behind the scenes‘ tour – Visitor survey (n = 47) – Observations – Informative documents (sustainability agreement, info on reusable system for stand operators)



Location	Data collected
Hamburg – PORT ANNIVERSARY	– Interview with Netzwerk Green Events (Pre & Post) – Interview with organizer/ stand operator (bergmanngruppe) – Interview with service provider (ÖKOR.A.S.T) – Quantitative data on usage from stand operator & service provider – Feedback from visitors & observations
Hamburg – Sunset Series	– Interview with Netzwerk Green Events (Pre & Post) – Interview with event organizer (BMS – Die Laufgesellschaft) – Interview with service provider (sustable) – Short interviews with participants (n = 10) and observations – Quantitative data on usage
Liepāja – Youth festival	– Interview with Liepāja municipality (Pre & Post) – Visitor survey (n = 50) – Interviews with stand operators (n = 6) – Quantitative data on usage
Riga – City Birthday	– Interview with Riga municipality – Group interview with municipality event organizers (n = 8) – Visitor survey (n = 130) – Survey with stand operators (n = 9) – Quantitative data on usage

5.1 Tallinn

Song & Dance Festival

Case description

- Event type: Public event, free entry
- Date: 28 June – 6 July 2025
- Visitors/Participants: ~ 120,000 visitors, 40,000 performers (singers, dancers, musicians)
- Target group: General public, cultural tourists, families, local communities, performers of all ages
- Special features: UNESCO Intangible Cultural Heritage, one of the world's largest amateur choral and dance festivals, includes parade, concerts, mass dances, and side events



The festival is the largest event in Tallinn and takes place every two to three years. Reusable solutions had already been partially introduced in previous editions by *Tallinn municipality*, however, the current initiative aimed to optimize the overall approach and align three event areas operating with different systems and service providers. The three areas and their respective characteristics are described below. In addition, water containers were installed at the venue, allowing both visitors and performers to refill their reusable bottles with drinking water free of charge.

(1) Performer Area with Catering

Reusable system for dishes, cups & cutlery

- Separated area
- No deposit
- No single-use option
- Costs handled by municipality
- Return options: Immediate return at 15 collection points managed by catering
- Assisted by volunteers
- Eesti Pandipakend OÜ handles the logistics, cleaning, and redistribution of the packaging

(2) Main Event Venue with Food stalls

Reusable system at visitor food stalls

- Deposit: 1€ for each item, no deposit for cutlery
- Costs food stalls: 0,40€ per item, 0,05€ per cutlery (for opened boxes)
- No single-use option allowed
- Return options: Multiple return stations across the event area
 - o Managed by service provider staff
 - o Cash deposit return
 - o Donation boxes were installed where people can return items and deposit is donated to charity
- Ringo Eco OÜ manages the infrastructure, packaging flow, and reverse logistics
- Supportive communication materials were used (e.g., posters, pictograms, video)

(3) Food delivery to Performer Accommodation (schools)

Optional reusable system for delivery orders

- Performers are staying at school buildings and often order food there through Wolt or Bolt
- In-app communication to promote reusables
- Deposit: 1€
- Return options: dedicated bins placed in school buildings (no extra support by staff)
- Online transfer (no cash)
- Ringo Eco OÜ provides and manages the return containers and collection service
- Communication materials (e.g., posters) in schools guide performers

Statistics

(1) Performer area

- 132,000 bowls for participants
- Return rate: 98%

(2) Visitor area

- 97,046 reusable cups and plates/ bowls
- Return rate:
 - o 87% for cups,
 - o 89% for bowls/plates
- 1,036 items donated (1%)

(3) Delivery to accommodation

Orders:

- Bolt: 18% increase compared to weekly average 3 weeks prior (247 vs. 209)
- Wolt: 16% increase compared to weekly average 6 weeks prior

Return:

- Total placed bins: 47
 - o 16 bins empty
 - o 17 bins with ~ 10 items each
 - o 10 bins with ~ 55 items each
- Total items returned: 820 (including cups from visitor area)



Feasibility

(1) Performer area

- Very well working system:
 - o Result of extensive prior planning and organization
 - o Easy and intuitive process design: Performers are guided through step-by-step
 - Deposit would have made process too complicated without relevant benefits
 - o Clear communication and instructions
 - o Assistance from volunteers at all steps
 - o Guided return with direct sorting of items proved as good approach
 - o Reduced number of reusables put into trash (especially cutlery)
 - o Area for food consumption and return separated from rest of performer area
 - o Ice cream after return completed process and increased return motivation
- Process and cooperation with service provider worked well
- Only little number of reusables found in trash which was mostly sorted out
- Challenges:
 - o Coordination of large number of people
 - o Not enough trays available and therefore had to be cleaned often
 - o Cutlery sometimes thrown away (partly sorted out by waste crew)
 - o Realistic forecast of needed food and minimization of food waste

Feasibility

(2) Visitor area

Stand operators related

- Resistance by some food stands (intentional use of single-use, even though not allowed)
 - Problem: No consequences/ sanctions, as contract was with intermediary and not directly with organizers → needs to be changed in future
- Benefits for prior good experiences – no or reduced advanced payments
- High flexibility by Ringo for food stands (e.g., many packaging options, late orders) increased convenience of system for stand operators
- Stand operators over-ordered and many dishes were returned unused → delay in invoice issuing

Service provider related

- First experiences with such big event for Ringo
 - Additional new and unexperienced staff caused operational issues
- Return process not optimal (especially for cutlery return)
 - Waste bins in front of return tent led to cutlery being thrown away
 - No (sufficient) intervention by Ringo staff
 - 1€ deposit might have been too small as return incentive
- High flexibility by Ringo for food stalls possible (e.g., many packaging options, late orders)
 - However, many packaging options made return logistics/ storage more chaotic
- Inaccurate forecasting by stand operators and higher order quantities than needed increased difficulties for Ringo
 - Option: fee for unopened boxes
- Provider last time seemed better organized in background, however, no difference for end-user and improvement for stand operators

Visitors related

- Communication and info materials available but not sufficient (still issues with return)
 - Pictogram designed by municipality, including cutlery, to guide visitors
 - Instructions by Ringo too small and communication not clear (waste bins in front of return tents increased thrown-away cutlery)
- Waste sorting improved being supported by volunteers
- Scanning was disabled during the event (only cash return at tents); recommendation: allow scanning for 24 hours after the event ends so that dishes that ended up leaving with visitors can be returned in the city afterwards

(3) Delivery to accommodation

- Cooperation with food delivery apps and related communication did increase use of reusables
 - Increase not clearly attributable to either communication in schools or in app
- Returned items mostly from festival area
 - Schools in city center did not have many reusables from ordering as there were many options for food consumption nearby
 - At school further away with not many eating options nearby, people ordered more and there were also Ringo boxes in the return bins
- Waste sorting improved as it was made sure that they had all types of bins at all accommodation schools

Acceptability

Stand operators

- In general, food stalls are getting used to reusables
- Partly still used single-use packaging (indicative for remaining resistance)
- Costs as central issue

End-user

- Nicer experience for performers to eat from reusables than single-use
- Overall positive visitor feedback & attitude
- Good system for end-user as no service fee applied
- Not yet wide-spread understanding for reusable cutlery

Replicability, Transferability & Scalability

- Coordination of multiple reusable systems and service provider possible if clearly separated areas
- Design of return process highly relevant
 - Return of cutlery biggest issue to solve (needs very clear additional info for end-user)
 - Intuitive and supported return in performer area proved to work well
 - In visitor area, return process still needs to be improved (more support and clearer instructions)
- High relevance of good and extensive communication
- Information about system for end-user needs to be increased and improved
- Exchange with stand operators beforehand
- High relevance of possibilities for sanctions if stand operators do not comply (no intermediaries and very clear contracting)
- Promotion of reusables for online food orders proved successful to increase use rates

“So, the better the communication beforehand, less mess you have afterwards.” (*Tallinn strategic management office*)

Additional insights and learnings

Practical learnings from volunteers at Performer area

- 4-5 hour shift worked well – should start at same time to make it easier for leader to manage
- Clear color marking of unused and used boxes for dishes helpful
- Name Badges for Volunteers – easier, stronger and friendlier connection among volunteers
- Uniform for Team leaders – easier to identify those in charge (from afar)
- Bright-colored hats individually for each crew (e.g., Transport, Guides, Tray Carriers)
- Provide enough trays so that they do not have to be washed repeatedly
- Convenience for staff/ volunteers (e.g., pushcarts, additional table for used dishes so they don't have to be lifted from the floor)
- Additional walkways separated from eating area to avoid crowds etc.
- Numbering of service lines
- Quick meeting and introduction to tasks at beginning for team leaders
- Better forecasting of diners and counting at place



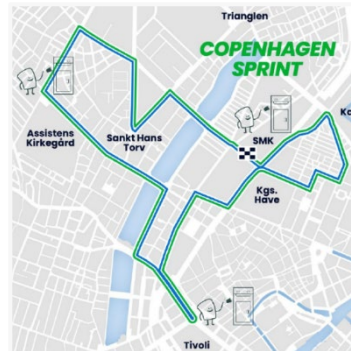
5.2 Copenhagen

Copenhagen Sprint

Event description

- Event type: Public event, free entry;
Road cycling race with public festivities
- Date: 21–22 June 2025
- Visitors: ~ 10,000 per day
- Target group: Cycling enthusiasts, families, young people

The Copenhagen Sprint is an international road cycling race and part of the Tour de France side program held annually in Denmark. Complemented by a vibrant public festival, it is offering family-friendly activities like live music and community events celebrating cycling culture.



Event description

- Event type: Public, free entry; European 3x3 Basketball Championship and urban sports festival
- Date: 5–7 September 2025
- Visitors: ~ 8,000–10,000 per day
- Target group: Families, young people, sports fans,



The Copenhagen Street Days 2025 combined international 3x3 basketball competitions with diverse urban activities, food stands, and community experiences.

Cases description

Both events introduced a mandatory, deposit-based reuse system for food and beverage packaging supported by return machines. The *Municipality of Copenhagen*, acting as the public event organizer, appointed the service provider *NewLoop* to install and operate the system. That included provision of packaging and return machines, logistics, washing, digital payments and monitoring. At Sprint, four standard return machines, seven small return machines, and ten donation boxes were deployed along the race course and throughout the event area. At Street Days, four standard return machines and four donation boxes were installed. Returns were managed entirely digitally without the need for an app. The deposit amount was set at 5 DKK for cups, 10 DKK for bowls and 15 DKK for trays. Participating stand operators had to pay 2 DKK service fee per item and 100 DKK for unopened boxes.



Statistics

	Sprint			Street Days		
	Total	Drinks	Food	Total	Drinks	Food
Items delivered	23,750	21,110	2,640	5,052	2,940	2,112
Gross return rate*	93.42%	95.20%	79.20%	92.12%	86.7%	99.67%
Net return rate**	87.54%	90.12%	75.92%	89.17 %	80.85%	99.57%
Sorting out	0.59%	0.51%	1.04%	0.12%	0.12%	0.12%
CO ₂ savings in kg CO ₂	1,111	824	287	196	111	89
Waste savings in kg	71	57	14	16	7	5
Deposits donated	21%	25%	1%	54%	49%	60%

Notes: *The gross return rate covers all packaging sent from the warehouse.

**The net return rate shows the proportion of packaging that has actually been returned by consumers.

Feasibility

Municipality perspective:

- Cooperation across multiple departments; initiative from Technology, Development and Resources department
- Unusual tendering process: specific reusable packaging system obligatory
 - Financial burden covered by municipality (as specific system was obligatory)
 - Cost difference between average single-use packaging and reusable packaging
 - Problem: single-use cups partly available for free for events as part of marketing efforts from beverage providers
- Most central aspect was to convince private event organizers and to foster a positive mindset towards reusable systems
- Reusable system needs to be already integrated into planning of events (e.g., event area design, location of return points, electricity needs)
- Implementation overall successful, no major issues during events
- Return rate high enough to be more sustainable than single-use
 - Cups used by NewLoop already more sustainable after two uses⁵

Event organizer perspective (Sprint):

- Reusable system in line with organizational values
 - Intent to increase events sustainability, provide a sense of quality and increase the user experience
- Interest groups expressed interest in more sustainable packaging (i.e., Youth Climate Council)
- Were interested in participation but did not want to commit before being convinced of environmental impact based on data
- Perceived barrier: difficult partner marketing due to unbranded cups
- Experiences convinced event organizers to implement system again next year

⁵ EcoCore® Zero Waste Cup™ LCA (2020)

Feasibility (continued)

Service provider perspective:

- Communication with stand operators:
 - At Sprint, several staff members lacked understanding of the system, so clearer internal communication is needed and staff is able to support visitors
 - At Street Days: Improvement, several of the stand operators have tried it before and are more familiar with the process and product, hopefully indicative of development in general public's reception
- General feedback from event management: expressed enthusiasm for the project
 - Generally received positive feedback and did not experience any dissatisfaction from users during the event
 - Found that it was not disruptive operationally
- Visitor usage: Overall good engagement and high return
 - Sometimes congestion occurred at the machines, which could discourage others from returning
 - Higher return of bowls at Street Days than Sprint because of
 - High share of volunteers who received food for free and handed back bowls directly
 - No lids for bowls at Street Days and therefore not possible/ as attractive to take home
 - Very close return station to most popular food stand
- Placement of return machines could be further improved (some more used than others)
 - Food container returned mostly close to stands
 - Placement of Donation containers: Not optimal at Sprint (should be more visible and closer to exit), increased donation share at Street Days
- Mix of disposable and reusable cups at Street Days caused confusion for both employees and guests (→ should be avoided)
 - Permanent operators were not included in reusable system
 - Free drinks in single-use cups were handed out for marketing purposes (needs to be regulated as well)
- At Street Days some return machines mainly filled with trash (including disposable cups)
- Small containers: Can be used for food packaging, but fill up quickly. Should be avoided if possible

Visitor usage observations (Street Days):

- Awareness & Information
 - Many noticed the reuse system only after purchasing
 - ~ 50% read instructions
 - Staff did not regularly inform customers about the reuse procedure
- Usage & Return behavior
 - Majority of visitors returned their packaging
 - Some did not realize the need or did not care to return (walked past, threw away, left items on top station)
 - Partly confusion or problems (Malfunction with lid, inconsistent labeling), but returns generally successful
 - Queues formed during peak hours



Feasibility (continued)

Stand operators representative (Sprint & Street Days):

