THE BALTIPLAST PACKAGE OF SOLUTIONS FOR

REDUCING
SINGLE-USE PLASTICS & PLASTIC PACKAGING

Interreg Baltic Sea Region
Co-funded by the European Union
CIRCULAR ECONOMY BALTIPLAST

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BALTIPLAST: Baltic Approaches to Handling Plastic Pollution under a Circular Economy Context Output 2.5, May 2025

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LIST OF ABBREVIATIONS

BEF-DE	Baltic Environmental Forum Germany
BSR	Baltic Sea Region
DE	Germany
EE	Estonia
EIA	Environmental Impact Assessment
EoL	End-of-life
EU	European Union
GHG	Green House Gases
HAW	Hamburg University of Applied Sciences
HDPE	High Density Polyethylene
KTU	Kaunas University of Technology
LCAP	Litter Control Action Plan
LDPE	Low Density Polyethylene
LT	Lithuania
LV	Latvia
MSW	Municipal Solid Waste
NGOs	Non-Governmental Organisation
NIR	Near-Infrared
PET	Polyethylene Terephthalate
PP	Polypropylene
PS	Polystyrene
PVC	Polyvinyl Chloride
SE	Sweden
SEI	Stockholm Environment Institute Tallinn
SMEs	Centre Small and Medium Enterprises
SUPs	Single-Use Plastics
TalTech	Tallinn University of Technology

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1. INTRODUCTION

The Baltic Sea Region (BSR) faces serious environmental threats due to rising plastic production and poor recycling rates. Around **1,500 tonnes of plastic**[1] enter the Baltic Sea each year, with microplastics accumulating in marine ecosystems and even entering the human food chain. Wasteful consumer habits, inadequate waste management, and increasing pollution pressure the region's fragile environment[2]. Addressing the issue requires **coordinated action** across local and regional governments, private and public organisations, residents, and other actors in the plastic value chain to prevent and reduce plastic waste at its source.

The **BALTIPLAST** project is an initiative funded by the **Interreg Baltic Sea Region Programme 2021–2027,** dedicated to prevention and reduction of single-use plastics (SUP) and plastic packaging across the Baltic Sea Region (BSR). The project's consortium unites a diverse range of partners including local public authorities, universities, research institutions and NGOs from Germany, Sweden, Finland, Estonia, Latvia and Lithuania to foster sustainable consumption and plastic waste management. **BALTIPLAST** seeks to make a long-term contribution to the on-going efforts to reduce plastic waste in the region, aiming to minimise the amount of plastic entering the Baltic Sea and mitigating its environmental impact.

The present document, **Output 2.5 – The BALTIPLAST Package of Solutions for reducing Single-Use Plastics and Plastic Packaging**, is the main outcome resulting from the project implementation. It compiles and presents the refined solutions tested over the course of three years, incorporating feedback from piloted organisations and lessons learned during implementation. This document not only disseminates the projects key results but also serves as a practical guide to encourage the adoption of these solutions by a wide range of stakeholders.

This output is designed for **local authorities, public and private organisations, as well as NGOs, SMEs, and large enterprises.** By showcasing successful implementation examples across different organisations, it demonstrates the tangible benefits of reducing Single Use Plastics (SUP) and plastic packaging.
Throughout the project, a range of solutions that integrated circular economy principles into all activities, were tested and refined across three operational levels:

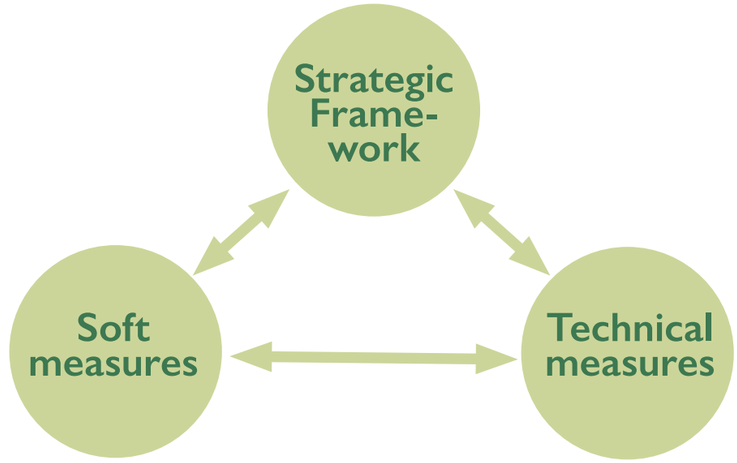
- **Strategic and management**
- **Technical and technological**
- **Communication & behaviour change**

To improve usability, the document is structured to allow each target group to quickly access the sections most relevant to them.

1. **Strategic Framework Solution –** presenting strategies and planning documents for local plastic waste management, primarily for municipal authorities and decision-makers.
2. **Technical and Technological Solution –** designed for waste management operators and local authorities, focusing on practical tools and systems for implementation.
3. **Soft Solutions and behaviour change for organisations –** presenting low-effort, low-investment measures targeting public and private organisations, such as schools and businesses.
4. **Soft solution and behaviour change for households –** offering easy measures to be implemented at the household level.

This structure ensures that stakeholders can easily find actionable insights based on their needs. Summaries of the solutions, along with their evaluation results, are presented in Chapter 2, while full descriptions of each solution are included in the Annexes.

Figure 1. Relationship between strategic framework and soft and technical measures



In addition to presenting concrete solutions, the document includes an assessment of the pilot activities, evaluating their feasibility, social acceptability, and replicability. The assessment considers practical challenges, stakeholder engagement, and adaptability to local conditions, offering guidance for tailoring implementation. The assessment is based on the following criteria:

- **Legal feasibility –** alignment with local and national regulations and any legal barriers encountered.
- **Technical feasibility –** availability of technical resources and constraints during implementation.
- **Financial feasibility –** affordability and resource demands for target groups, including the need for training or external support.
- **Social acceptability –** user perceptions regarding the usefulness, clarity, and ease of applying the solutions.
- **Replicability –** potential for scaling the solution within and beyond the pilot countries

Furthermore, the document includes an **Environmental Impact Assessment (EIA)** covering both the **technical and technological solution** and the **soft solution** targeting organisations and households.

This assessment highlights the potential of these solutions to reduce plastic consumption and waste, and clearly presents their broader environmental benefits, quantifying the associated **carbon emissions reductions** and translating it into monetary values, making the benefits more tangible and accessible also for non-technical audiences.
By demonstrating both the **environmental and economic value** of these actions, the BALTIPLAST Package of Solutions reinforces the urgency of reducing plastic consumption and provides stakeholders with a clear basis for adopting more sustainable plastic management practices.