- Ordering & Costs
 - Order via link but difficult to estimate needed quantities (esp. as events were held for the first time)
 - No option to order smaller quantities or restock gradually
 - Upfront payment required (DKK 10,000–15,000) challenging for small businesses
 - New Loop charges for transport, handling, packaging, and deposit
 - Additional fees: handling fee of DKK 100 unopened box / full price charged for opened boxes
- Packaging Design & Functionality
 - Currently three packaging types available
 - Need for broader assortment to fit different meals (e.g., sushi).
 - Lids unnecessary when food is eaten on-site
 - QR code should be on the container rather than the lid to allow lid-free use
- Communication & Return Process
 - Better on-site communication/hosting needed at return stations
 - Smooth returns are key for a positive user experience
 - Bartenders/stall workers often have to assist customers with returns

Stand operator staff (Sprint & Street Days):

- In general, easy to use (especially if only cups or with prior experience)
- Barrier:
 - Communication: Effort to explain system (esp. deposit)
 - Most emphasized need for better information for visitors (so that staff does not have to inform and support visitors)
 - Costs (more expensive than single-use & high upfront costs)
 - Additional effort for customers
 - Wider design/ size selection would be appreciated

Acceptability

Visitors (Sprint, 15 interviews)

- Overall attitude: mostly positive towards reusables in general
- Motivation: Sustainability & money return
- Barrier:
 - Many respondents had (initial) difficulties using the system
 - Deposit return (entering card details; no compatibility with phone, too many steps)
 - Understanding the system
 - Reluctance to use phone for return
 - Additional effort (time)
 - Not enough communication/ support from staff
- Deposit box (if mentioned) seen as positive

Visitors (Street Days, 29 interviews & observations)

- Mostly positive mindset towards reusables in general and particular offer (~90%)
- Main reasons why: Sustainability; feeling good about helping the environment; cleaning up after oneself seen as part of culture
- Driver: System characteristics (unified system; easy to use with only few steps; easy to find return points; compatibility with phone/ apple pay; fast money transfer; cash-free)
- Extra effort justified by improved sustainability
- Very few negative responses: annoying, impractical
- Barrier & Room for improvement:
 - Communication: some did not notice packaging was returnable; desire for clearer information
 - Payment: entering card details in public; prefer direct card connection)
 - System malfunctions: occasional lid malfunction
 - Usage: difficulties handling several items; need for more return stations (at times long queues)
 - Support: limited help when issues arrived
- Deposit amount seen as fair
 - Motivates returns but not a major issue if occasionally lost or delayed

Stand operator staff

- Overall attitude: mostly positive in relation to implementing reusables
- Main motivation: Sustainability (if not, then single-use is preferred)

Replicability, Transferability & Scalability

- Centralized reusable system with return machines for both beverages and food suitable for future implementation and scaling
- Return machines proved to be suitable to increase convenience for both stand operators and end-users
 - Intuitive and digital deposit transfer options important
- Planned implementation at next year's edition of Sprint and several other events at own expenses of event organizers
- Financial considerations for future implementation:
 - Difficult to compete with single-use in open market
 - Financial feasibility challenging without additional regulations/ legislation
 - Option for municipality to only allow reusables at events in public areas
- Additional advantages of the reusable system as basis for widespread adoption:
 - Digital platform for return process allows:
 - Possibility to donate deposit to event
 - Easy and fast opportunity for visitors to support events they like
 - Refunding option for event organizers
 - Possibility to engage visitors (e.g., additional information on upcoming events, loyalty programs, etc.)
 - Possibility to include different packaging allows flexibility (e.g., branded cups from sponsors)
 - Compatibility with newly established city-wide return system (see 6.1) is likely to increase convenience and familiarity
 - Additional return points reduce stress on return points in event area
 - Further implementation at future events especially relevant and convenient
 - Permanent and compatible system can decrease effort and increases acceptance among end-user (e.g., familiarity, return options after or outside of event)
- Problems to be solved and optimization potential:
 - Financial barriers for small businesses (Options: e.g., post-event settlement, donation option)
 - Packaging design suited for immediate consumption, not just take-away
- Scaling of system central aspect to guarantee its long-term impact

5.3 Hamburg

UEFA EURO Fan Zone

Case description

- Event type: Public, free entry
- Date: 14 June – 14 July 2024
- Visitors: ~ 614,000 in total, up to 50,000 per day
- Target group: International football fans of all ages

The UEFA EURO Fan Zone was organized by a private event organizer (*bergmanngruppe*) in close cooperation with *Hamburg Tourism* as lead partner and *BUKEA (Ministry for Environment, Climate, Energy and Agriculture)* as sustainability lead, in alignment with UEFA guidelines. *Netzwerk Green Events* functioned as an external advisor for sustainable events. Key focus for this project was the centralized reusable system for both beverages and food. The system was embedded in a comprehensive, pre-defined sustainability agreement aimed at delivering the “most sustainable EURO ever”. Consequently, all participating stakeholders were required to comply with the agreed criteria. The framework covered multiple dimensions, including gastronomy, procurement and waste management, communication, energy and climate, as well as social aspects. A key guiding principle was adherence to the EU waste hierarchy, on the basis of which a mandatory reuse system was introduced.

System process

1. All stand operators place orders online for needed items in advance
2. Service provider provides items in the morning at central station
3. Stand operators hand out multi-use items to visitors
4. Visitors give items back after use at central take-back station or at food stands (cash return)
5. Stand operators give back returned items at central take-back station
6. Service provider collects items, washes them and provides new ones the next morning



Operationally, the system was separated for beverages and food, however both could be returned at the same central return point. The food system was managed by *Sustable*, who was responsible for the provision of a range of reusable packaging, collection, and cleaning. Stand operators were supported through detailed informational materials, including FAQs and exemplary calculations, and were offered additional personal assistance to address specific questions. Operators paid a fixed fee per item used (17ct), which was partially subsidized through public funding. One exception to the mandatory reuse requirement was the use of uncoated paper for food service. Communication towards visitors took place via screens, signage, the website, and “Green Volunteers” on-site.

Statistics

- 384,000 reusable cups (hot & cold) and 30,000 reusable food containers used
- Waste savings: ~ 15,000 kg of plastic waste; ~ 600 kg of paper packaging
- Reduction of: ~ 70% of lightweight packaging; ~ 14% of paper
- CO2 savings: ~ 12 t CO2e

Feasibility

- Public initiative and subsidies as central driver of implementation
- Selection of service provider difficult, as only few could handle scale of event
 - Sustainable convincing because of close-by washing station → reduced transportation
- Mandatory participation of operators crucial for widespread usage
- System design suitable for smooth operations
 - Shared system with centralized return (no long return queues)
 - Increased convenience and ease of use for both operators and visitors
 - Low effort for operators and support from organizers
- Costs as main issue for operators → Relevance of public subsidies
 - Generally increased costs make the cost problem even more present and severe
 - Exceptions will be used to save costs
 - Monitoring/ control needed
- Good argumentation for sustainability because of slogan (“Most sustainable EURO ever”)
 - Bargaining power for organizer
- Non-branded cups and cash deposit return led to fraud at return point
- Green Volunteers helped give attention to problems and adjust
- Low return from international visitors because of lacking knowledge (high communication need)
- Communication was increased during throughout event to address knowledge differences
- Donation boxes at exits were added to give the opportunity for fast return

Acceptability

Stand operators

- Costs as biggest issue → importance of subsidy from public side
- Obligation is key for participation → exceptions will be used if possible
- Ease of use and support has positive effect

Visitors

- Mostly neutral reactions
 - As reuse is only option, visitors
- Easy and fast return increases convenience
- Closed event area reduces return problems
- High relevance of sufficient information about reuse system, especially for international guests
- Some visitors are happy about reuse offer

Visitor survey - Open feedback (n = 47)

Positive feedback

Sustainability/ less waste

Good approach

Product itself

Good return system

Easy to use

Aesthetics

Mandatory reuse

Deposit for charity

Low deposit

“Less waste.
No queues
when you re-
turn them.
Great idea that
you can also
donate the de-
posit to a good
cause.”

„Effort due to
returning the
containers.”

Negative feedback

Everything positive

Return

Poor labeling as deposit

No EURO design

Not everything reusable

Own reuse option not allowed

Hygiene

Deposit

„Not easily recognizable as a
deposit crockery. Labeling in
the languages of the tournament
participants would be helpful.”

Replicability, Transferability & Scalability

- Shared, centralized system (i.e., central return station) proved as helpful and sensible for future events
- System of service provider worked well and could also handle higher volumes
- Costs arrangements must be negotiated individually, still costs need to be considered as central issue (importance of subsidy/ public support)
 - Potential for reduced costs with higher volume in future
- Clear sustainability guidelines and contracting proved to be crucial
 - Should include possibility for sanctions
 - Exception to mandatory system have to be chosen carefully



HAMBURG PORT ANNIVERSARY



Case description

- Event type: Public, large-scale maritime festival celebrating the port's anniversary
- Date: 9–11 May 2025
- Visitors: ~ 1.2 million visitors
- Target group: General public, families, local and international visitors

The pilot case was initiated by *Netzwerk Green Events* and implemented in one of twelve sub-event areas of the PORT ANNIVERSARY in Hamburg. The overall event is publicly organized (*Department of Economic Affairs, Labor and Innovation*) and the specific area handled by a private event organizer (*bergmanngruppe*). The objective was to test a return machine for reusable cups in order to increase convenience and return rates among visitors while reducing the workload for staff. The return machine

provided by *ÖKOR.A.S.T.* was positioned directly adjacent to the point of sale and was configured to accept the specific cup types used at the sub-event area. The €1 deposit was refunded in cash. The return process was designed to be simple and largely self-explanatory; nevertheless, clear bilingual instructions were displayed on the machine. Event staff informed customers about the return option and were responsible for collecting the returned cups for cleaning as well as replenishing the cash stock. In addition, a support team from the service provider was present on site to provide technical support.

Statistics

	0,31	0,51	Total
Cups used	1050	280	1330
Cups lost	25	0	25
Return rate	97.6%	100%	98.1%

Reference operator: usually ~ 90% return rate, some events with ~ 60-70% return rate

Return at machine:

Cups taken back by reverse vending machine

- Friday: 350
- Saturday: 520 (had to be closed at 17:45)
- Sunday: 430
- Potential: ~2000 cups per day per machine



Feasibility

- Difficult but successful process to find suitable service provider that fulfilled all objectives
 - Very easy and non-digital/app deposit return (because of many international visitors)
 - No service fee on every deposit return (would otherwise contradict circularity)
 - High enough volume capabilities
 - Easy and fast emptying process
 - Reliable cup identification (no deposit for cups of other operators)
 - Safety
- Overall positive resume of event organizer/ stand operator
 - Noticeable workload reduction
 - Not too much communication effort
 - Interested in future use (at big events)
- Operational challenges:
 - Return machine needs staff support (emptying cups, restocking deposit money) → needs to be calculated into work load
 - Cups are stored temporarily in machine and are not usable in meantime
 - Lower use frequency and more cups needed
 - High cleaning effort at once
 - Inconvenient storage method → stacked cups would be preferred (faster and cleaner)
 - Few (solvable) technical issues
 - Potential safety issue with cash deposit
 - Not flexible if different type of cup has to be used spontaneously
- Communication strategy towards end-user central success factor
 - Experience showed that visitors do not read text/ instructions
 - Need for intuitive system design and straight-forward explanation on the machine (visualized without much text)
 - Should be accompanied by short, clear instructions from staff at sale
- Easy handling/ use of machine for most visitors
 - Only few handling errors (e.g., wrong cups)
- Potential for improvement:
 - System would make more sense if usable for whole event, however:
 - Would need sorting, coordination, and external washing
 - Cups still have to have high use frequency
- Currently costs > labor decrease, but optimistic about shift in future
 - Specific costs: Machine rent (usually offered for purchase)

“I could imagine that in the future, it will only work with such machines, that it will be standardized and all event organizers will work with them.”
(Stand operator)

Acceptability

- Very positive responses from visitors (appreciative of option for fast and separate return)
- Return machine increased acceptance and attitude among end-user
- Most visitors wished for implementation at whole event and compatibility with all areas
- Cash deposit well accepted by visitors
- Public event organizer overall willing to test new options in relation to reusables (however only for cups as first step)
- Stand operator overall willing, however with many concerns beforehand → was positively surprised after the event

“I was totally positively surprised.” (Stand operator)

Replicability, Transferability & Scalability

- All stakeholders involved were convinced of the potential of return machines to improve reusable systems at events
- Compatibility of systems should be given for end-user (further increases acceptance)
- Standardization and large-scale implementation would include the need for certain adaptations/optimizations
- While cash refunds were applied as it is simple and inclusive, digital payment options could reduce maintenance efforts and security risks
- Both stand operator and service provider see responsibility for wide-spread change in public hand
- Other successful use cases from service provider support future scalability further

Service provider perspective:

- Positive & optimistic:
 - Convinced of feasibility
 - Growing interest and acceptance
- Return machine also applicable for food containers

Current Barrier

- No direct cost benefit (for operators)
- Lack of standardization (for both operators and end-user)

Factors for future success/ extension

- Standardization (Cups & systems)
- Political/ Public support and initiative
- Cooperation of all involved parties
- Efficient integration into logistics
- Deposit clearing
- Central deposit scout for whole event
- Support at site in the beginning
- Safety
- Clear and easy communication at machine

“With a coffee machine, I sell something and then I earn money. With a reverse vending machine, I initially don't earn any money. Those are expenses.” *(Service provider)*

Hamburg Sunset Series

Event & System description

- Event Type: Running event with registration
- Date: 16 July 2025
- Participants: ~ 700, incl. ~ 300 user of water station
- Target group: Athletes/ Runners

The Sunset Series is a running event organized by *BMS - Die Laufgesellschaft mbH*. The 5km round course provides different participation formats, either one to three rounds individual or four rounds as a team relay. The aim was to test reusable cups for route refreshments fully handled by an external service provider (*sustable*). Finish line refreshments were already switched from single-use cups to deposit bottles in previous events. Participants were informed about the reusable cups and needed return beforehand via email as well as at the event by the event speaker. The pilot case was initiated and supported by Netzwerk Green Events.