The BALTIPLAST Package of Solutions serves as a comprehensive and practical resource for **local authorities, policymakers, businesses, and institutions** seeking to adopt more sustainable approaches to plastic use and waste management. By offering **evidence-based and adaptable solutions,** it supports stakeholders in overcoming implementation challenges and driving meaningful plastic reduction strategies. It also ensures that knowledge transfer and results from the project remain accessible and applicable beyond its duration, fostering **long-term impact and replication across the Baltic Sea Region and beyond.**

1 More Baltic Less Plastic Project, Baltic Sea Conservation Foundation (BaltCF), 2020
2 Stockholm Environment Institute, BALTIPLAST – Baltic Approaches to Handling Plastic Pollution under a Circular Economy Context, 2023

2. BALTIPLAST SOLUTIONS

2.1 Strategic Framework Solution: Guidelines for developing strategic documents to reduce single-use plastics and plastic packaging at the municipality level

2.1.1 Short description of the solution

Aim and target groups

Moving towards a circular plastic economy requires a systemic and strategic approach on a national and local level. To prevent and reduce plastic waste in a city or municipality, it is necessary to understand the problems related to the use of plastics and plastic waste and the options for tackling them in the hierarchy of local government strategic documents.

An effective strategic framework with clear goals, targets, rules, and guidelines helps the municipality implement measures to cope with plastic waste challenges. Therefore, the BALTIPLAST project developed guidelines for municipalities to establish a strategic and legal framework (hereinafter referred to as 'strategic framework') for plastic prevention and reduction.

Description of the solution

The solution – BALTIPLAST Strategic Framework Guidelines – consists of the following parts:

- Explanation of the concept of the strategic framework for the prevention and reduction of plastic waste in municipalities
- Step-by-step guidance for developing the strategic framework
- Illustrative examples of local-level strategic documents in the Baltic Sea Region (BSR) addressing plastic waste

The guidelines were developed based on the BSR municipalities' experiences and best practices. The BALTIPLAST partner municipalities piloted the strategic framework by preparing their local strategic documents.

The strategic framework can be envisaged as a three-level pyramid of documents for moving towards sustainable use of plastics in local government (Figure 2)

Figure 2. The concept for the strategic framework

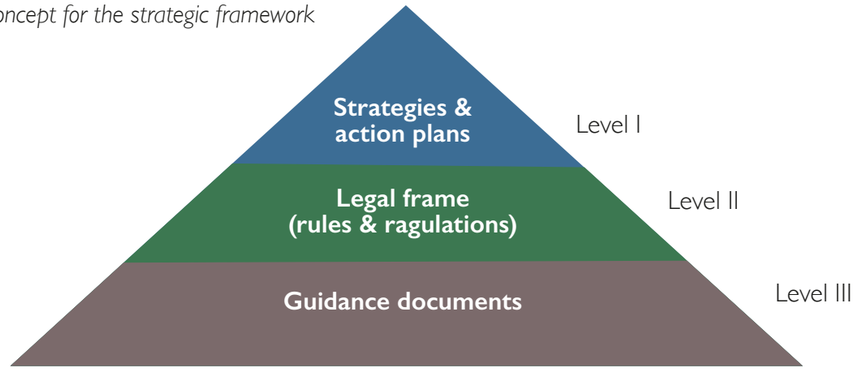


Figure 3. Steps and activities for developing and implementing the strategic framework document

At the top of the pyramid are higher-level strategic documents (e.g. local-level strategies, action plans, roadmaps) that provide clear direction (goals, targets and actions) for the sustainable use of plastics (level I). The more explicit a higher-level strategic document is in addressing the defined problems and setting goals and targets, the easier it is to find appropriate measures, develop relevant rules and guidance documents, monitor their implementation, and finally succeed in the sustainable use of plastics.

Higher-level strategic documents usually lead to the adoption of legal rules and regulations (level II) that provide already more specific requirements and duties for the prevention and reduction of plastic waste (e.g. local waste management rules, banning the use of certain plastic products, rules for organising environmentally friendly public events, packaging waste collection requirements).

At the bottom of the pyramid are various operational guidelines (level III) that provide instructions and recommendations for different target groups (e.g., event organisers, procurers, municipal employees, and residents) on preventing and reducing plastic waste. In general, the guidelines are necessary to harmonise the implementation of planned activities, raise awareness and enhance understanding of the importance of plastic waste prevention and reduction.

The step-by-step guidance is structured according to the four key steps of developing above-mentioned strategic documents in the municipality (Figure 3).

The lessons and knowledge gained during the pilots are presented in the guidelines as challenges and recommendations at the end of each step. The full description of the Strategic Solution is provided in Annex.

2.1.2 Piloting the Strategic Framework Solution

In the following sub-chapter, an overview of the piloted strategic documents is given. The pilots aimed to test the above-described strategic framework solution.

LIST OF PILOTS

The following strategic framework documents were developed in the BALTIPLAST project:

Table 1. Strategic Documents developed as part of the BALTIPLAST project

Municipality	Name of the document	Level of the strategic document (I, II, III)	Approval date
Helsinki (FI)	Litter control action plan 2.0	I	December 2025 (planned)
	Roadmap for sustainable plastic usage in city operations	III	June 2025
Tallinn (EE)	Circular economy development plan 2035	I	June 2025
Daugavpils (LV)	Latgale regional waste management plan	I	31 July 2024
	Guidelines on avoiding SUP at municipality events and public events	III	Not approved by official procedure
Valmiera (LV)	Guidelines for Sustainable Use of Plastic in Valmiera Municipality	III	June 2025 (planned)
	Guidelines for Organizing Green Events in Valmiera Municipality	III	June 2025 (planned)
Kaunas (LT)	Recommendations on the use of single-use plastics in Kaunas city	III	20 November 2024

**See the description of levels in section 2.1.1.*

RESULTS & LESSONS LEARNED

Helsinki

Helsinki piloted the development of the **Roadmap to Sustainable Plastic Usage in City Operations** and the updating of the Litter Control Action Plan 2.0 (LCAP 2.0). Helsinki has multiple programmes and guidelines that mention plastics or circular economy, but until now, no document focused comprehensively on plastics. The roadmap includes guidelines and recommended actions for sustainable plastic use, from procurement to waste management. The binding actions of the roadmap are incorporated into the city`s action plan for circular economy and LCAP 2.0.

The roadmap, an initiative of the BALTIPLAST project, was developed with the project resources. The development of LCAP 2.0 is financially supported by the city council. There is a person working full-time with the LCAP and its implementation, which speeds up the updating of the document as well.

Strong support from the stakeholders, the interest of target groups, political interest and engagement of the city departments have been the key success factors for the roadmap and LCAP development. Also, the responsible team for LCAP 2.0 is eager to focus on plastics and include measures that consider the learnings from the BALTIPLAST project. Developing a completely new strategic document takes more time and resources than updating an existing one. In the latter case, especially if the working group is largely the same as it was for the initial document, and the background and current situation are familiar, the process can be relatively quick.

Tallinn

Tallinn piloted the elaboration of the **Circular Economy Development Plan 2035,** a framework document for circular products and services, among other areas. With the circular economy development plan, Tallinn wants to prioritize production and consumption that involves reusing, repairing and sharing. In compiling the action programme for circular products and services, Tallinn analysed what measures the city can implement to prevent and reduce the use of single-use plastic products and packaging at public events, tourism, circular businesses, and public procurement.

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 plastic waste in the city facilitated the development of a specific action programme for circular products and services. The possibility of hiring a new person also helped the document development process.

The challenges were more related to the content than to the document's development process. The strategic document's format restricts the detailed coverage of plastic waste and the setting of corresponding indicators. Tallinn and other local governments in Estonia have the legal right to introduce local regulations that ban single-use plastic cups and cutlery, for example, at public events. However, in many other areas, such as takeaway food and drinks, only the national level can promote reusable packaging.