System process

1. Cups are delivered by service provider
2. Cups are handed out pre-filled to runners at refreshment points by event staff
3. Cups are returned at return bins along the course or collected, if necessary, by event staff
4. Cups are sorted back into transport boxes by event staff
5. Collection and return transport of cups by service provider
6. Cleaning by service provider

Statistics:

- Cups ordered:
6 boxes x 500 cups each = 3.000 cups
- Cups in usage:
2 boxes opened = 1.000 cups
- Cups lost: 4
- Costs: 270€



Feasibility

Event organizer – Tested event

- Feasible, but not practical enough
- Return at bins worked well
- Operational challenges and barriers:
 - Difficulties for runners
 - Cups too big (could be optimized for future events) → Waste of water and time (already at maximum capacity at bigger events)
 - Drinking not easy enough
 - Volume of cups at return problematic (especially for bigger events)
 - Extra effort (needs to be sorted afterwards)
 - Staff already works on volunteer basis

Feasibility (continued)

Service provider – Tested event

- Pilot overall successful as expected (easy with small event size)
- For bigger events upscaling would be needed, e.g., bigger return bins
- Logistics central issue but possible if wanted (economic vs. sustainability focus)
- Change/sustainability cannot be achieved without effort/hard work
- Convinced of ecological benefit
- Acceptance of end-users not seen as a problem
- Central factors: legal requirements & costs

“Of course, it's a logistical challenge, but reducing CO2 emissions (...) is not possible without effort.”
(Service provider)

Event organizer – Prior experiences and learnings from other running events

What works well:

- Deposit bottles at finish line (still applied)
- Change from plastic to paper cups (with coating) during races (still applied)

What doesn't work (yet):

- Reusable cups at finish line of small events
 - Branded cups with self-washing lead to operational difficulties
 - High hygiene standards
 - Labor-intensive
- Goal to recycle used cups
 - Issues with public cleaning services (sorting, etc.)
 - Regional differences
 - Special cup containers
 - Some user errors (other garbage)
- Reusable cups during course
 - Safety as major problem
 - Injury risk too high with many participants
 - Cups don't all end up in return bins
 - Needs additional support
 - Logistics difficult (already at maximum capacity)

“Well, it's simple, (...) I don't have a solution (...) for how a reusable cup could beat a disposable cup to such an extent that we switch to reusable cups completely, because it's simply not practical in many, many ways.” (Event organizer)

Other:

- Conducted study on CO2 impact of running events showed that cups only account for 2% of total event emissions → however costly to change
 - Biggest impact travel of participants
 - Measures: free or discounted public transport, no car parking spaces, bike spaces, emphasize in communication

Event organizer – Experiences from other countries

- Bottles as refreshments along the route
 - Criticism: Rubbish scattered along the entire length of the route
- Drink pouches that must be presented at the end, otherwise a time penalty is imposed
 - Criticism: Cannot be controlled at large events
 - Criticism: Torn-off packaging corners still end up on the ground
- Water balls made of algae that dissolve in the mouth
 - Criticism: Possible hygiene problems
- Filling station for self-filling with high pressure so that it works while running past
 - Criticism: Again problematic with a large number of runners

Acceptability

Event organizer

- Interested/ motivated in making running events more sustainable → however concerns about practical implementation
 - No major concerns about specific pilot implementation
- Newspaper article about waste at running events sparked change in running event community
- Not convinced of sustainability impact of reusables in relation to other measures
- Not much external pressure (cooperation partner, participants)

Participants

- Overall positive feedback
- Must be convenient to use during run (e.g., enough return options) → fulfilled at Sunset Run
- No problems with usage at Sunset run
- Concerns about practicality at larger events
- Concerns about additional effort for events on volunteer basis

Replicability, Transferability & Scalability

- Event organizer interested in shift towards more sustainability but reusables seen as not feasible (cons > pros)
 - Focus on other areas (recycling, transportation, etc.)
- Possible for small events, but effort/costs not proportional
- Not seen as applicable to larger events (e.g., marathon)
 - Main barrier: safety & logistics
- Service provider optimistic ('Question of wanting')
- Participants open for change if ease of use is given

5.4 Liepāja

Kopums / MAD Liepāja Youth Festival

- Event type: Public event, free entry
- Date: 16–17 August 2025
- Participants: ~16,000
- Target group: Young people and youth organizations; families and the general public

Kopums / MAD Liepāja is a two-day youth festival that brings together young people, youth workers, and a wide range of organizations. The event aims to break down stereotypes, foster dialogue on socially relevant topics, and provide a platform for creativity, culture, sports, and civic engagement. The festival is organized and financed by *Liepāja municipality*.

As part of the event, a shared reusable cup system with deposit return incentives was piloted for the first time. The municipality organized and financed the reusable system, while the service provider handled the operational implementation. This included the delivery of reusable cups, the operation of a centralized return point within the event area, and the provision of communication materials explaining the system to visitors and stand operators.

The reuse system was designed to be cost-neutral for operators, who did not incur any additional fees beyond handling the deposit. Beverages were sold in reusable cups at participating operators. Used cups could be returned at a designated return point located within the event area, where deposits were refunded in cash or via card. One exception for reusable cups was made for athletes, as they received free drinks and the cup return could not have been assured without deposit.



Statistics:

- 3670 reusable cups ordered, 389 reusable cups used
- 69% return rate (269 cups returned, 120 cups lost)
- 51% cash deposit return vs. 49% card return

Feasibility

Municipality:

Preparation phase:

- Costs for system covered by municipality, deposit paid by vendors
 - Communication with service provider challenging: initially reluctant to explain and adapt to small and unexperienced use case
 - Service provider handled provision of cups, return, logistics, washing & communication
 - Communication materials need improvement
 - Voluntary participation of vendors for now; from next year on new regulations
 - As vendors are stationary, they are not chosen by organizers and therefore also not excluded if not willing to participate
 - Central problems to be solved in planning:
 - Upfront deposit payment
 - High number of cups sold per box which some vendors do not need in total
 - Solution:
 - Individual meeting with service provider to discuss payment options
 - Payment after event too risky; municipality also not able to cover risk
 - Joint meeting with 7 operators (Challenge: Negative influence of single operator that did not want to join the system)
- Compromise to only pay 50% upfront and flexible stock up during event (Start with small quantities)
- Offer from event organizers to cover deposit costs for vendors who struggle to pay upfront

System feasibility at event:

- Return station not always directly located by visitors: Could be placed more strategically and communicated in a map at stands and with bigger banners
- Information material from service provider only general to be reusable, but additional event-specific information (e.g., location of return point) would have been helpful
- Information was only available in Latvian, however also international visitors
- Municipality functioned as intermediary between stand operators and service provider which worked well, however was not planned and is not suitable for bigger events
- Volunteers could have been stationed more in food area to support visitors with system

Stand operators:

- Challenges:
 - Upfront deposit payments difficult for small businesses (especially in beginning of event season)
 - Storage constraints (not enough space for boxes)
 - Other vendor(s) that still offered single-use led to decreased sales
 - Extra work/ time: Handling of cups and deposit
 - Difficulties with handling of deposit in cash register (e.g., regarding taxes on deposit)
 - Accurate forecasting of needed quantities challenging
 - Some visitors still needed assistance with system (explanatory communication material could be improved)
 - Few customers refused to buy drinks in reusables
 - Seen as not very suitable for youth/ kids
 - Cups have to be supervised as they could be stolen in order to receive the deposit
- Positive feedback:
 - Central return reduced workload
 - (Financial) support from municipality
 - Easy to explain system

Acceptability

Stand operators

- First experiences with reusables system for operators: mostly open and interested in gaining experience as reusables may become mandatory
- Reusable system itself seen as manageable but with certain inconvenience/ challenges
- Upfront deposit payment seen as difficult which led to negative reactions
 - Partly based on confusion prior to event as labeled as “cost-free”
- Support (personal and financial) from municipality however appreciated
- Some negative reactions from visitors difficult for stand operators
- Seen as unfair when not all stand operators participate
- Deposit partly seen as too high in relation to costs of drinks

Visitors:

- Overall positive feedback in visitor survey (n = 55)
 - 80-84% see return (points) as convenient
 - 74% think the deposit amount is acceptable
 - 36% would have needed more information and 26% did not see system as clear and understandable
- Does not reflect the low use and return rate
- Stand operators reported mixed reactions
 - Few customers refused to buy drinks in reusables



Replicability, Transferability & Scalability

- Reusables will become mandatory for street sales at events: Good experience for both municipality as well as stand operators

Stand operators:

- Most would participate in reusable system again (some only if it becomes mandatory)
 - If mandatory, they see the need for (financial) support from municipality
 - Concerns about service fee at future events (already struggling with deposit payments)
- Preference for system with centralized return in future as well
- System as applied at event seen as reasonable
- Deposit should not be too high in relation to costs of drink/ food

Open challenges:

- Continued use of reusables of stationary vendors not yet implemented (e.g., difficulties with hygiene requirements, foreign tourists, app system)
- In Jurmala beach area, there is the need for a service provider that includes washing as beach cafes/ kiosks often do not have water connection
- Need for solution for events where food is for free and no deposit is collected

5.5 Riga

The Riga City festival

- Event type: Public event, free entry
- Date: 16 August 2025
- Visitors: ~ 60.000
- Target group: General public and tourists

The Riga City Festival is a large-scale event in Latvia, held across multiple locations throughout the city. *Riga municipality* tested a decentralized system for reusable cups in one designated event area. A uniform €2 cash deposit was agreed upon with all 21 stand operators. The operators were responsible for



providing the reusable cups and managing returns individually. Communication directed at event visitors, such as posters and on-site signage, was provided by the municipality.

Statistics (of selected stand operators)

Operator	1	2	3	4	5	6	7	8	9	Total
Cups rented	520	1560	506	520	596	520	336	520	1430	6508
Cups lost	164	324	141	61	20	33	38	26	158	965
Return rate	68%	79%	72%	88%	97%	94%	89%	95%	89%	85%

Feasibility

Overall

- Decentralized system mostly seen as complicated and inconvenient
- For stand operators, the system significantly complicated operation, caused stress and conflict
- Very negative feedback from visitors because of inconvenient usage (especially concerning return)

Municipality perspective

- Enthusiasm for deposit systems in general low among public event organizers (seen as additional burden)
 - Did not systematically review previous experiences or compared systems in depth
 - Priority lies at content of event
- Municipality regarded decentralized system as only possible reusable solution for this event
 - Awareness of disadvantages, however, also affected by other circumstances and decisions
 - No financially viable offer from any service provider (Costs ~ 20,000€)
 - Prior implemented token-based centralized system was reviewed very negatively and therefore not further implemented (issues with money return)
 - Limited reliability of deposit service providers in the city

→ Decisions were made pragmatically based on budgets and approximate cost expectations

→ Responsibility for implementation of regulation seen on stand operator's side

Feasibility (continued)

Stand operators (survey, n = 9):

- Operational Challenges:
 - Increased workload and time consumption
 - Additional effort to process cup return (deposit + sorting dirty cups)
 - Increased waiting time for customers (one queue for purchase and return)
 - Additional effort to explain the system for staff (not all read instructions, not available in English)
 - Difficult to provide information in English in Latvia
 - Conflicts with unsatisfied customers
 - Impact on sales (especially with cheaper drinks where deposit is comparably high)
 - Storage (Deposit boxes take up more space, separate space for dirty cups needed)
 - High amounts of cash needed for deposit return
 - Unambiguous identification of cups of each stand
- Stand operators further criticized lack of (sufficient) prior discussion or agreement
- Poor communication contributed to vendors feeling unprepared
- Prior instructions and joint chat during event did not suffice (lack of actual training)
- Positive feedback: Reduced waste

Acceptability

Visitors (survey, n = 83)

- Many prior negative experiences with reusables systems (especially tokens) lead to high overall skepticism
- 67% rate reusable system as inconvenient
- Main criticism: Inconvenient return, especially long queues, with up to 30 min waiting time
- No possibilities to return cups after event
- System partly not understood (especially by foreigners): only 50% see it as clear and understandable
 - Not enough information for 45%
- Inconvenient return and difficulties with system led to cups being thrown in trash
- Complaints to Consumer Rights Protection center from consumers in regard to deposit (in relation to several events)

“The whole event with deposit cups was very chaotic. Huge queues for transfer. In the end, I did give up and threw it in the trash because my time was more precious.”

“It would be more convenient if the deposit system had one transfer point, regardless of caterers/merchants. It was difficult to hand over the glass right where I got it (...), I would have liked to have handed it over later (...).”

“There should be a lot more places to put deposit cups so that you don't have to stand in line. And these places should accept deposit cups of all traders. If this cannot be provided, then we return to disposable cups.”

Stand operators:

- Overall negative attitude as the reusable system, as currently implemented, creates operational problems and dissatisfaction

Replicability, Transferability & Scalability

- System, as currently implemented, creates operational problems and dissatisfaction
- Clear preference from stand operators for centralized system with additional return points with one service provider responsible for whole event in the future
- Negative experience still seen as necessary and valuable by project partners
 - Basis for argumentation for future implementation
 - More expensive but well-working centralized system superior to decentralized system with many problems and dissatisfaction
- Negative experiences of visitors can lead to decreased trust and general resistance towards reusable systems, consequently, it is highly relevant to only implement well-working systems with certain level of convenience to guarantee long-term acceptance
- Financing of system remains central issue
 - Option considered: Service fee for stand operators (based on Estonian system)
- Further increase in acceptance from stand operators as well as visitors needed
- Both public event organizers and stand operators have to take responsibility for implementing reusable system together (no “buck-passing”)



5.6 Implications for events

The pilot cases demonstrate that there is no universally optimal reusable system for events to be feasible, accepted and scalable, rather that system design needs to be tailored to the specific characteristics and requirements of each event type as well as the local conditions they operate in. Still, despite this contextual variability, several overarching implications can be made.

In general, reuse systems perform most effectively when implemented as integrated solutions. In particular, shared and centralized infrastructure, especially for return logistics, proves to be more efficient and user-friendly than fragmented, stand-alone approaches. System compatibility across events and locations can enhance familiarity, reduce complexity, and increase acceptance. Closely linked to this, convenience emerges as the central driver of user acceptance. Ensuring a certain degree of convenience is critical, as insufficient usability can lead to negative attitudes and hinder long-term adoption. Further, proactive communication strategies are a central support mechanism. First, the exchange with system stakeholders and the consideration of their perspective when setting up a system increases acceptance. Second, clear communication towards end-users at the event facilitates user understanding, reduces uncertainty, and promotes correct system use. The pilot cases indicate that user habits are not fixed, but behavioral change towards reuse is achievable over time with appropriate system design and repeated exposure. At the same time, structural barriers remain significant. The financing and availability of suitable infrastructure are key challenges for system-level stakeholders that limit widespread implementation. Finally, the findings highlight the importance of regulatory frameworks. Standardization and clear regulatory guidance can shift responsibility away from individual actors towards systemic and scaled solutions, thereby enhancing consistency and adoption. In this regard, mandatory implementation at public events proved to be an effective lever to accelerate the transition towards reusable systems.