Daugavpils

Daugavpils helped develop the **Latgale Regional Waste Management Plan 2024–2030.** The document sets strategic objectives, targets and measures to tackle waste management challenges, including the challenges of plastic waste. The process of the development of the waste management plan can be considered successful. It went as planned, involving all the possible stakeholders, including citizens. The positive lessons are the environmental report, the survey among waste operators and citizens, and holding hybrid public consultations (both meetings online and at the premises). Sub-contracting the company that organised the process was also a success that ensured the quality of the document.

One of the challenges was incorporating aspects that are not mandatory by law into the plan. Considering that many municipalities were involved, with different budgets, there were numerous discussions about the necessity and benefits of every measure.

The limited budgets of municipalities led to most of the activities included in the plan being statutory. For this reason, plastic waste was addressed together with other types of waste. In addition, Daugavpils compiled informal **guidelines for municipality employees on avoiding SUP at municipality events and public events.**

Valmiera

Valmiera developed **Guidelines for Sustainable Use of Plastic in Valmiera Municipality** and **Guidelines for Organising Green Events in Valmiera Municipality.** The latter includes reducing single-use plastics as one of the key environmental themes relevant to events.

The BALTIPLAST project provided a good framework and motivation for developing the guidelines. A key indirect driving force was management's overall understanding of the need and support for improving the municipality's environmental management. The municipality's experience with piloting the cup deposit system at the city festival was crucial for the guidelines for environmentally friendly events. It is also important that all parties involved in organising events have a prior understanding of events' environmental impact and the need to reduce it.

Challenges include sufficient time to developing the document, as well as changing daily habits of using plastics which are closely tied to environmental awareness and the ease of changing the habits. The involved parties support improving daily practices within the

municipality's operations and organising environmentally friendly events, as long as these actions do not require significant additional investments in time, finances, or human resources. In the case of events, this means finding a solution where payment for the deposit system is balanced between service providers, caterers, and event attendees. In addition, market analysis, i.e. the availability of reusable cup providers, must be conducted when developing the guidelines.

In connection with the guidelines, Valmiera is planning training sessions for municipal representatives and staff involved in event organisation. These trainings will focus on environmental sustainability, explain the actions described in the guidelines and thus support the acceptance and implementation of the guidelines in practice.

Kaunas

Kaunas prepared the **Recommendations on the Use of Single-use Plastics in Kaunas City** (for the city organisation, inhabitants, event organisers, catering establishments, etc.) to reduce plastic pollution and promote sustainable consumption habits. The recommendations were based on the BALTIPLAST project information and the results of waste inventory conducted in the city organisation divisions and municipal schools. The city informs event organisers about the recommendations when issuing the public event permits.

Strong interest in reducing SUP and support from municipality employees and schools have been key success factors in developing the recommendations. Close collaboration between divisions was a positive lesson as well. However, the preparation

of the recommendations took more time than planned due to the employees' busyness. It is also important to periodically educate and remind the target groups about the health and environmental impacts of single-use plastics.

Table 2. Success factors and challenges in the implementation of the Strategic Framework Solution

City	Focus Areas	Success Factors	Challenges	Follow-up Actions
Helsinki	Procurement, waste management, plastics in city operations	Strong stakeholder and political support, dedicated staff for LCAP	Creating new strategic documents requires more time/resources	Roadmap incorporated into city circular economy action plan and LCAP
Tallinn	Reuse, repair, sharing economy, public events, procurement	Local government leadership support, ability to hire new staff	Strategic format limits plastic-specific detail and indicator setting	Municipal rights allow local bans on SUP at events; national law needed for broader impact
Daugavpils	Plastic and general waste management	Inclusive stakeholder engagement, hybrid consultations, out-sourced facilitation	Budget constraints limited ambition; mostly statutory measures included	Informal SUP guidelines for municipal and public events
Valmiera	SUP reduction at events and in municipal offices	Management support, event-based experience (e.g. deposit system at city festival)	Limited time and habit change, need for cost-balanced systems	Planned staff training to support implementation and uptake
Kaunas	Reducing plastic in public events, schools, catering	Staff and school support, internal collaboration	Delays due to staff workload, need for ongoing awareness-raising	City shares recommendations when issuing event permits

2.1.3 Evaluation/Assessment of the Strategic Framework Solution

Assessment of feasibility, social acceptability and replicability

The summary of the assessment of feasibility, social acceptability and replicability of the strategic framework solution is presented below based on the pilots in five municipalities..

Table 3. Assessment of the Strategic Framework Solution implementation

	Helsinki (FI)	Tallinn (EE)	Daugavpils (LV)	Valmiera (LV)	Kaunas (LT)	Evaluation score*
Feasibility legal technical financial	All partner municipalities estimated that the development of a strategic document requires high amount of human resources. This is typical for developing a strategic and legal document on the municipality level. The financial resource needs vary from low to high depending on the level and scope of the strategic document (i.e. the complexity and procedure of the document development). There are no legal or technical obstacles that hinder the development of such documents. However, the legal system can be different in the partner countries. Therefore, in some countries, the national regulation allows local authorities to regulate the use of SUP and promote reuse, while in other countries, it is regulated on the national level.					2
Social acceptability	Yes, the general support from different stakeholders exists. Very relevant is the support from the political decision-makers.	Yes, the general support from different stakeholders, including political decision-makers exists. The stakeholder consultations showed the interest and need for the reduction of single-use plastics.	Yes, the municipalities and other stakeholders supported the strategic document.	The municipality's administration supports, however the implementation of guidelines requires wider engagement of stakeholders.	Yes, the stakeholders supported the documents.	2
Replicability	All partner municipalities consider that providing the strategic framework for plastic waste prevention and reduction is important and their experiences (relevant strategic documents) can be replicated in other BSR municipalities. However, local legal framework has to be taken into account when developing the strategic document.					2
Average score						**2**

**Is the solution legally, technically and financially feasible; is the solution socially acceptable; is the solution replicable in other BSR municipalities? 2 = yes, 1 = partially, 0 = no*

MAIN CONCLUSIONS

Key findings and need for fine-tuning
There is a clear need at the municipal level in the Baltic Sea Region to develop a **strategic and systematic approach** to reducing SUP and plastic packaging. This requires not only **step-by-step guidance,** but also the **active engagement of relevant stakeholders**, such as event organisers, municipal departments, and public institutions. The pilot activities demonstrated that key actors are supportive of having a clear **strategic and legal framework,** as it provides a practical basis for implementing plastic reduction measures.

While no legal or technical obstacles were identified that would prevent municipalities from developing such strategic documents, **national legal frameworks must be taken into account**. In some countries, local authorities have the legal competence to regulate SUP use, while in others, such regulation is reserved for the national level.

The piloting also confirmed that the proposed **strategic document hierarchy** provides a useful starting point for municipalities to assess existing plans and, where needed, **develop or update their strategies.** In many cases, **updating existing documents** proved more efficient than drafting new ones from scratch, particularly when the same working groups were involved. However, **time and resource limitations** remain a challenge, underscoring the importance of **institutional coordination, clear mandates,** and support for implementation at the local level.