In the following the practical pilot implications are described structured along the system elements introduced in the prototype solution.

Technical system considerations

Material & design

The choice of materials and container design must align with the operational needs of stand operators, particularly given the heterogeneity of food and beverage offerings. Service providers should therefore offer a sufficiently broad portfolio of sizes and formats. Beyond functionality, design also influences user behavior: features such as lids can enhance the perceived utility of containers for at-home use, thereby reducing return rates. Similarly, event-specific branding can increase the likelihood that items are kept as souvenirs. However, branding is often requested from participating businesses.

At the same time, high-quality, visually appealing, and stable designs can create a competitive advantage over single-use alternatives by improving the overall dining experience.

Logistics & storage

Logistical considerations represent a key operational constraint. One reoccurring issue within pilot cases related to storage capacity. Many stand operators have limited space, making the storage of reusable containers and transport boxes challenging. This is especially critical when only large unit quantities are available, while smaller, more flexible quantities would better match actual demand. Further, the introduction of centralized and shared return points requires careful additional planning regarding reallocation and deposit clearing. Specific event types, such as large-scale running events, can be particularly challenging in regards to logistics.

Cleaning

In most cases, centralized washing solutions are more efficient and better suited to ensure hygiene standards. Rinsing processes can create additional operational pressure, particularly when it remains decentralized at the stand level.

Hygiene & (food) safety

Hygiene requirements and food safety regulations significantly shape system design and feasibility. Regulatory changes, such as requirements for specific dishwashing infrastructure or restrictions on on-site washing, can limit operational flexibility. In certain contexts, such as large running events, reusable items (e.g., cups) may also pose safety concerns that need to be addressed in system planning.

Return & deposit

The design of return and deposit processes is central to both user acceptance and operational feasibility. Inconvenient return processes can lead to negative user experiences and long-term resistance. Decentralized return systems tend to increase waiting times and staff workload, whereas centralized solutions are more efficient. From a user perspective, fast and simple return processes are the most critical factor.

Best practices emerging from the cases include shared systems with central return stations, ideally supported by automated return machines that function without requiring app-based interaction. Return points should be conveniently distributed across the event area, including high-traffic locations such as food courts, exits, and along event routes. Additional options, such as donation boxes, can further facilitate returns, although usage rates vary across contexts.

The appropriate deposit level depends on the target group, event type, and product offering. Deposits that are too high, especially relative to product prices, may reduce acceptance, particularly among low-income users, while deposits that are too low may incentivize items being taken home. Both cash and digital deposit returns are viable, however, there is a clear trend towards digital solutions, provided that they are simple and do not require registration or app usage.

Cutlery return remains an unresolved challenge, as deposits are often not appropriate due to the low value of items. Alternative incentive mechanisms or additional support are therefore required.

Additionally, users appreciate options to return items after or outside of the event, which can further increase system flexibility and acceptance.

Data and Monitoring

Continuous data monitoring and the establishment of feedback loops are important enablers for system optimization. They allow for evidence-based adjustments, improve system performance over time, and support the evaluation of user acceptance and operational efficiency.

Knowledge & Communication strategies

Knowledge

A lack of familiarity with reusable deposit systems among end-users remains a key barrier, indicating a need for ongoing education. At the same time, learning effects are evident: repeated exposure to such systems increases user competence and acceptance, as seen in cases where deposit-based reuse has become standard practice. Nevertheless, the persistence of an attitude–behavior gap is a central challenge. Even when users hold positive attitudes towards reuse, practical barriers, such as lack of system understanding, additional effort, or unclear return processes, can prevent actual use. Reducing knowledge gaps and minimizing “social friction” are therefore critical for increasing reuse rates.

In addition, structured knowledge exchange between stakeholders is critical to avoid repeated implementation errors and to accelerate cross-context learning. This is particularly relevant given that the relevance and impact of reusable systems are still frequently questioned by key actors. Transparent sharing of impact data and practical experiences can help build credibility, strengthen stakeholder adoption, and support more informed decision-making regarding system adoption and scaling.

Communication

Effective communication is a key support mechanism and must combine visual, digital, and personal elements to reach diverse target groups. Reliance on static formats such as posters alone is insufficient.

Instructions should be highly intuitive, concise, and ideally understandable without extensive text. Providing materials in both local languages and English further enhances accessibility.

Moreover, personal support plays an important role, particularly during the introduction phase of new systems. Trained staff, including volunteers, stand operators, or service provider personnel, can act as “reuse ambassadors” and facilitate user onboarding. However, the responsibility for compensating knowledge gaps should not rest solely on stand operators. New or unfamiliar system components, such as reusable cutlery, require particularly intensive communication.

In addition, early and transparent communication with stand operators is essential to foster acceptance, address concerns, and ensure that their perspectives are integrated into system design.

Framework conditions

Financing

Financing is a central determinant of both feasibility and acceptance. Currently, single-use systems often remain the cheaper option, creating a structural disadvantage for reuse. As a result, additional incentives or funding mechanisms are required. Different cost distribution models exist, each with trade-offs. Public funding, such as full municipal financing or targeted subsidies, can facilitate initial implementation and provide opportunities to gain experiences, although long-term financial sustainability may be challenging. Service fees for stand operators often make it difficult for them to maintain profitable, particularly for smaller businesses that may already struggle with upfront deposit costs. Passing costs on to end-users via service fees may encourage repeated use of items, however, can negatively affect acceptance.

Pricing structures for transport boxes and minimum order quantities also require careful consideration. Fees for unopened boxes and large unit sizes can create additional financial risks for operators, highlighting the need for flexible offerings. Reducing upfront costs is particularly important to enable participation by smaller vendors.

Another option for co-financing reusable system are donation boxes through which visitors can easily support the events if wanted.

Reusable service infrastructure

The availability of suitable infrastructure is a prerequisite for optimal system implementation but is not guaranteed in all contexts. In the absence of fully developed systems, second-best solutions must still ensure a sufficient level of convenience to prevent the formation of negative attitudes through unfavorable initial experiences.

Regulatory frameworks can provide planning security and incentivize infrastructure development. Additionally, compatibility with existing city-wide or cross-event systems should be prioritized to allow returns beyond the immediate event context and increase overall system usability.

Regulations

Regulations play a crucial role in driving systemic change. Voluntary approaches alone tend to result in low participation and limited impact. Effective regulatory frameworks should actively involve key stakeholders, particularly event organizers and stand operators, in their design and implementation. At the same time, the responsibility for compliance should not be placed solely on these actors but supported by municipalities, including consideration of financial implications.

Sustainability as a standalone motivation is often insufficient, regulatory measures can provide the necessary external driver. The ban of single-use packaging at events in public spaces proved to be effective. Arrangements with system stakeholders should ideally mandate participation in reusable systems, include enforcement mechanisms, and minimize intermediaries. Exceptions should be applied selectively and transparently.

Sustainability reflection

The pilot cases led to the introduction, expansion or optimization of reuse systems for food and beverages in all locations, thereby reducing the environmental impact of the respective events. They demonstrated that reusable systems at events can significantly reduce the use of disposable cups and food packaging, particularly in controlled event environments where organizers can define operational conditions and participation rules. The cases showed that high participation and return rates are achievable when reusable systems are well integrated into event logistics, supported through clear communication, and combined with convenient return infrastructure and deposit systems. Especially mandatory proved effective in increasing reusable usage and reducing waste generation during events. At the same time, the sustainability impact depended strongly on operational execution, stakeholder coordination, and visitor acceptance. The findings further indicate that events can serve as highly visible demonstration spaces for circular practices and can contribute to raising public awareness and normalizing reusable systems beyond the event context itself.

6. Evaluation of Cluster III: Take-away & Home-delivery pilot cases

This chapter presents the evaluation of the Cluster III pilot cases addressing reusable packaging systems in take-away and home-delivery contexts in Copenhagen, Hamburg, Tallinn, Gdańsk, and Anykščiai. As outlined in Table 10, the pilot cases tested a wide range of operational models, including municipal-initiated system, reusable systems in markets or office-based structures, and voluntary cooperation models with local businesses.

Table 10. Cluster III - Overview of pilot cases

City	Location	Time frame	Approach tested
Copenhagen	City (Old town)	Start: September 2025	City-wide reuse system with digital reverse vending machines for food and beverage packaging
Hamburg	Weekly market	Start: October 2025	Refill (reuser-owned) system for reusable packaging
	Weekly market	Start: November 2025	Return (provider-owned) system for reusable packaging
Tallinn	Ministry building	Start: February 2025	Reusable packaging for take-away with three options
Gdańsk	4 offices	Start: September 2025	Vending system for lunch meals in reusable packaging at offices
Anykščiai	15 restaurants in city area	Start: July 2025	City-wide reusable packaging system for restaurants and cafes

Compared to institutional catering and events, take-away and home-delivery systems represent a more complex context for circular food packaging. The sector is characterized by strong competition, decentralized consumption patterns, and a comparatively open market structure with many alternative options available to consumers. At the same time, businesses usually have limited leverage to influence customer behavior and are often reluctant to fully replace single-use packaging due to concerns regarding convenience, operational complexity, and customer acceptance. As a result, a complete or mandatory transition towards reusable packaging is considerably more difficult in this context and is often perceived as unrealistic under current market conditions. Consequently, the pilot cases focused not only on testing reusable packaging itself, but also on the broader ecosystem conditions necessary for circular food delivery systems to function in practice.

Politically, the pilot cases illustrate a growing strategic interest among municipalities in facilitating city-wide reuse infrastructures and interoperable systems. Several cases were closely linked to emerging municipal strategies and upcoming EU packaging regulations, particularly regarding reuse targets under the PPWR. The cases further highlighted the importance of municipalities as coordinators and enablers, particularly in supporting stakeholder cooperation and reducing implementation barriers.

From an environmental perspective, the cases demonstrated clear potential to reduce single-use packaging waste in take-away systems, especially where return infrastructure and interoperability were well developed. However, the findings also show that sustainability outcomes are highly dependent on user

participation, return rates, transport logistics, and the scale of system adoption. Achieving significant environmental benefits therefore requires widespread and continuous use of reusable systems.

Socially, the cases revealed that acceptance of reusable systems in take-away contexts is strongly shaped by convenience, habits, and perceived effort. While many consumers expressed positive attitudes towards sustainability and reuse, an attitude–behavior gap frequently remained visible in practice. Return convenience, simplicity, and system familiarity emerged as decisive factors for actual participation. At the same time, repeated exposure and increasing visibility of reusable systems contributed to normalization processes and growing acceptance over time.

From a technical and operational perspective, the pilot cases highlighted the complexity of organizing functioning reusable ecosystems across multiple actors and locations. Still, the pilot cases demonstrated that such systems are feasible and the pilot cases can function as proof of concept for scaling reusable packaging in urban contexts.

Economically, the cases revealed ongoing tensions between sustainability ambitions and market realities. Many businesses remain concerned about costs, operational burden, and uncertain consumer demand. However, the cases also demonstrated that reusable systems become more viable when supported through shared infrastructures, pooling approaches, municipal facilitation, and economies of scale. Particularly in Copenhagen, the pilot case illustrated how systems intentionally designed around market feasibility and scalability may increase long-term adoption potential.

The following sections discuss the individual pilot cases in detail based on the data summarized in table 11. The findings are then summarized across cases into implications for circular take-away and home-delivery systems.

Table 11. Cluster III - Overview of collected data

Location	Data collected
Copenhagen – City system	– Interview with Copenhagen municipality (Pre & Post) – Report from service provider (NewLoop) – Quantitative data (use and environmental impact) – Field study by NewLoop – Field study by Gate21 (three visits in total)
Hamburg – Weekly markets	– Interview with SURI management (Pre & Post) – interviews (n = 10) with sustainability-oriented regular customers at Goldbekmarkt (Pre) – Interview with two SURI sales staff (Post) – Observations & feedback at both markets – Survey at both markets (Goldbekmarkt n = 43; Isemarkt n = 17) – Observations & feedback at staff training
Tallinn – Ministry building	– Interview with Baltic Restaurants (Pre & Post) – Sales data
Gdańsk – Vending machines	– Interview with Challengeen (Pre & Post) – Feedback from four office managers (Pre & Post) – End-user survey at four tastings (n = 90) (Pre) – Individual feedback from end-users with technical problems – Sales data



Location	Data collected
Anykščiai – City system	– Interview with Anykščiai municipality and Environmental Center for Administration and Technology (Pre & Post) – Two interviews with and feedback templates (n = 6) from participating restaurants and cafes (Post) – Interview with Anykščiai tourism center – End-user survey (n = 211) – Usage data

6.1 Copenhagen

City-wide reuse system with reverse vending machines



Case description

The *municipality of Copenhagen* aimed to promote the adoption of reusable beverage and food packaging by facilitating a city-wide system with return machines in public spaces. To this end, the municipality issued a public tender to allow a private service provider to design, install, and operate such a system. The tender specified a set of minimum technical and operational requirements.

In October 2025, *NewLoop* launched its reusable packaging system and currently operates 38 return points across the inner city. The return machines enable end-users to reclaim deposits via a web-based application, which is accessed through QR codes placed on both the packaging and the machines. The application also allows for the integration of additional features, creating added value for both end-users and participating businesses.

The responsibility for recruiting and integrating businesses lies primarily with *NewLoop*, however the municipality provides financial incentives through an innovation fund to a limited number of businesses that commit to the system and share usage data. *Torvehallerne*, a major food court in the city, had already committed to participating in the system prior to the tendering process.

To further increase end-user participation, the municipality plans to test behavioral nudging interventions at the point-of-sale.