Evaluation conclusion
Taking into account the key findings, pilots' experience, and evaluation summary, it can be concluded that the strategic framework solution, consisting of the explanation and step-by-step guidance, illustrated with lessons learned from the pilots and existing example documents, can be considered a feasible and replicable solution in other BSR countries.

IMPACT HIGHLIGHTS

8

Strategic documents were developed in 5 cities within the Baltic Sea Region (BSR).

First time municipalities had dedicated documents focusing comprehensively on plastic reduction.

The BALTIPLAST Strategic Framework Solution Led to new municipal hires dedicated to plastic reduction and waste management.

These documents focus on strategic areas such as Litter control, Single Use plastic reduction, and Green Events Adoption

Sparked a shift in municipalities' environmental strategies, integrating plastics more centrally.

Fostered stronger collaboration between city departments and environmental units.

2.2 Technical and Technological Solution: Decision making framework for optimizing post-consumer plastic sorting and advancing recycling process

2.2.1 Short description of the solution

Aim and target groups

This solution aims to speed up the introduction of high-grade recyclable plastic waste back into the circular economy. The solution catalyses enhancement of the system for separately collected plastic waste and plastic waste sorting capacities by applying up-to-date technological advancements. Introduction of innovative techniques for identification of polymer type is crucial to ensure higher levels of recyclability in the plastic waste management chain. The solution comprises a set of measures to be utilised by **local governments** along with **waste collection operators** for the successful management of municipal plastic waste streams.

Description of the solution

Most of the existing municipal systems do not support sufficient volumes and quality for collecting and sorting of plastic waste, thus, enhancement of the systems for separately collected plastic waste and sorting capacities are urgent. In the EU approximately 46% of post-consumer plastics are recycled3, however percentages significantly differ among the countries. The European Commission for Packaging and Packaging Waste Directive sets a 55% recycling target for plastic packaging waste by 2030. The solution targets enhanced collection and sorting of post-consumer municipal waste with the aim to achieve higher rates of plastic that goes into recycling.

The solution comprises the following stages and measures:

Stage 1. Assessment and planning

- Evaluate existing plastic waste collection and sorting system at the municipality
- Identify gaps and required enhancements in plastic waste sorting capacities

Stage 2. Testing

- Implement the utilization of NIR spectroscopy tool in the selected municipal systems/entities
- Identify the composition of plastic waste by classifying plastic waste items according to the polymer type (PET, HDPE, LDPE, PP, PS, etc.) and collect data
- Conduct comparative analysis of visual sorting and NIR spectroscopy methods to assess improvements in sorting accuracy.

Stage 3. Scaling and optimization

- Expand implementation to broader municipal systems/entities
- Optimize the processes based on performance data collected
- Promote active collaboration between municipalities, waste management operators, and SMEs to drive further innovations in post-consumer plastic waste recycling.

The full description of the solution is presented in the Annexes.

2.2.2 Piloting the Technical and Technological Solution

LIST OF PILOTS

The piloting of the Technical & Technological Solution was performed in three municipalities of the Baltic States, namely **Daugavpils, Kaunas** and **Tallinn**, which differ in population size. The population ranged from approximately 78,900 (2023) in Daugavpils to nearly 319,800 (2023) in Kaunas and more than 447,000 (2023) in Tallinn.

- **Kaunas (LT) –** the activities took place at the facility of waste management operator JSC ‚Kauno švara' and entailed sorting of plastic packaging waste from multi-family and single-family households.
- **Daugavpils (LV) –** the activities were performed at waste management site ‚Ciniši' and entailed plastic waste sorting from public collection points.
- **Tallinn (EE) –** the activities took place at Circular Economy Centre and entailed sorting of plastic packaging waste from multi-family and single-family households.

The piloting activities were carried out in close cooperation between project partners as well as representatives of municipalities and waste management operators.

3 The Circular Economy for Plastics – A European Analysis, Plastics Europe, 2022 Framework Solution

RESULTS & LESSONS LEARNED

In the following paragraphs we present the main results and lessons learned by each of the solution phases, highlighting the experiences of piloting municipalities.

STAGE 1. ASSESSMENT AND PLANNING

Municipal waste collection systems were evaluated according to the amounts and quality of waste, service level and flexibility. In all three municipalities, residents have access to post-consumer waste collection services. Kaunas and Tallinn offer 'door-to-door' separate post-consumer waste collection for single-family households through municipality owned/ contracted companies. In contrast, Daugavpils lacks a 'door-to-door' collection system for post-consumer waste, meaning that such waste is excluded from its organized waste transport system. For multi-family houses, separate post-consumer waste collection is organized collectively for several buildings.
The evaluation results showed that separately collected post-consumer waste collection system could ensure higher amounts and better quality of plastic waste in comparison to waste collected from mixed municipal solid waste (MSW) stream. This implies that separately collected post-consumer plastic waste collection provide prerequisites for the enhancement of polymer type identification and increase in plastic waste recycling rates.

STAGE 2. TESTING

The proposed technical solution involved near-infrared (NIR) spectroscopy-based technology for plastic sorting. Advantages and limitations of this method against other primary spectroscopy methods were analysed. The analysis revealed that NIR spectroscopy method is the most effective for a rapid identification and sorting of plastic waste in small- and large-scale recycling plants. Summarising the choice, the TrinamiX device was applied for piloting activities. The cloud-based device offered practically unlimited power for classification of plastics. This hand-held device provided real-time identification of plastic materials (polymer type) with possible applicability for flexible and mobile solutions. The protocol for analysing of post-consumer plastic waste samples was developed.

A two-step procedure was used for waste characterization. In the first step, post-consumer plastic waste was separated from the other categories of waste (paper, cardboard, metal and other). In the second step, the post-consumer plastic waste was sorted according to the labelling on the plastic item vs. sorting based on identification of polymer type by NIR spectroscopy method. The items that could not be identified in terms of polymer type were assigned to the 'non-identified' category. The 'multilayer packaging' category was also determined separately.

The use of near-infrared (NIR) spectroscopy tool significantly improved polymer type identification, reducing the percentage of unidentified plastics in comparison to visual recognition method. At the same time it offered possibilities for identification of not only traditional (fossil fuel based) plastics, but also bio-based plastics. It should be noted that plastic waste contamination limits polymer type identification and further steps in the plastic recycling chain.

STAGE 3. SCALING AND OPTIMIZATION

Integrating plastic waste management into broader municipal systems involved aligning plastic waste management practices with municipal waste management policies, infrastructure, and community engagement strategies. A key priority in this phase was establishment of procedures that enabled seamless adoption across municipality. This included the procurement and deployment of NIR devices in sorting centres, training personnel, and ensuring data-driven process refinement. To maximize efficiency, this phase also emphasized performance monitoring and continuous optimization. Data gathered from previous phases provided valuable insights into the effectiveness of plastic waste sorting mechanisms, guiding improvements in collection routes, waste categorization protocols, and contamination reduction strategies. Beyond technical optimization, this phase incorporated active collaboration among key stakeholders, including municipal authorities, waste management operators, recycling facilities, and small and medium enterprises (SMEs). By following this decision-making framework, the municipal administrations and waste management operators have driven higher recycling efficiency, improved waste sorting accuracy, and established a scalable model for sustainable plastic waste management across piloted municipalities.

As part of the lessons learned, relevant success factors and challenges in implementing the Technical and Technological Solution have been identified

Table 4 shows the success factors and challenges in implementing the Technical and Technological Solution as part of the lessons learned.

City	Success Factors	Challenges	Follow-up Actions
Kaunas	Strong stakeholder and political support	Operational and logistical inefficiencies.	Synchronize collection and sorting schedules.
		Data collection and quality.	Build a comprehensive dataset of scanned items with polymer types and contextual metadata.
		Collaboration and stakeholder coordination.	Promote community engagement and educational campaigns.
Daugavpils	Local government leadership support	Insufficient spatial coverage.	Expand collection points and modes.
		Data collection and quality.	Analyse trends in contamination and sorting accuracy by item type and condition.
		Collaboration and stakeholder coordination.	Create regional forums, working groups.
Tallinn	Inclusive stakeholder engagement	Institutional coordination weaknesses.	Clarify roles among municipality and waste management operators/ private partners.
		Comparative performance evaluation.	Cross-validate sorting accuracy to quantify NIR benefits and identify key performance differences.
		Collaboration and stakeholder coordination.	Partnerships for knowledge exchange and co-development.

2.2.3 Evaluation/Assessment of the Technical and Technological Solution

Assessment of feasibility, social acceptability and replicabilitys

The following presents a summary of the feasibility, social acceptability, and replicability assessment of the technical/technological solution based on pilots in three municipalities.

Table 5. Assessment of the Technical & Technological Solution implementation

	Kaunas (LT)	Daugavpils (LV)	Tallinn (EE)	Evaluation score*
Feasibility legal technical financial	The representatives from all three municipalities agreed that piloting activities didn't face legal restrictions. At the same time, it was pointed out that on the national level there are no regulations or guidelines for municipalities to promote technical/technological solutions for plastic waste sorting. Also, associations of municipalities have no capacities to support local governments in this undertaking. The piloting activities didn't face any technical constraints, since all procedures described in the TrinamiX manual were followed. If needed, the information is accessible via https://TrinamiXsensing.com/plasticsorting, or by individual consultations with TrinamiX technical staff. Purchase/licensing price of the TrinamiX tool was reasonable, thus, acceptable for municipalities. The representatives from LT noted that acquisition of TrinamiX tool (Germany) in LT meets restrictions of public procurement procedures. In LT, the national electronic public procurement system operates only in Lithuanian language. This is a limiting factor for foreign companies offer products and services on LT market.			2
Social acceptability	Management staffs at the municipalities and waste management companies understood benefits of the TrinamiX tool for plastic waste sorting. The technical/technological piloting activities have catalysed a transfer of advanced recycling technologies to the targeted municipalities. Transnational cooperation among the targeted municipalities has assisted in a better understanding of local conditions and identifying challenges to be solved. It also contributed to the improvement of communication between municipalities and waste management operators.			2
Replicability	All partner municipalities consider that technical/technological solution for plastic waste identification and sorting is well suited for flexible and mobile applications and can be replicated to other BSR municipalities. Equipped with TrinamiX' mobile NIR spectroscopy tool, the waste management operators are empowered to perform detailed on-the-spot analyses of diverse solids, e. g. to identify different types of plastics (polymers). However, regulations/guidelines for municipalities to promote technical/technological solutions for plastic waste handling are required.			2
Average score				**2**

**Is the solution legally, technically and financially feasible; is the solution socially acceptable; is the solution replicable in other BSR municipalities? 2 = yes, 1 = partially, 0 = no*

MAIN CONCLUSIONS

Key findings and need for fine-tuning
Improved and harmonized systems for **separately collecting packaging waste** are essential for enhancing **polymer type identification** and increasing **plastic waste recycling rates.** The pilot results confirmed that **separately collected post-consumer plastic waste** offers significantly better quality and quantity compared to material retrieved from mixed municipal solid waste streams.

The use of **near-infrared (NIR) spectroscopy,** as piloted with the TrinamiX tool, markedly improved the identification of plastic polymer types compared to visual sorting methods. This technological solution showed strong potential for **flexible and mobile applications** and was well accepted by municipal and waste management staff. However, a considerable portion of the collected plastic waste was found to be **contaminated, deformed, or damaged,** complicating or preventing accurate identification.

This underscores the need to develop **a standardized protocol and techniques for assessing contamination levels** in municipal plastic waste. Such protocols would support municipalities in improving pre-sorting practices and adapting infrastructure for better recycling outcomes.

Finally, **municipal administrations and waste operators should build stronger partnerships** with **innovative public and private sector actors**, particularly those working on post-consumer plastic recycling technologies and the development of value-added products. This collaboration will be critical in transitioning to a more **circular and efficient plastic waste management system** across the BSR.

Evaluation conclusion
Considering the experience of the pilots and evaluation summary, it can be concluded that the technical/technological solution could be adapted to the local conditions and replicated to wide range of municipalities in the Baltic Sea Region countries.

2.2.4 Environmental Impact Assessment of the Technical and Technological Solution

To conduct the Environmental Impact Assessment (EIA) for the technical and technological solution in the cities of Kaunas, Daugavpils and Tallinn multiple data streams were utilized.
Initially, data from Stage 1 and Stage 2 provided the following organizational information, including:

- Organizational details (contacts, number of employees, etc.)
- Types of plastic involved
- Measured plastic quantities

Subsequently, additional data on current waste management practices in these municipalities were collected. This included:

- Annual waste generation,
- End-of-life (EoL) treatment methods, and
- Transportation details.

The data from these stages was then extrapolated to enhance the assessment.

The evaluation examined the current waste management systems for both mixed waste and separately collected plastic waste. In addition to the baseline, alternative scenarios were included to assess their carbon footprints, considering both end-of-life (EoL) treatment options and the use of secondary raw materials in plastic production, alongside higher recycling rates.

Scenarios for Mixed Plastic Waste:
- Scenario 1: Focuses on recycling plastic types that are typically recyclable, including HDPE, LDPE, PP, PVC, PET, and ABS.
- Scenario 2: Builds on Scenario 1 by integrating recycling with the use of 80% secondary (recycled) plastics in plastic production.

Scenario for Separately Collected Plastic Waste:
- TrinamiX Scenario:

Based on the sorting results from **NIR spectroscopy technology (TrinamiX tool)**, this scenario reflects the actual recycling potential identified during piloting and assumes the **use of 80% recycled plastics** in new plastic production.

Figure 4 presents a comparison of the carbon footprint, measured in tons of CO_2-equivalent per ton of plastic waste, for the current situation and alternative scenarios in Kaunas, Daugavpils and Tallinn.