Statistics

- 38 return points in the inner city
- Overall, system still in early implementation phase with limited volume
- Positive trend in usage rate, return rate and rate of sorted out items
- Focus lies on recruiting more participating businesses and increasing volume

Minimum criteria in tendering

1. The return machines must be sized to accommodate both beverage and food packaging (though not packaging covered by the deposit scheme), be configured to read RFID and/or QR codes, and be capable of refunding money to a payment card
2. Return machines must be solar and/or battery-powered and easily attachable to the surface, so they can be quickly moved if necessary; it is the supplier's responsibility to restore the surface if it is altered
3. Packaging must include an embedded return incentive with an attached value or a fee for non-return
4. The packaging must be returnable by anyone
5. The packaging must be equipped with an RFID tag and/or QR code
6. The system must not be app- or cash-based
7. Logos and other marketing materials can be added to the packaging
8. Collection and delivery of packaging using electrically powered vehicles, preferably electric bicycles and similar.
9. The washing facility must be at a close proximity of Copenhagen
10. The reverse vending machines can accept and register packaging from other recycling companies (on the Danish market)
11. The system must be data-driven, with the municipality having access to all non-personal data so that it can optimize the system in collaboration with the operator
12. The system operator must document the following on a quarterly basis:
 - Number of reusable packaging items used
 - The operating costs of the recycling system
 - Communication or recruitment campaigns conducted
 - Number of packages disposed of
 - Number of packages that have gone missing from the system.

Feasibility

Municipality perspective:

- System was intentionally designed to be scalable, sustainable and feasible under real market conditions
 - Reuse is understood as a means to achieve sustainability and feasibility, not as the sole objective
- The municipality sees its role primarily in enabling and initiating the system, while long-term operation and expansion should be market-driven
 - The municipality aimed to establish a system that could eventually operate without long-term public involvement or subsidies
 - This based on the assumption that systems dependent on subsidies are unlikely to remain operational once funding ends
 - Following the design, tendering and procurement phase, only limited municipal involvement is required for ongoing operation
- Key system characteristics contributing to its success include:
 - Low-tech and mobile return infrastructure (return machines do not require electricity or permanent installation)
 - System can accept packaging from multiple providers
 - Packaging used by NewLoop is designed to have comparatively low environmental impact
 - Digital platform intended to provide additional value beyond scanning/tracking
 - Existing international partners integrated into the value chain from the beginning
- The municipality temporarily supported the onboarding of businesses through funding schemes:
 - Intended as an initial incentive to encourage businesses to test the system
 - The goal was to lower barriers for initial participation and create positive practical experiences
- Several new businesses have already joined the system and participation of bigger chains is expected to increase volume and interest of additional businesses
- Long-term financial feasibility of the system for the service provider is primarily dependent on achieving sufficient market share
- The pilot is viewed as a successful proof of concept, demonstrating that a reusable packaging system can be operationally feasible and environmentally sustainable

Service provider perspective (October to February):

- Overall positive development of return and outsourcing rate over time
 - A significant share of packaging has already been returned during the early phase of implementation
- The system is still in an early implementation phase, resulting in limited deployment and comparatively low circulation volumes.
- Onboarding of participating businesses still ongoing after launch
- Companies generally reported that the system was easy to implement operationally
 - Businesses that fully replaced single-use cups reported relatively short adjustment phases of approximately 2–4 weeks
- Operational optimization measures included:
 - More frequent emptying and washing of return machines to reduce outsourcing
- Adaptation of the bicycle courier collection system for the scaling phase.
- Challenges:
 - Branding was perceived as a barrier for participating businesses, as they highlighted the importance of maintaining their own branding and visibility on packaging.
 - Usage rates remained limited when reusable packaging was only an optional alternative

Feasibility (continued)

Insights from four field visits at Torvehallerne (December & March):

- Two dominant use cases for cups: Cold drinks (i.e., soft drinks, beer) usually offered exclusively in reusable cups, while hot drinks (i.e., coffee) usually available in both reusable and single-use cups
 - Reasoning: Coffee is more frequently purchased for to-go consumption than cold drinks
- Reusable coffee cups showed very low adoption rates, while single-use cups remained the dominant option
 - Staff at point-of-sale are critical gatekeepers: Staff often defaulted to disposable cups, did not mention reusable options, or found the process too time-consuming
 - Due to low usage rates, staff is often not yet used to the process if a reusable cup is requested
 - Promoting reusables is usually not a priority for cafes in general which emphasizes the relevance of commitment on management level
 - Habits and default settings matter: Observations suggest that making reusable cups the default option could significantly increase uptake; Staff interviews indicated that actively asking every customer about reusable cups slowed transactions, while automatic default serving in reusable cups could normalize the behavior
- High usage rates of reusable cold drink cups, however return rates by customers themselves remained low
 - No negative impacts on sales were observed and staff feedback was generally positive
 - A central challenge was the lack of customer awareness and understanding
 - Many customers were unaware that cups could be returned, did not know where return stations were located, or failed to notice the machines
 - As a result, cups are often left behind at the table or are placed near/in waste bins
 - Proactive staff communication remained limited: Customers were often not informed that the cups operated with a deposit system or how returns worked
 - Visibility and communication were insufficient: Existing signage was largely ineffective because they were poorly positioned, visually inconspicuous, or outside staff/customer attention areas. Customers frequently overlooked return machines even when located nearby
- International visitors faced additional challenges: Foreign customers frequently did not receive explanations about deposits or return procedures, partly because staff communicated the system primarily in Danish
- Operational integration into daily café routines was not yet fully optimized: Staff sometimes struggled with cash register systems, cup placement, and internal routines
- Overall, the field visits suggest that the success of reusable systems in public spaces depends less on the technical functionality itself and more on:
 - Staff engagement
 - Visibility and convenience
 - Communication and nudging
 - Public familiarity and normalization of reuse practices

Acceptability

End-user perspective:

- User reviews from NewLoop suggest an overall positive attitude towards the system: 4.26 out of 5 stars from reviews October to February (n = 694) with a positive trend to 4.35 for January/February
- Insights from Torvehallerne:
 - Biggest barrier appeared to be the lack of awareness of the reusable option in general and the knowledge about return options
 - Low visibility and insufficient communication reduced acceptance and participation
 - When made aware, customers expressed both positive and negative perceptions: Many users appreciated the environmental concept and found the system intuitive once explained; Others disliked the plastic material, worried about hygiene or microplastics, or viewed the need to remember returns as stressful
 - Return process itself usually perceived as simple once understood
 - Habits and default settings can strongly influence uptake:
 - Optional reusable cups led to low proactive usage
 - Default reusable options seen as more effective for normalization
 - Convenience and simplicity remained central conditions for acceptance
 - Single negative use experiences can significantly influence acceptance and usage of system

Participating businesses perspective:

- Overall positive assessment from already participating businesses once routines stabilized
 - Businesses that fully integrated reusable cups observed relatively short adjustment periods for customers and employees
- Additional acceptability barrier: Lack of branding possibilities on cups
 - Concerns about reduced brand visibility and customer experience
- Acceptance increased when reusable packaging became integrated into normal routines instead of remaining a voluntary add-on
- Staff perspective
 - Staff reactions overall mixed but generally pragmatic
 - Environmental purpose generally acknowledged positively
 - Reusable cups partly perceived as:
 - Additional work
 - Slower customer interaction
 - More complicated during busy periods
 - Staff acceptance depended strongly on:
 - Management priorities
 - Integration into routines
 - Visibility and ease of explanation

Replicability, Transferability & Scalability

- National legislation identified as the key driver for significant scaling in Copenhagen:
 - Sustainability alone not perceived as sufficient motivation for businesses or end-users to change their behavior
 - EU and national legislation expected to create necessary market pressure and increase adoption
- The system was explicitly designed for scalability and transferability beyond Copenhagen
- Frederiksberg municipality already adopted the system, representing an inter-municipal replication example
- Additional interest reported from several European cities
- Existing international washing and logistics partners considered major enablers for rapid scaling
 - As partners already operate internationally, new cities do not need to establish washing and logistics infrastructure on their own
- Low-tech and flexible nature of the system and return machines are further relevant enablers

6.2 Hamburg

Reusable system at weekly markets

Cases description

SURI Signature, a local trader operating at several weekly markets in Hamburg, tested two distinct approaches to implementing a reusable system. The planning and implementation was supported by the *Baltic Environmental Forum Hamburg (BEF)*. Considerations regarding possible system design options were complemented by exchanges with other market vendors, packaging producers as well as customer feedback. A central aim throughout the process was to achieve an appropriate balance between sustainability objectives, customer value, and economic viability. At Goldbekmarkt, a reuser-owned system was introduced, whereas at Isemarkt, a provider-owned pooling system was applied. The comparative test served to identify a suitable, operationally robust and well-accepted solution that SURI can implement consistently across all 10-12 markets. In addition, the findings are intended to inform recommendations for other market traders considering the adoption of reusable systems.



Case 1: Goldbekmarkt

Start: October 2024

- Market days: Tuesdays, Thursday & Saturdays
- Customer structure: Mainly regular, sustainability-oriented customers
- System type: Reuser-owned
 - SURI offers reusable containers to customers for sale
 - Material: Stainless-steel
 - Costs: 6€ each
 - Customers are responsible for taking care of the containers (e.g., washing)
 - Possibility to return the containers for 1€ washing fee
- Direct costs for SURI: Purchase of containers (~ equal to selling price)
- Single-use alternative: Plastic-free containers and bags (paper or cardboard)

Case 2: Isemarkt

Start: November 2024

- Market days: Tuesdays & Fridays
- Customer structure: High share of tourists and irregular customers
- System type: Provider-owned (pooling system)
 - SURI offers reusable containers from external service provider for deposit
 - Operator: RECUP (REBOWL)
 - Material: PP
 - Deposit: 5€ for bowl incl. lid
 - Containers can be returned to SURI or at many locations throughout Germany (without need for app or registration)
- Direct costs for SURI: Participation fee
- Single-use alternative: Plastic containers and bags (PP and HDPE)

Both markets

- Status quo: Single-use plastic containers and bags (PP and HDPE) or own reusable containers
- Test Phase: Tested reusable system described above and
 - Customers can buy products in their own reusable containers
 - 4% discount on purchases in all types of reusable containers
 - Communication campaign at the market stand to inform about new system at selected dates
 - Info material (poster, post cards)
 - Personal interaction with customers

Statistics⁶

Summary

Goldbekmarkt:

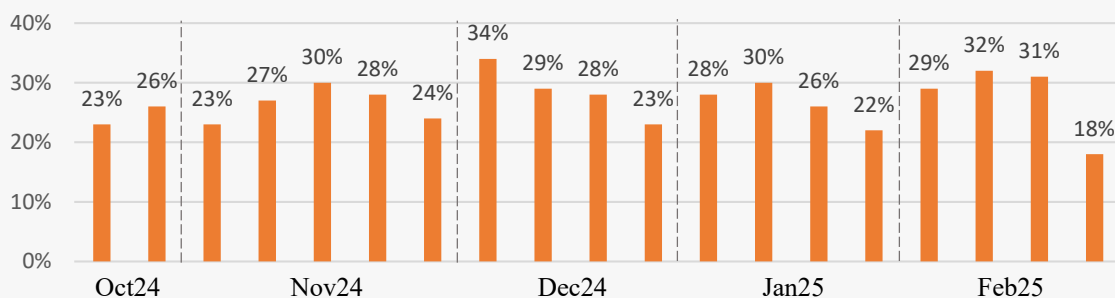
- Prior use rate estimated at ~ 5 to 8%
- Strong increase directly after introduction to >20%
- Share of purchases with reusables in pilot phase:
 - Saturdays: Ø 27% (up to 34%)
 - Thursdays: Ø 12% (up to 24%)

Isemarkt:

- Lower willingness to use reusable containers
- Share of purchases with reusables in pilot phase:
 - Fridays: Ø 4% (up to 18%)
 - Many days with no purchases in reusables at all

Share of purchases with

Saturdays at Goldbekmarkt



Feasibility

Summary:

- Aim to increase awareness and actual use of reusables successful
- Own, reuser-owned system (without external provider) considered more effective

System reflection:

- Reuser-owned system at Goldbekmarkt proved to be more suitable for SURI and their customers
- Added flexibility of pooling system not sufficient to convince irregular customers at Isemarkt
- Discount as option for increased customer value proved successful
 - Reasoning: Reduced costs for SURI through reduction of single-use packaging needed is forwarded to customers
- Return and washing option at Goldbekmarkt less problematic than expected: customers often kept containers which led to limited cleaning effort
- Return as central barrier at Isemarkt

⁶ Data from some market days are missing when cash register was not clearly assignable to one market

Feasibility (*continued*)

Organizational impacts and challenges:

- Complex planning and preparation (analysis of options and concept development) difficult but possible with suitable support (project work)
- Planning and set up of system were dependent on (initial) financial support
- Manufacturing delayed rollout but did not affect system feasibility in general
- Internal process adjustments for different markets and systems (packing, logistics) proved challenging but anticipated to be improved once one final system is applied across all markets
- Initial staff reactions: cautious and skeptical at first, but attitudes turned more positive quickly after introduction
- Staff training necessary to handle new procedures (System knowledge, communication strategies)
 - Training was considered helpful, but real-life implementation differed – follow-up training recommended
- Additional effort for staff but possible to adjust into new routine over time
- Slightly more time needed per transaction (customer questions, deposit handling, discount entry)
 - Difficult on busy days, esp. weekends; weekday operations still well manageable
 - Proactive communication by staff limited due to time pressure
 - Communication support from BEF on busy market days considered very helpful
- Reuser-owned system relies on customer cleaning (SURI only has limited capacity for washing)
- Data gaps from cash register makes full usage analysis difficult

Success factors:

- Thorough research and iterative exchange with stakeholders (i.e., packaging suppliers, other vendors, customers) as basis for system and container design
- Continuous communication on system and on the importance of reducing single-use plastics significantly boosts participation
 - Ideally supported externally to reduce workload for sales staff
 - Conversations with customers while they wait in line especially fruitful
- Staff engagement and commitment crucial (adaptation to new processes and communication effort towards customers)
 - Should be prepared for that with training before implementation and along the way
 - Implementation of incentives for high communication efforts from staff at second rollout in order to maintain usage rates
- Financial incentive for customers (4% discount) supports uptake (increased customer value)
- Regular customers are more open for changing towards reusables

Acceptability

Customer perspective

Summary

- Reuser-owned system at Goldbekmarkt better accepted
- Added flexibility of pooling system not sufficient to convince irregular customers at Isemarkt
- Change in behavior seen as learning process that takes time
- Communication efforts and discount both effective in influencing usage
- Product design highly relevant: Preference for containers that are rectangular, see-through, and leak-proof while also looking aesthetically pleasing
- Many customers still choose single-use out of convenience considerations
- Ideally, system should be compatible with other market vendors

Pre-assessment (*n* = 10 interviews with sustainability-oriented regular customers)

Overall:

- Existing interest and intention to use reusable products
- In principle, willingness to overcome challenges (process of getting used to it)
- Preference for simple and intuitive use
- Desire for a unified system for the entire market

Requirements/wishes for reusable containers:

- Dishwasher safe
- Space-saving (stackable)
- Various sizes
- Safe: no leakage
- Transparent

✓ Advantages of (SURI) reusables:

- Ecological: Avoidance of single-use plastic consumption
- Social: Sense of belonging and being part of something (recognition value of the containers) & feeling good about oneself
- Product: High quality, no leakage or damage to the goods
- Aesthetics: More attractive in the fridge

✗ Disadvantages of (SURI) reusables:

- Biggest challenge: Always bringing reusable packaging
- Needs time to adjust/ get used to system
- Difficult for spontaneous shoppers
- Transport: Occasionally takes up too much space
- Different systems at different stands

Observations & Feedback during test phase

- Many (very) positive responses and interest at Goldbekmarkt
 - Motivation to bring their own containers / to try it out
 - Pleased, that reusable containers are being offered at all / that their own reusable containers are being accepted
 - Many customers quickly became familiar with the new system (sooner than expected)
 - Satisfied with design and quality of SURI containers
- Discount for reusables considered as major factor by staff, especially at Goldbekmarkt
- Main issue at Goldbekmarkt: customers forgetting to bring containers
- Partly no interest in the topic and only isolated negative responses
 - Reasons against participation: not regular customers; transport too inconvenient; too impractical in general
 - Other criticism: Containers are not see-through; Skepticism, whether containers are actually leak-proof; Size/ Shape of REBOWL unsuitable
 - Some concern about new cardboard single-use packaging (not see-through, leakage worries)

“Finally, someone is taking action. We've been bringing our own containers for years.”