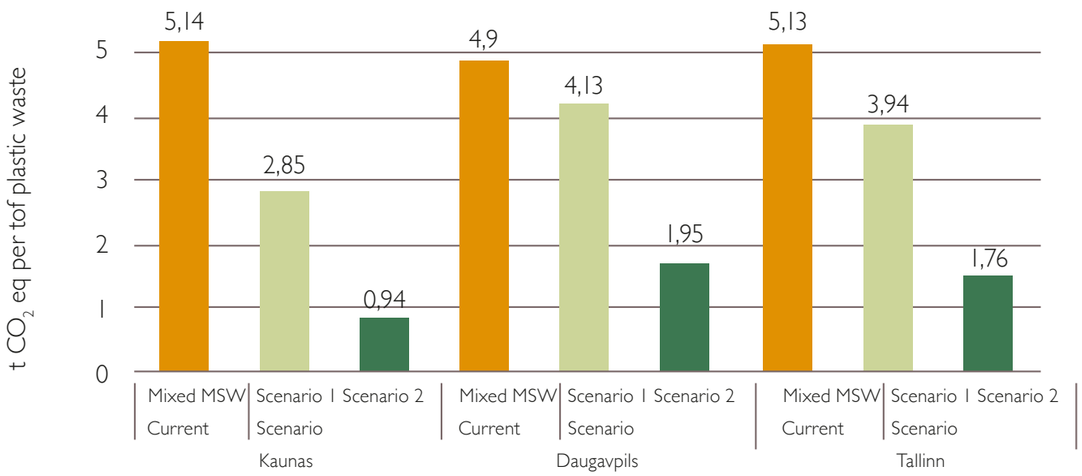


Figure 4. Comparative assessment of different plastic management scenarios from MSW streams in the pilot municipalities

In Kaunas, the current mixed municipal solid waste (MSW) scenario had the highest carbon footprint at 5.14t CO_2-eq, while Scenario 1 reduces emissions to 2.85t CO_2-eq. The lowest footprint is observed in Scenario 2, with 0.94t CO_2-eq.

In Daugavpils, the current mixed MSW scenario results in 4.90t CO_2-eq, and the TrinamiX tool, which was also applied, led to a slightly higher footprint of 5.01t CO_2-eq. Meanwhile, Scenario 1 reduced emissions to 4.13t CO_2-eq, and Scenario 2 significantly lowered them further to 1.95t CO_2-eq.

In Tallinn, the current mixed MSW scenario has a footprint of 5.13t CO_2-eq, while Scenario 1 reduces it to 3.94t CO_2-eq, and Scenario 2 achieves the lowest footprint at 1.76t CO_2-eq.

The results indicate that the current mixed MSW management systems in all three cities have the highest carbon footprints. Both Scenario 1 and Scenario 2 lead to substantial reductions in emissions, with **Scenario 2** consistently achieving the **lowest carbon footprint across all locations.** This is due to the **increased recycling rate** (resource recovery) and **the use of secondary materials** in the production stage in these alternative scenarios. Notably, in Daugavpils, the application of the TrinamiX tool did not result in a reduction in emissions, as its footprint was slightly higher than the current mixed MSW scenario. This contrasts with Kaunas and Tallinn, where alternative scenarios showed clear reductions in emissions.

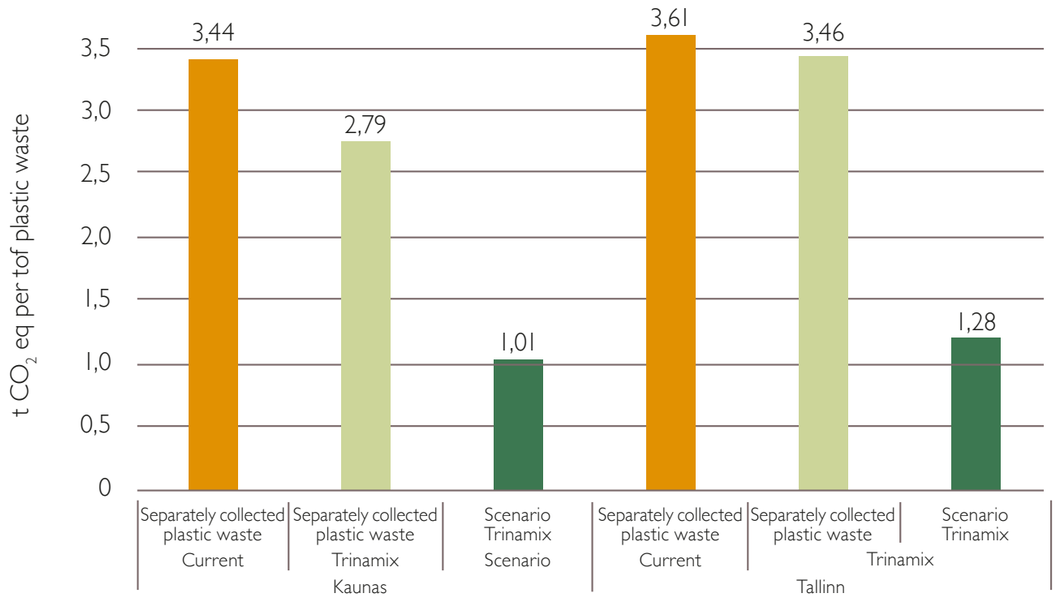


Figure 5. Comparative assessment of separately collected plastic waste in the pilot municipalities

Figure 5 compares the carbon footprint, measured in tons of CO_2-equivalent per ton of separately collected plastic waste, for the current situation and different waste management scenarios in Kaunas and Tallinn. In the current system, plastic waste sorting (composition) was determined based on labelling, whereas with the TrinamiX tool, the device was used to enhance the accuracy and efficiency of the sorting process.

In Kaunas, the current separately collected plastic waste scenario results in a carbon footprint of 3.44t CO_2-eq, while **the application of the TrinamiX tool,** which increases the sorting rate for separately collected plastic waste, **reduces carbon footprint** to 2.79t CO_2-eq. The Scenario TrinamiX achieves the lowest footprint at 1.01t CO_2-eq. In Tallinn, the current situation for separately collected plastic waste has a footprint of 3.61t CO_2-eq. With enhanced sorting using the TrinamiX tool, the footprint is reduced to 3.46t CO_2-eq, while the TrinamiX Scenario achieves the lowest footprint at 1.28t CO_2-eq.

To express the results in an alternative way, **marginal prevention costs** were also calculated, i.e. the amount of investment needed to prevent the calculated CO_2 emissions. The table presents the marginal prevention costs of CO_2 emissions (in EUR per tonne) **for different waste management approaches** across three cities – Kaunas, Daugavpils, and Tallinn – focusing on two waste categories: mixed municipal solid waste (MSW) and separately collected plastic. It compares the current situation with the use of the TrinamiX tool and three scenarios: Scenario 1, Scenario 2, and Scenario TrinamiX.

Table 6. Marginal prevention costs of CO_2 emissions from technical and technological solution (EUR/tonne)

City	Category	Current situation	TrinamiX tool	Scenario 1	Scenario 2	Scenario TrinamiX
Kaunas	Mixed MSW	683.36		378.98	125.38	
	Separately collected plastic	457.82	370.83			134.46
Daugavpils	Mixed MSW	651.92	666.08	549.07	259.18	
Tallinn	Mixed MSW	682.80		524.39	233.79	
	Separately collected plastic	479.65	460.21			170.05

Increased sorting reduces CO_2 emissions costs by 82% in Kaunas and 66% in Tallinn for mixed MSW, while separately collected plastic shows cost reductions of 65–71% with Scenario 2. These results highlight the significant **environmental and economic benefits** of enhanced waste sorting systems.