Acceptability (continued)

Survey (Goldbekmarkt n = 43; Isemarkt n = 17)

- Overall positive attitude and experience at both markets
- Sustainability as most important reason for usage
 - Financial incentives and communication more secondary, potential to convince people
- Reusable products offer ecological and personal added value and encourage people to shop more sustainably
- Usage seen as simple in general, however certain difficulties remain:
 - Goldbekmarkt: A little bit challenging to remember to bring containers along and transport them
 - Isemarkt: Transport and return are partly perceived as inconvenient
- Respondents are generally environmentally conscious, but concern is not translated into action to the same extent

“I think the reusable system is very good. It's a start and it's heading in the right direction.”

“I am informed and motivated in a very friendly manner, and it is transparent and I am highly motivated.”

“I'm forgetful and would probably forget the containers quite often.”

“It's a great incentive that there are discounts for using your own reusable containers!”

“You always have to remember to bring the containers back. It took me a while to think of egg cartons.”

Replicability, Transferability & Scalability

- SURI internally replicates reuser-owned system at all markets based on experiences during test phase
- Implementation of coherent system increases operational convenience for staff
- Additional staff training ensures smooth transition at full rollout
- Containers were optimized according to customer feedback and needs
 - Silicone-framed and transparent safety-glass lids to allow customer to see the contents
- Challenge: Adapting to diverse market contexts (varying customer types)
- Staff optimistic, that reuse becomes habitual at market over time
- SURI system is generally suitable to be adopted by other vendors
 - Compatibility at market possible
 - Other vendors already showed interest in topic and reusable system during test phase
 - Certain internal reorganization of logistics and processes needed
 - Complementation of system implementation with communication effort considered crucial for high adoption rate
 - System especially suitable for vendors with high share of regular customers
 - System design transferable to other types of market vendors or conditions
- General challenges for transfer and scaling:
 - Germany has many different reusable systems creating confusion and complexity
 - Lack of standardization, multiple “island solutions” without harmonization
- Digital tracking (QR/Apps) is essential for scaling beyond pilot scope
 - Enables cross-system container return and traceability
- Early engagement and alignment of public authorities and system providers enabled discussions on future standardization and harmonization

6.3 Tallinn

Reusable packaging for take-away at ministry canteen

Case description

Baltic Restaurants, the catering provider for two lunch canteens at the joint ministry building in Tallinn, introduced a reusable packaging system for take-away meals. The building houses six ministries and a total of over 1,300 employees with 980 work spaces. The canteens are accessible only to ministry employees and their guests.

As part of the initiative, single-use packaging was completely eliminated and replaced with three alternative reusable options. Customers could either bring their own containers, purchase a container (€2) for repeated personal use, or use a container from the service provider Ringo against a deposit of 1€. The Ringo containers can be returned both within the ministry building and at various return points across the city. Consequently, customers simultaneously had the choice between a reuser-owned and a provider-owned system.



Statistics

Sold articles:

- 4696 articles sold during February (only partly for take-away)

Sold reusable containers:

- February 2025
 - 5x Ringo containers handed out for deposit
 - 10x 2€ containers sold
- March 2025
 - 12x Ringo containers handed out for deposit
 - 7x 2€ containers sold

Feasibility

Planning considerations:

- Coordination was required with ministry building contacts but no objections
- Staff training important: Need to explain the system to customers and handle small extra tasks like, e.g., cash register inputs for deposit tracking
- Possible expected challenges:
 - Plate loss: people taking canteen plates to their offices and not returning them (those not wanting to use any of the take-away options) → already problem beforehand
 - Customer resistance: Estonia already has many overlapping deposit systems, which can confuse people
 - Additional effort for staff in communication and bookkeeping (expected to settle after some weeks)
- Expectations:
 - Staff and ministry employees as open-minded (building houses the Climate Ministry and others expected to lead by example)
 - Communication as key success factor
 - Could serve as a model for future replications at other outlets



Feasibility *(continued)*

Implementation:

- Preparation needs:
 - Set up of explanatory/information signs
 - Employees need training/ information on reasoning and new tasks/ processes
 - Accountants had to make a new code for the cash register, because VAT does not apply to the deposit, but it does apply to the washing fee
 - Set up of Ringo return box at building
- Overall impression:
 - Positive/ successful, especially bring you own (including 2€ containers)
 - Ringo deposit system less popular, though kept running for longer testing
 - Full switch to reusables as right approach for significant change
- Communication (posters, screen announcements, clear instructions) were very helpful
 - Reduces communication needs of sales staff
 - Explanation of reasoning to customers crucial
- Operational impact:
 - Sales volumes remained stable
 - Plate loss decreased compared to before with single-use take-away options
 - Limited extra work for staff
 - Washing and bookkeeping adjustments were manageable
 - Info materials reduced communication efforts
 - Financial: overall neutral (few lost sales vs. savings on less packaging needed)
 - Ringo collects 0.30ct washing fee per item which is ultimately paid by customers
 - Costs for set up of Ringo return station in building
- Other:
 - Ministry setting favorable, as many people are motivated to support sustainability initiatives
 - Indirect brand reputation benefits being located in a government building where policy decisions are made

Acceptability

Customer perspective

- Stable customer numbers: reusables instead of single-use not a reason to eat elsewhere
- Full switch as right approach to change behaviors
- Most customers chose to buy their own box or bring one from home
- Ringo not very popular: possibly due to confusion/ resistance to Estonia's many deposit systems
- Many people eat on site in the ministry building and do not need take-away food packaging
- Introduction of system reduced plate loss, which suggests, that reusable containers are used as alternative

Replicability, Transferability & Scalability

- Baltic Restaurants continues with the new established system and considers expansion to other locations
- If customers are regular, a system with option for own reusable container is advised
 - If food needs to be weighed, a standard container may be more convenient than customers' own varying container
- In general, system can be easily transferred to other caterer supplying canteens

6.4 Gdańsk

Vending system for lunch meals in reusable packaging

Case description

The entrepreneur *Challengeen Sp. z o.o.* developed a deposit-based smart reverse vending machine, *Venloop*, designed for the distribution of pasteurized meals in reusable glass jars (*Awaryjny Sloik*). The system was piloted at four local companies as a lunch option for their employees. Depending on the company, the employees worked in an office-structure or in manufacturing, allowing the comparison of different conditions. The reverse vending machine can be accessed via an online application that enables users to purchase meals (including 2 PLN deposit for the jars), unlock the machine, and retrieve the filled jar. After consumption, the jars can be returned at the same location, whereupon the deposit is automatically refunded to the user's account. The machine identifies both dispensed and returned jars using integrated weighing technology. The integration of direct card payment (tap-to-pay) is already planned to be integrated based on user feedback to increase flexibility. Meals are produced locally by *Smaki Kaszub*, and were tailored to user preferences through tasting sessions conducted at the participating companies. Logistics are outsourced to an external operator (*Food4you*). Both the hardware and software components of the system were newly developed in collaboration with *Indoornavi* and underwent extensive testing prior to implementation.



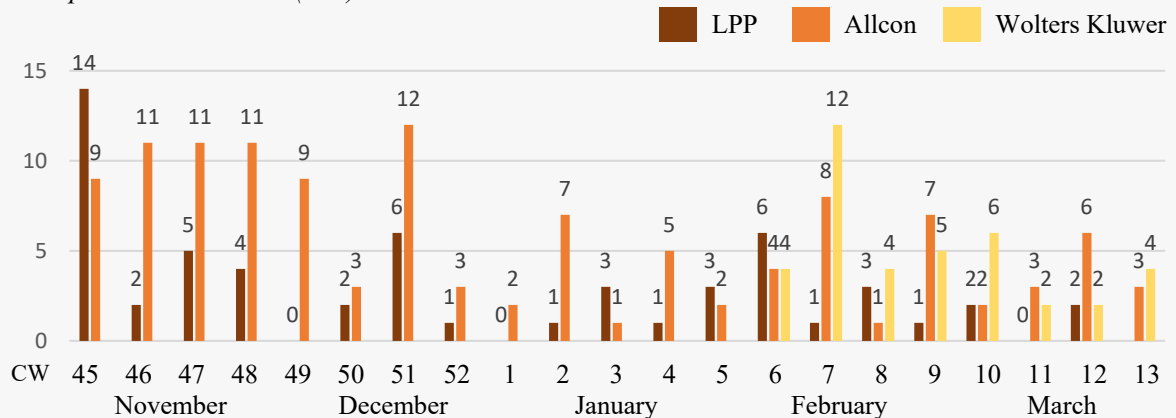
System process

1. The operator supplies the producer with glass jars as needed.
2. The producer prepares the food, and packages it in the reusable jars.
3. Operator transports the jars in bulk from the producer to the offices where vending machines are located, replenishing as needed.
4. Employees purchase food from vending machines.
5. Employees consume food, either at work or at home.
6. After use, employees clean the jars and return them to the designated vending machine or collection point.
7. When the vending machine reaches capacity with returned jars, a notification is sent to the operator to collect who retrieves the jars during the next delivery run.
8. The producers cleans the returned jars, removes labels, and prepares them for reuse.
9. Damaged jars that cannot be reused are sorted out and sent to recycling.

Statistics

- At Orplast (launched on 21 October 2025), only few sales were recorded, leading to the decision to relocate the Venloop in February 2026 to Wolters Kluwer with a high potential office structure
- High initial sales in first weeks at Allcon with slight decrease over time
 - High average sales per customer
- High interest in first week at LPP to try the offer and following moderate consumption

Sales per calendar week (CW)



Additional information

Location	LPP	Allcon	Wolters Kluwer
Start date	04.11.2026 (CW45)	04.11.2026 (CW45)	04.02.2026 (CW6)
Test duration	21 weeks	21 weeks	8 weeks
No. of employees	~ 5.000 total; ~ 100 in area of vending machine	~ 150 total; ~ 30-50 in area of vending machine	~ 300; ~ 30-50 at of-fice per day
Total sales	57	120	39
Ø Sales per week	2.7	5.7	4.9
Total customers	17	13	12
Repeat customers	12	9	8
Ø Sales per customer	3.4	9.2	3.3
Returns	49 (86%)	98 (82%)	31 (79%)

Feasibility

Technical perspective

- Overall, technical feasibility was successfully demonstrated
- Achieved through extensive pre-launch development and testing of both hardware and software (front-end and back-end systems)
- Continuous system optimization based on real-world use in pilot; initial issues were manageable and solvable
- Internet connectivity at offices is a critical requirement; issue at one office encountered but successfully resolved
- Advanced technical challenges require on-site intervention; proximity of pilot locations facilitated efficient troubleshooting
- High technological maturity is necessary to minimize on-site maintenance, particularly for scaling to more distant locations
- Overall reliable return process with only minor initial issues
- Customer support facilitated via integrated chat function, enabling direct and timely assistance
- Usability challenges remain, particularly in relation to the payment process
 - Planned implementation of NFC/tap-to-pay is expected to improve convenience and potentially increase uptake

Operational perspective

- System operation stabilizes after an initial support-intensive phase
- External partners effectively handled logistics and cleaning without complications
- Shelf-life of meals enables efficient stocking and reduced food waste, supporting operational efficiency

Business and financial perspective

- Legal requirements (e.g., sanitary inspection; terms and conditions of website) were manageable and did not pose major barriers
- Offices showed interest in participation, driven by employee benefits and corporate social responsibility (CSR) objectives
- Business model based on food sales, with offices providing space and energy infrastructure
- Profitability depends on sufficient sales volume; low initial demand challenges economic viability
- Key cost drivers include R&D, hardware (~€1,400 per machine), reusable containers, and system operations
- Tasting sessions at participating offices supported product acceptance and facilitated implementation
- Relatively small sales volume observed in pilot could be mostly attributed to non-reuse-related aspects:
 - Limited number of employees at some locations
 - Existing competing food options (e.g., vending machines with snacks)
 - Product-market fit limitations (jar-based meals not consistently preferred)
 - Context-specific factors such as employee habits and budget constraints
- Expanding product variety could increase demand but may require additional investment and technical adaptations
- Focus on improvement in usability in order to increase sales

Feasibility & Acceptability

Feedback from participating companies' office coordinators:

- Overall positive attitude and willingness to try out new options to enhance lunch experience for employees
- Opportunity to better understand their employees' preferences and how circular solutions can be integrated in workplace
- At all locations, cooperation and implementation went smoothly
- Office coordinators see benefits for both company as well as employees (i.e., new and more sustainable lunch option for employees)
- Positive attitude and reactions from employees towards concept and openness to try
 - Sustainability perceived positively
- Reusable system itself not seen as barrier as its overall simple and intuitive
- Location of Venloop in kitchen area facilitated usage and return
- Regular usage and (long-term) success considered as dependent not only on product quality and sustainability impact, but also on competitiveness with available alternatives and convenience of whole process
- Room for improvement: Further simplification of process, especially direct card payments without need for website visit
- At Orplast, continued usage was very little as it did not align with habits and financial situation of employees
 - Main barrier was not concept itself but mismatch with target group

“The reusable system itself was not perceived as a barrier; on the contrary, due to the simple flow and favorable office conditions, it functioned smoothly and intuitively.” (Allcon – Office coordinator)

Acceptability

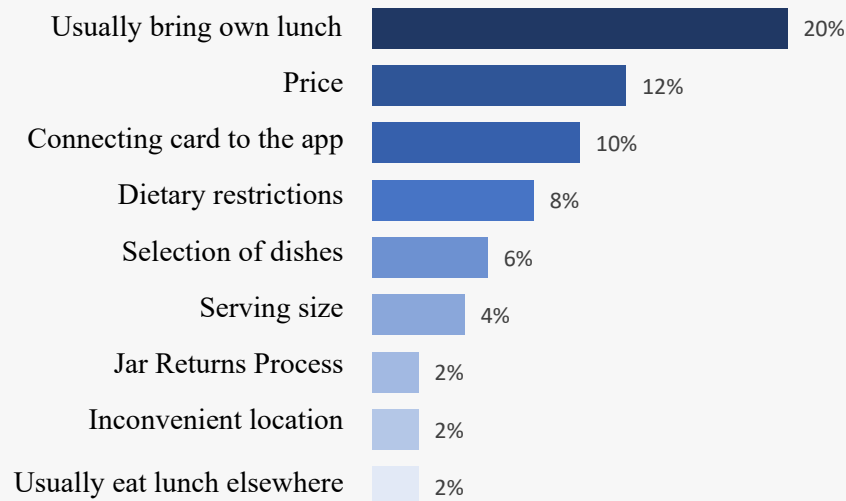
End-user perspective

- Tasting session before launch good opportunity to pitch idea, create awareness and tailor the offer to employees needs
- Employees showed positive attitude towards system and offered meal options
- Use rates and acceptance simultaneously influenced by system design, price, location and food preferences/ habits
- Clear difference in adoption between locations
 - System worked better at companies with office structure and higher salaries; Orplast as manufacturing site did not fit the offer
 - Price as biggest barrier reported from manager, however price decrease by 20% didn't increase use rates
 - High average order per customers at Allcon supports potential of customer retention when conditions are favorable and initial barriers are overcome
- Meals were generally rated positive at tastings, however, does not always align with existing habits and preferences
 - Some employees prefer snacks for lunch (especially bakery products)
 - Option to also offer snacks in Venloop, but no suitable container yet and problem with durability
 - Many employees bring own lunch to work (cheaper)
 - Direct competition (e.g., other vending machines)
- Difficult to change habits → long-term process
- Direct communication channels with users (online chat) enabled rapid issue resolution and support
- Only few reported issues/ concerns in relation to the reusable system design

Acceptability (continued)

Survey at tasting sessions (n = 90 from all four offices)

- 33% buy lunch at least multiple times a week, 40% multiple times a month, 23% rarely
- Rating on overall impression, attractiveness, and convenience (very) positive
- Perceived as (very) positive by 97% that the lunch is offered in reusable jars
- 78% of respondents intended to try the offer
- Variety/ Additional lunch option as main reason for usage (44%), the reusable packaging motivates 8% the most
- Barriers (single-choice):



“An interesting option, tasty dishes in jars and not in plastic containers.”

- Few respondents also wished for alternative food options, such as vegetarian meals

Individual feedback from users with technical issues (n = 12)

- Users were content with quality and tastiness of food
 - Most will continue usage (despite technical issues)
 - For some, generally only backup option for when no own food is brought to work
- System in general good but has to function/ technical issues have to be solved
- Technical issues partly hindered usage, but once resolved usage continued
- Options for improvement:
 - Increase reliability of technical aspects
 - Optimize restocking (of popular meals)
 - More variety over time
 - Visual presentation/ design of machine

Replicability, Transferability & Scalability

- Effectiveness is dependent on both, internal (i.e., system design, product quality) as well as external (i.e., income levels, habits, competition) conditions
 - Central adaptations for future implementation: mobile application appeared to be a significant friction point for users, consequently, the development of direct card payment (tap-to-pay) has been initiated to increase accessibility and spontaneous purchases.
- System is better suited to office-based environments with higher-income employees, rather than manufacturing settings and should be replicated accordingly
- Current feasibility is partly dependent on the close proximity of pilot locations, which facilitates technical support and maintenance; Scaling the system will require increased technological robustness and reduced reliance on on-site interventions
- Operational conditions may change at scale, such as higher sales volumes and less direct support, which may influence overall feasibility
- Replication in new locations requires the establishment of local partnerships
 - Specifically, new food producers and logistics operators must be identified and integrated
 - Alternatively, supplying more distant locations from an existing operator is possible but requires bulk deliveries at low frequency to remain efficient
- The business model is modular and can be adapted depending on stakeholder needs
 - It may include only the vending machine technology or a fully integrated system combining hardware, logistics, and food provision
- The system has potential applicability beyond the current use case
 - It can be adapted to other contexts where reusable packaging solutions are needed
 - There is also the option for food producers to use the system directly for distribution, eliminating the need for an additional operator
- Initial discussions with a municipality indicate interest in replicating the system
 - The technology provider supports potential adopters by advising on requirements for producers and operators

6.5 Anykščiai

City-system for reusable food packaging



Case description

The *municipality of Anykščiai*, in cooperation with the *Environmental Center for Administration and Technology (ECAT)*, implemented a city-wide reusable packaging system for take-away food in local restaurants and cafés. The development of the system and container design involved local stakeholders through workshops, ensuring that the approach was practical and aligned with the needs of participating businesses.

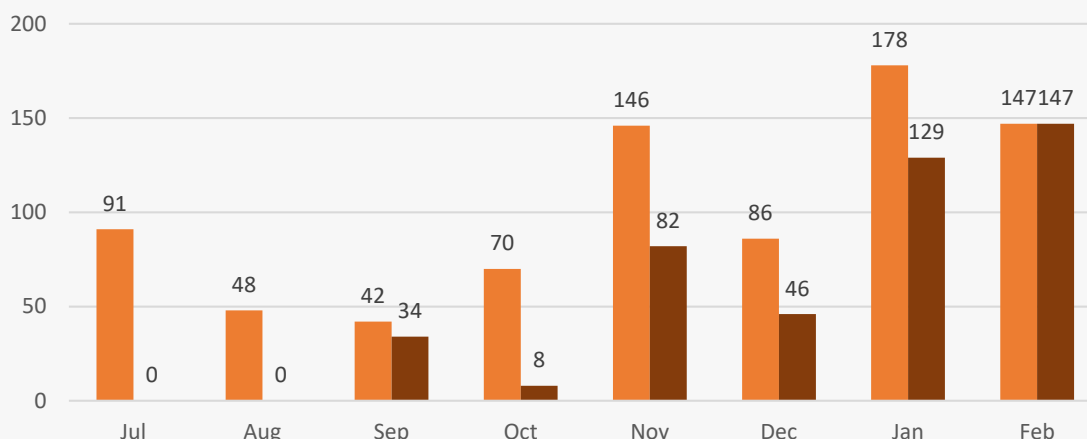
In total, 16 restaurants and cafés in the region were recruited to participate in the system and were formally contracted by the municipality. To get started, 3,000 reusable containers were procured and are distributed to participating restaurants according to demand. To raise awareness and promote adoption among both businesses and customers, the implementation was accompanied by a promotional campaign. The official launch of the reusable packaging system took place in July 2025.

The reusable system includes two types of reusable containers (food and soup) and operates based on a deposit scheme. Customers pay a deposit of €3 or €4 per container when purchasing take-away food. The deposit is collected by the participating restaurants, which provide customers with a receipt. When customers return the containers together with the receipt, the deposit is refunded. Participating restaurants are responsible for the handling and maintenance of the containers, including washing and preparing them for subsequent reuse.

Statistics

- Total of 808 containers used and 446 returned (55%) within the test period
 - 405 containers for food, 403 containers for soup
 - Returns increased over time and higher return rate is expected in long-run
- One restaurant responsible for 62% of usage (501 containers)
 - Followed by one restaurant with 13% (103 containers)
- 9 out of 16 restaurants used less than 10 containers in test period

Items used Items returned



Feasibility

Summary

- Implementation of municipality-led reusable take-away system overall feasible in small town context
- Very innovative and big first step for the town/ region and the country
 - Reusable packaging systems, e.g., at events, had not previously been implemented (except deposit bottles in supermarkets)
- Main success was raising awareness and prompting reflection among restaurant owners and residents about reusable packaging
- Actual behavior change in end-users is yet limited, but the project created the opportunity for stakeholders to reconsider their habits in long-term
- Take-away in general relatively low at restaurants in Anykščiai
 - System can work well if it aligns with the restaurants' offer and their customers habits

Challenges for municipality

- Initially, high resistance of restaurants to participate at all
 - 3 to 5 considered participation in beginning
 - Communication campaign, including coverage of project in national TV, helped convince total of 16 restaurants to take part
- Public procurement took longer than expected (~ 4 to 5 months from start of preparations to signing contract)
- 16 participating restaurants difficult to manage for municipality
 - Easier to get started with few and expand later on

Relevance of communication

- Communication efforts were identified as the most critical factor for the pilot's success
 - Municipal communication campaign as basis for restaurant participation as well as awareness for topic and system in town
 - Further, restaurants must actively inform customers about the reusable option to ensure usage
 - Restaurants first had to understand and accept their role in this
 - Where restaurant staff did actively promote the system to customers, usage increased
 - Environmental awareness among restaurant owners and staff were considered important drivers
 - Continuous personal exchange between municipality and restaurants including education on environmental impact proved to be a successful driver

Contextual factors influencing usage

- Location and type of restaurant matters: A take-away-focused restaurant outside the city center recorded much higher usage compared to central restaurants which reported lower numbers
 - Explanation: Customers in the center eat on-site more often than take-away



Feasibility (continued)

Restaurants' perspective (n=8 templates & 2 interviews)

- Affordable system, as containers are provided by municipality and restaurants only responsible for handling and washing
- Main motivation to participate is improved sustainability
- Restaurants felt well informed from municipality
- Containers do not fit for all restaurants
 - Would prefer more variety in shape and sizes
- At most restaurants, not enough take-away users for the system to work
- Deposit often considered as too high
- More marketing is needed throughout test phase to promote the system
 - E.g. with influencers
- Staff mainly neutral or supportive, not high impact on work, as not many containers used
 - However, can be additional effort to promote containers, especially on busy days
- See potential in long-run, as system is very innovative in the country and people have to get used to it

“In my opinion, many people only care about sustainability as long as it doesn't require extra effort.”
(Restaurant manager)

“The benefit is that, although very slowly, we are carrying the message of sustainability and trying to share it with our customers.”
(Restaurant manager)

“I only see this project in the long term, because this is a change in mindset, it takes a long time, it doesn't happen in a month, two or even a year.”
(Restaurant manager)

“Customers ask, some are very impressed with this project, but not all of them buy the dishes.”
(Restaurant manager)

Acceptability

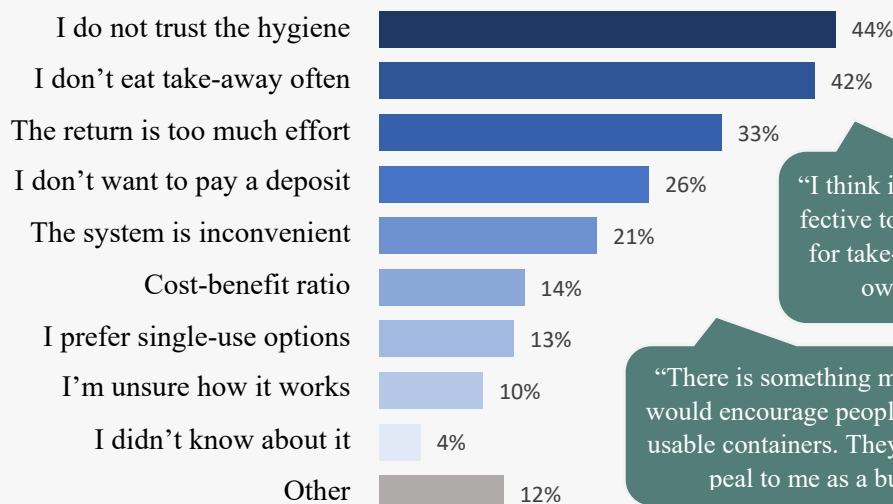
- Main success was raising awareness and prompting reflection among restaurant owners and residents about reusable packaging
- Restaurant owners initially showed high resistance, but could be convinced over time with help of public promotional campaign

End-user perspective

- Many residents have a positive attitude towards project in general, however actual usage of reusable containers remains low
- Take-away culture in the town is relatively limited, which reduces potential usage
 - Usage is higher in locations where take-away food is more common, such as restaurants outside the city center
- Some users perceive the system as unnecessary or inconvenient, and have concerns about deposit and hygiene

Survey among (potential) end-user (n=211)

- Most respondents (54%) rarely use take-away
- 84% have heard of the reusable system beforehand
 - Most common sources: Social Media (46%), Online news (36%), at restaurant (24%)
- Most respondents see themselves as environmentally responsible (87%) and consider reusables as more sustainable (75%), however, only 52% consider the system as a good idea for Anykščiai
- From those that did not use the system before (n=194), the deposit amount was rated (very) dissatisfactory by 30%, followed by hygiene (21%) and information available (19%)
- Of those that used the system before (n=17), 18% rated the information available as dissatisfactory, followed by deposit amount (12%)
- Reasons for not intending to use the system (*multiple responses possible*):



“There are more important aspects to improve in the sustainability system; this is just a drop in the ocean.”

“I think the deposit could be lower.”

“I think it would be more effective to offer a lower price for take-away food in your own containers.”

“There is something missing that would encourage people to buy reusable containers. They do not appeal to me as a buyer.”

“It is inconvenient for me to bring the box back to the restaurant where I bought it, because then I have to keep the receipt. So if you lose that receipt, you also lose your money.”

“Deposits should be mandatory. Single-use packaging should be eliminated. Encourage discounts for taking food away in your own containers. Significantly tax single-use packaging.”