Conducting the EIA for the technical and technological solution presented several challenges. These included issues with data availability, quality, and consistency across regions, as well as difficulties in harmonizing cross-border methodologies and emission factors due to differing national regulations. The variability in technological implementation and the reliance on scenario-based assumptions introduced additional uncertainties.

IMPACT HIGHLIGHTS

Technical and Technological solution of BALTIPLAST demonstrated significant reductions in both carbon footprint and CO_2 prevention costs for **mixed municipal solid waste (MSW)** and **separately collected plastic waste** through enhanced sorting and recycling.

82%

In Kaunas, **82%** reduction in carbon footprint for **MSW** (from **5.14 to 0.94 t CO_2-eq/ton)** and **71%** reduction for **separately collected plastics** (from **3.44** to **1.01 t CO_2-eq/ton).**

Marginal prevention costs dropped for MSW from **€ 683.36** to **€ 125.38/ton** and for separately collected plastics from **€ 457.82** to **€ 134.46/ton.**

66%

In Tallinn, **66%** reduction in carbon footprint for **MSW** (from **5.13** to **1.76 t CO_2-eq/ton)** and **65%** reduction for **separately collected plastics** (from **3.61** to **1.28 t CO_2-eq/ton).**

Marginal prevention costs dropped for MSW from **€ 682.80** to **€ 233.79/ton** and for separately collected plastics from **€ 479.65** to **€ 170.05/ton.**

60%

In Daugavpils **60%** reduction in carbon footprint for **MSW** (from **4.90** to **1.95 t CO_2-eq/ton).** No separate collection of plastics currently implemented.

Marginal prevention costs fell from **€ 651.92** to **€ 259.18/ton.**

The decrease in the **Mixed Municipal Solid Waste (MSW)** carbon footprint is due to the increased recycling rate (resource recovery) and the use of secondary materials, enabled by the TrinamiX tool – an innovative device implemented by BALTIPLAST to enhance the accuracy and efficiency of the sorting process.

2.3 Soft Solution for Organisations: Single-use plastic reduction at public entities and companies

2.3.1 Short description of the solution

Aim and target groupss

One solution to the plastic issue is to implement soft measures at an organisation, as done in the BALTIPLAST pilots with municipal administrations, schools, events, and with businesses, who are the target users of this solution. Soft measures involve low-effort, low-investment actions. Our solution includes an inventory of plastic usage to identify where large amounts of plastic are used and where waste arises, enabling targeted reductions.

Description of the solution

The inventory process involves identifying plastic usage and waste, setting reduction goals, implement reductions and reassessing after a period to measure success. We use the "Plastic inventory tool" 4 (hereafter also referred to as "the tool") to measure consumption, identify potential reduction, and track progress. It is a simple excel-based list with pre-defined plastic items that the organisation potentially is using in its daily operations and options for adding additional items. The organisation weighs each plastic item in use over a self-defined timespan and enters it to this excel list. At the end a "pile" of plastic items is listed, it sums up in kilograms and can be sorted by types of plastics in use.

This tool is adapted for businesses, schools, and municipalities by giving particular examples of plastic items relevant to them, for example, a school that might use plastic stationary for kids but also food packaging at the canteen. It also includes an environmental assessment feature.

Data collected provides insights into:

- **Types of potential reduction measures:** Identifying common sources of plastic consumption per stakeholder group.
- **Application by stakeholder groups:** Suggesting effective and feasible soft measures for each stakeholder type.

The compiled data allows for general recommendations on reducing plastic consumption based on stakeholder type. The steps of the inventory process are:

1. Measuring plastic consumption: Allows users to input and calculate plastic use by weight
2. Identify sources: Identify main sources of plastic
3. Implement identified measures: Define reduction measures and commit to reducing consumption.
4. Measure reduction: Enter reductions into the tool to get clear figures on relative and absolute savings.

The BALTIPLAST pilots have been adapted to different municipalities, target groups, and operations, providing a range of experiences to understand success factors and the challenges faced.

The full and detailed description of the solution can be found as Annex to this document.

2.3.2 Piloting the Soft Solution for Organisations

The soft solution for organisations has been piloted at several entities in seven municipalities in the project countries, listed in the table below.

The piloting process has been carried out in slightly different ways and adopted to the piloting municipalities, target group and business in question. Pilots have been accomplished by different supporting measures.

[4] The complete tool can be found here: https://interreg-baltic.eu/wp-content/uploads/2025/02/VersionJan24-Inventory-Tool-Businesses_EN.xlsx

LIST OF PILOTS

The following pilots were conducted as part of the BALTIPLAST project:

Table 7. List of the pilots of the Soft Solution

Municipality	Businesses	Municipal entities	Green events	Schools
Tallinn (EE)	5 offices (Põhjala, Factory – creative hub, Swedbank – bank, Elron – public transport, Tallinn Music Week – event, Alexela – energy provider)	n/a	Sporting event – LHV, Women's Run	3 schools (Rocca al Mare School, Laagna, Gymnasium, Ääsmäe, Primary School)
Kaunas (LT)	7 offices (KRDA – regional development, Kauno RATC – waste management, Nivela – catering, Vesta Consulting, Kauno Svara – waste management, Vilterus – decoration, Baltijos Vartimai – translation, KTU – education)	3 divisions (Investment and Project Division, Environment Protection Division, Transport and Traffic Management division)	n/a	2 schools (Kaunas St. Casimir Progymnasium, Kaunas Martynas Mazvydas Progymnasium)
Västerås (SE)	n/a	Unit of research and school development	Västerås City Festival	3 schools (Apalby elementary school, Hamre elementary school, Mälarpark elementary school)
Valmiera (LV)	n/a	Administration Building	Valmiera City Festival	1 school (Valmiera Design and Arts Secondary School)
Daugavpils (LV)	4 offices (Ddzksu – housing, Satiksme – public transport, Siltumtikli – heat management, Udens – water management)	3 departments (Development Department Educational Department, Urban Planning Department)	n/a	2 schools (Daugavpils Zinatnu Secondary School, Daugavpils Vienibas Elementary School)
Hamburg – Bergedorf (DE)	n/a	n/a	n/a	3 schools (GS Leuschnerstrasse, STS Bergedorf, STS Lohbrügge)
Utena (LT)	2 offices (Utenos komunalininkas – utilities, Utenos vandenys – water management)	n/a	Biliakiemis Herbal Festival	n/a

RESULTS & LESSONS LEARNED

In the following paragraphs, the main results and lessons learned from the implementation of this solution are provided by type of organisation (businesses, municipal entities, green events and schools), highlighting the experiences of pilots in the partner municipalities. In this report, we present the 10 best examples.

BUSINESSES

Tallinn

In Tallinn, businesses from different industries conducted a **three-week waste collection and weighing process,** supported by university students who helped gather and record data. The plastic inventory highlighted **common sources of plastic waste,** such as single-use packaging from food and beverages, office supplies, and promotional materials.

Key actions and results:

- **Improving waste sorting systems,** with clearer separation of plastic waste streams.
- **Engaging employees through awareness sessions** and simple waste reduction measures.
- **Hosting webinars,** focusing on correct waste disposal and the environmental risks of plastics.