Replicability, Transferability & Scalability

- Pioneer position of pilot as first reuse system for take-away in Lithuania paves the way for other municipalities to replicate
- System itself can be replicated in other towns with suitable conditions, ideally
 - Take-away culture at restaurants
 - Similar sized to Anykščiai (Small town)
 - Openness to (innovative) sustainability initiatives
- Success factors:
 - Marketing campaign to generate visibility and positive mindset among residents
 - Intensive communication with restaurants and cafes to
 - Promotional efforts directly at point-of-sale
 - Convenience for end-user, ideally with participation incentive
- Scalability to bigger cities limited because of decentralized approach (more suitable for small towns)

6.6 Implications for take-away

As pointed out in the beginning of Chapter 6, the implementation of reusable packaging systems in the take-away sector takes place under more challenging market conditions compared to Clusters I and II and is characterized by higher competitiveness and a more open market structure. End-users generally have a wider range of alternatives available, while organizations have less leverage to encourage participation in reusable systems. Many businesses remain hesitant to fully replace single-use packaging, as they seek to maintain the convenience associated with disposable options for customers. Consequently, a complete or mandatory transition to reusable packaging is particularly difficult in this context and is often not (yet) considered realistic. Nevertheless, the pilot cases demonstrate that the implementation of reusable systems is technically and operationally feasible across different use cases. However, their success and actual usage rates strongly depend on contextual conditions and complementary support measures.

Across all cases, suitable system characteristics emerged as a central foundation for participation, both for organizations offering take-away services and for end-users consuming take-away products. Convenience and practical fit are essential, if the system does not integrate smoothly into existing routines, participation remains low. Relevant system characteristics to be considered include packaging design, return infrastructure, logistics, washing processes, payment systems, compatibility between systems, as well as deposit and cost structures. Suitable system configurations further depend strongly on contextual characteristics, including the scale of implementation, such as large city-wide systems, small municipal solutions, or private business initiatives, as well as the type of customers addressed, e.g., regular versus irregular users. Across contexts, the compatibility and interoperability of systems emerged as important factors for increasing convenience and reducing barriers to participation.

At the same time, the pilot cases demonstrate that successful reusable systems in the take-away sector require ecosystem-based approaches rather than isolated solutions implemented by individual businesses. No single actor has sufficient control over the overall system, instead, implementation depends on coordination between municipalities, participating businesses, reusable packaging service providers, logistics providers, washing partners, and end-users. The findings therefore led to the Integrated Circular Take-Away and Food Delivery Ecosystem (ICTAFDE) approach presented in the Cluster III solution.

Further, system design should not be understood as a purely technical issue, but rather as a central behavioral and organizational determinant shaping the feasibility, acceptance, and scaling potential of reusable systems. Across cases, even comparatively small inconveniences, such as unclear return procedures, additional cognitive effort, registration requirements, or limited return locations could significantly reduce participation. Consumers were particularly sensitive to additional effort and disruptions of established routines, confirming the persistence of a strong attitude-behavior gap within take-away contexts. Even environmentally motivated consumers often prioritized convenience in everyday food consumption situations.

Besides end-users, businesses represent central operational actors within circular take-away systems, but also face considerable implementation challenges. Restaurants, cafés and other food vendors often operate under high economic pressure and limited operational capacity. Concerns regarding additional workload, storage requirements, washing logistics, staff training, customer reactions, and financial risks emerged as potential barriers. At the same time, management commitment and organizational culture strongly influenced implementation success. Businesses that viewed sustainability and innovation as part of their organizational identity were generally more willing to experiment with reusable systems and invest in operational adaptation.

Another central implication concerns the importance of interoperability and standardization. Especially in open market environments with many participating actors, isolated or competing systems significantly reduce convenience and scalability. The findings therefore indicate that pooled systems and interoperable infrastructures can substantially lower barriers for participation, improve operational efficiency, and support broader normalization of reuse. System compatibility becomes particularly important from the

consumer perspective, as it allows for reusable packaging to be returned flexibly across multiple locations rather than only to a single business.

Technology and digitalization, such as digital tools, QR-code systems, and tracking platforms offered opportunities for monitoring, logistics optimization, and user interaction. At the same time, the findings indicate that registration requirements, app dependency, or unclear digital procedures sometimes discouraged users.

However, the findings also show that a well-functioning system alone is currently insufficient to achieve widespread adoption. In many contexts, single-use packaging still retains advantages in terms of convenience, costs, and established consumer habits, which often outweigh sustainability considerations in everyday decision-making. Consequently, reusable systems require complementary strategies that support participation, increase visibility of reuse systems, and gradually normalize circular consumption practices.

Communication efforts and choice architecture approaches emerged as important instruments. The cases demonstrate that communication at the point-of-sale can have a direct impact on usage behavior, as observed in Hamburg or Copenhagen, while awareness-raising activities in Anykščiai significantly influenced user attitudes towards reuse. Visible communication, public awareness campaigns, nudging approaches, and repeated exposure proved important for increasing understanding and reducing uncertainty. The findings further indicate that reusable systems are more likely to succeed when they become integrated into default consumption routines rather than requiring active additional decision-making from consumers.

The cases also underline the relevance of financial and operational incentives for increasing participation among both consumers and businesses. Incentives such as discounts for consumers using reusable packaging or financial support schemes for participating cafés and restaurants can help reduce economic barriers and encourage experimentation during early implementation phases. Municipalities therefore emerged as highly important enabling actors within take-away ecosystems. Particularly the Copenhagen and Anykščiai cases demonstrated that municipalities can facilitate circular transition by supporting infrastructure development, coordinating stakeholders, enabling pilot testing, and creating favorable regulatory conditions.

In addition, regulatory measures, including taxes on single-use packaging, requirements to offer reusable alternatives, or integration of reuse obligations into municipal frameworks, are considered important drivers for scaling reuse systems. The findings suggest that voluntary approaches alone may not be sufficient for achieving large-scale market transformation in highly competitive take-away markets. Therefore, long-term transition towards circular take-away systems will likely require a combination of optimized system design, behavioral strategies, economic incentives, and regulatory frameworks.

Overall, the findings further suggest that all of the abovementioned measures are highly interdependent, as none of them proved sufficiently effective in isolation.

The pilot cases illustrate both the sustainability potential and the practical challenges of implementing reusable systems in take-away and food-delivery contexts. Compared to institutional catering and events, the cases operated under more competitive and open-market conditions, where participation strongly depended on customer convenience, business motivation, and system usability. Nevertheless, the cases demonstrated that reusable take-away systems are technically and operationally feasible across different urban settings and business models. Where reusable options were easy to access, integrated into existing routines, and supported by sufficient infrastructure, reductions in single-use packaging and repeated system use could be achieved. At the same time, the cases showed that sustainability impacts in take-away contexts are particularly sensitive to participation rates, return behavior, and system convenience. The environmental effectiveness of reusable take-away systems depends not only on the replacement of single-use items itself, but also on achieving widespread adoption, high circulation rates, and long-term behavioral normalization among both businesses and consumers, for which the foundation is made through our pilot cases.

Economically, the pilot cases revealed significant tensions between sustainability ambitions and market realities. Reusable systems frequently require substantial investments in infrastructure, logistics, washing capacities, communication, and coordination before reaching economic viability. Particularly during early implementation phases, systems often depend on project funding, municipal support, or external financing. The findings therefore indicate that scaling reusable systems within open market environments requires long-term ecosystem development rather than short-term isolated interventions.

Overall, the pilot cases demonstrate that the transition towards circular take-away and food-delivery systems requires systemic transformation rather than isolated product substitution. Successful implementation depends on the interaction of infrastructures, governance structures, business models, operational logistics, and consumer practices.

The pilot cases ultimately underline that reusable take-away systems cannot succeed through individual behavioral change alone. Long-term transition requires coordinated ecosystem development that systematically reduces structural barriers and makes circular practices the easiest and most convenient option within everyday food consumption

7. Implications for Target Groups

The pilots and related evaluation conducted within the Change(K)now! project demonstrate that the transition towards circular food delivery systems requires the active involvement and cooperation of multiple target groups. Reusable packaging systems are not solely technical solutions but socio-technical systems that depend on coordinated action, organizational adaptation, supportive governance structures, and changes in everyday practices and routines. Consequently, the successful implementation, acceptance, and scaling of circular food delivery systems are strongly influenced by the roles, motivations, and interactions of public authorities, businesses, and end-users.

The findings across all cluster pilots show that each target group faces specific opportunities, responsibilities, and challenges in relation to the transition from single-use to reusable systems. Municipalities and public authorities in general play a particularly important role in creating enabling framework conditions, facilitating cooperation, and integrating circularity into policies and public procurement. Businesses are central operational actors that implement and manage reusable systems in practice, while end-users ultimately determine system effectiveness through their acceptance and everyday usage behavior.

At the same time, the pilot experiences underline that these actors are highly interdependent. The acceptance and participation of one target group are often closely linked to the actions and support provided by others. Successful circular systems therefore require collaboration across the value chain, continuous communication, and shared responsibility for implementation and long-term system development.

The following sections summarize the main implications and recommendations for the three central target groups addressed within the project: public authorities, businesses, and end-users.

7.1 Public authorities

The pilot cases demonstrate that public authorities play a central role in enabling and accelerating the transition towards circular food delivery systems. They can act as coordinators, facilitators, regulators, and role models by integrating reuse into strategic frameworks, procurement practices, public events, and institutional catering systems. The findings show that long-term implementation is particularly successful when reuse is embedded into municipal strategies, operational guidelines, and procurement criteria rather than relying solely on isolated pilot initiatives.

Municipalities are especially important in creating enabling framework conditions. This includes developing local regulations and guidelines, supporting infrastructure development, facilitating cooperation between stakeholders, and aligning local practices with emerging EU regulations such as the Packaging and Packaging Waste Regulation (PPWR). The pilot cases further indicate that municipalities can reduce implementation barriers by providing financial support, practical guidance, communication materials, and networking opportunities for participating organizations and businesses. In several cases, political support and management commitment were decisive success factors for implementation and scaling.

The results also underline the importance of cross-departmental cooperation within municipal administrations as well as with external system-level stakeholders. Municipalities therefore need governance structures that facilitate collaboration across sectors and organizational units. Pilot experiences show that municipalities should actively involve affected stakeholders in planning and implementation processes in order to increase acceptance and identify practical operational solutions early on.

Another key implication concerns the role of municipalities in communication and education. They can support mindset and behavior change by increasing public awareness, normalizing reusable practices, and communicating the environmental relevance of circular systems. Educational activities in schools and other public institutions are particularly valuable as they contribute to long-term behavioral change and social normalization of reuse practices.

Finally, the findings suggest that municipalities should pursue gradual and context-sensitive implementation strategies. Step-by-step approaches allow organizations and users to adapt over time, reduce resistance, and create opportunities for learning and optimization. Pilot projects can therefore function as important experimentation and learning spaces before scaling solutions city-wide or regionally.

7.2 Businesses

The pilot cases show that businesses are key operational actors in the transition towards circular food delivery systems. Their willingness to participate and adapt business processes strongly influences the feasibility and long-term viability of reusable systems. At the same time, businesses often face considerable operational, financial, and organizational challenges during implementation. These include additional workload, investments in infrastructure and logistics, staff training, and uncertainty regarding customer acceptance.

A central implication is that reusable systems need to be designed in a way that minimizes operational complexity and integrates smoothly into existing workflows. Simplicity, standardization, and convenience emerged as crucial success factors across the pilots. Businesses particularly benefit from systems with clear return procedures, manageable logistics, and low additional handling requirements. Pooling systems and shared infrastructures can reduce costs, increase flexibility, and lower barriers for participation, especially for smaller businesses.

The findings further indicate that management commitment and internal organizational culture strongly influence implementation success. Businesses that perceive sustainability as strategically relevant are more willing to invest in experimentation and adaptation processes. At the same time, staff acceptance is equally important. Employees need to understand the purpose and functioning of reusable systems and should be integrated into planning and decision-making processes from an early stage. Continuous communication and training are therefore essential. The pilots further demonstrate that staff at the point-of-sale significantly influence the adoption and usage rates of reusable systems, as they often act as gatekeepers who determine whether reusable options are actively communicated, recommended, and normalized in customer interactions.

Economic considerations remain highly relevant for businesses. Reusable systems are more likely to be adopted and scaled when they are economically viable or cost-neutral in the long term. The pilots demonstrate that businesses often require external support during the initial implementation phase, particularly when investment costs or operational risks are high. However, reusable systems can also create economic opportunities, including reduced packaging costs, improved brand image, increased customer loyalty, and preparation for future regulatory requirements.

Finally, the pilots highlight the importance of collaboration across the value chain. Successful reusable systems require coordination between food providers, logistics operators, washing facilities, municipalities, and technology providers. Businesses therefore benefit from participating in networks and partnerships that facilitate knowledge exchange, standardization, and shared infrastructure development.

7.3 End-users

The pilot cases demonstrate that end-users generally show openness towards reusable systems, particularly when systems are easy to understand, convenient to use, and well-integrated into everyday routines. However, acceptance and actual usage strongly depend on practical system characteristics and the degree to which reusable practices become normalized within the respective context.

Convenience emerged as one of the most important conditions influencing end-user behavior. Barriers such as additional effort, unclear return procedures, inconvenient return locations, or limited availability can reduce participation even when users hold positive attitudes towards sustainability. The findings therefore underline the importance of designing systems that minimize friction and integrate seamlessly into existing consumption routines. In many cases, mandatory or default reusable systems proved more

effective than voluntary options because users otherwise tended to continue choosing familiar single-use alternatives.

The pilots also indicate that familiarity and repeated exposure significantly increase acceptance over time. Initial skepticism or resistance often decreased once users became accustomed to the system and understood its functioning. Educational and communication measures therefore play an important role, especially during early implementation phases. Providing clear information about environmental benefits, system procedures, and practical handling can reduce uncertainty and misconceptions.

Educational settings such as schools were found to be particularly suitable environments for promoting long-term mindset and behavior change. Students not only learned about the environmental impacts of single-use packaging but also experienced reusable practices directly in their everyday routines. This experiential learning can contribute to establishing reuse as a social norm and influence future consumption behavior beyond the immediate institutional context.

At the same time, the findings show that end-users are not a homogeneous group. Acceptance and expectations differ depending on age, routines, cultural context, and consumption situation. Reusable systems therefore need to be adapted to the needs and realities of different user groups. Offering flexible and user-friendly solutions is essential for achieving long-term participation and behavioral change.

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Change(K)now! – 2026

Website: <https://interreg-baltic.eu/project/change-know/>

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Co-funded by
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CIRCULAR ECONOMY

Change(K)now!

The Change(K)now! project is co-funded by Interreg Baltic Sea Region.

The project's main objective is a mindset change from single-use to circular or multiple-use of food delivery systems in cities and residents of the Baltic Sea Region.