Challenges:
A challenge was choosing the plastic reduction measures. In large organisations, discussions and reaching agreements take time. However, businesses found the tool useful and expressed interest in **continuing waste tracking** beyond the pilot.

Kaunas

Businesses in Kaunas applied **two different approaches:** direct **waste collection and weighing,** and **tracking plastic purchases through procurement records.** Some companies involved employees in **individual plastic use monitoring,** increasing awareness of daily habits.

Key actions and results:

- **A 53% reduction in plastic waste** at Kaunas Regional Development Agency by avoiding unnecessary plastic use.
- **A 40% reduction** at Kaunas Regional Waste Management Center, mainly by replacing single-use food packaging with reusable alternatives.
- Supplier engagement, where businesses negotiated the return of plastic packaging to distributors.

Challenges:
Recruiting businesses for the pilot was challenging, as participation was mainly secured through personal connections. However, **businesses valued the opportunity to measure and actively reduce plastic waste.**

Utena

In Utena, the plastic inventory was conducted with **utility and water management companies,** emphasizing **procurement analysis** and waste tracking. The businesses worked with suppliers to **minimize packaging waste** and **switch to reusable materials where possible.**

Key actions and results:

- **22% plastic waste reduction** at Utena Water Company, through office supply changes and reusable kitchen materials.
- **15% reduction** at Utena Communal Services, with significant cuts in food-related plastic waste.
- **Establishment of supplier agreements** to reduce packaging waste and return used materials.

Challenges and achievements:
Businesses required additional guidance to complete the inventory effectively. However, once implemented, they found the tool **practical and replicable,** with long-term plans to maintain reduction strategies.

GREEN EVENTS AND MUNICIPAL ENTITIES

PLASTIC REDUCTION AT GREEN EVENTS:

Tallinn

The **LHV Women's Run** on 18th May 2024 took a significant step towards sustainability by implementing measures to reduce single-use plastics and promote waste management. The event gathered approximately 12,000 women and 2,000 children on site, with thousands of spectators. It provided a great opportunity to implement innovative measures for reducing plastic waste. The main issue identified was the widespread use of single-use plastics, the need for improved waste sorting among participants, and sponsors distributing single-use plastic bottled sports drinks.

Key actions and results:

- Comprehensive inventory was carried out, mapping single-use plastic materials used during the event. Based on the findings, a targeted action plan was developed and implemented.
- Bib sizes for the children's race were reduced by half, and the women's race bibs were downsized to minimize single-use plastic. Safety pins used for bibs were collected for reuse in future races.
- Four additional drinking water taps were installed to encourage the use of reusable bottles.
- 24,000 reusable cups were utilized, eliminating an equal amount of single-use plastic waste, along with the reduction of around 14,000 bibs.

One refreshment point provided water and sports drinks in reusable cups, significantly reducing waste. All food and drinks at the event venue were served in reusable tableware, with collection points placed around the site.

- Clearly labelled waste sorting bins for biowaste, plastic packaging, paper, and mixed waste were placed throughout the event.

Challenges and achievements:
Despite financial and human resource constraints, the event successfully implemented low-cost sustainability measures. The pilot demonstrated that sustainability initiatives can be integrated into major sporting events without significantly increasing costs. The model is replicable in other large-scale public events, particularly sports events, and serves as an inspiration for future green events in Estonia and beyond.

Valmiera

In Valmiera, Latvia, the **annual city festival** is a major event attracting around 50,000 visitors over four days. Within the BALTIPLAST project, the municipality aimed to reduce single-use plastic waste by introducing a deposit system for cups. The festival features numerous activities, concerts, and street food vendors, resulting in substantial waste, particularly single-use plastics.

Key actions and results:

- A communication campaign prior to the event to explain the deposit system, including a TV story, press releases, social media posts, and a short video shown during the event.
- Early discussions with caterers to ensure understanding and support.
- Massive direct educational communication to the visitors and the catering service providers by the company that offered the service of centralized deposit system for cups.
- During the festival, a live statistics activity engaged visitors with a questionnaire about the environment and the municipality's sustainability efforts. An outdoor exhibition provided information about plastics and the BALTIPLAST project.
- Impressive results: **29% reduction in waste** compared to the previous year. The event premises were much cleaner, with hardly any plastic cups littering the ground.

Challenges and achievements:

Key lessons learned included the importance of preparation, communication, and collaboration. Despite challenges, such as a few caterers circumventing the system, the overall experience was positive. The festival organisers demonstrated that it is possible to significantly reduce plastic waste and create a cleaner, more sustainable event, inspiring other municipalities to follow suit.

PLASTIC REDUCTION AT MUNICIPALITY ENTITIES – GOOD HOUSEKEEPING

Daugavpils

Three departments of Daugavpils municipality tested the BALTPLAST plastic reduction tool at their own premises. They saw this as an opportunity to lead by example in waste management and inspire their colleagues.

Key actions and results:

- Implementing the plastic inventory: Employees collected plastics for three weeks in spring 2024, then sorted, weighed, and recorded the data with help from project expert.
- During the summer, they developed a reduction plan and implemented it.
- The inventory was repeated in September, and the results were verified by BEF Latvia.
- Impressive results: Initially, they collected almost 2 kg of plastics, but after implementing reduction measures, this dropped to just **864 g** achieving a remarkable reduction of 56.8%. The largest type of waste was food packaging. The department became more conscious of their plastic use and made significant efforts to reduce it.

Challenges and achievements:

Challenges were minimal, with no major issues reported. Successes included the enthusiasm of key team members who drove the project forward and effective communication through reminder emails. The pilot proved to be a fantastic success, demonstrating feasibility and replicability. Financial resources were only needed for the reduction plan, and human resources were involved in data collection and analysis. This project truly showcased the power of teamwork and dedication in making a positive environmental impact.

Kaunas

The BALTIPLAST project in Kaunas brought together a group of environmental enthusiasts of the municipal administration to tackle plastic waste. Even the Transport and Traffic Management division, intrigued by the challenge, joined the project to see how they could reduce plastic pollution.

Key actions and results:

- The process started with the plastic inventory according to the BALTIPLAST guidelines. The inventory process was engaging and thorough. Employees collected and sorted plastic waste for two months, divided into two periods.
- They received training on the harms of plastic and brainstormed ways to reduce its use. The waste was categorized into administration, food and drinks, and sanitary items. Results were meticulously recorded and shared internally.
- Plastic waste significantly decreased between the two inventory periods:
  - Food and drink waste was the most common, while sanitary waste was minimal due to a cleaning contract.
  - The Transport division excelled by using fewer office supplies and decided to work mostly by computers.
  - The Environment Protection division rejected single-use food packaging, and the Transport division switched to reusable coffee cups.
- New guidelines for sustainable plastic use in Kaunas City as a result of the project.

Challenges and achievements:

Challenges were minimal, with some difficulty in identifying plastic types. Successes included strong employee interest and collaboration between divisions. The pilot proved feasible and replicable, with low financial resource constraints. Employees supported the pilot and provided valuable feedback. The divisions are committed to continuing their efforts beyond 2024, making a positive environmental impact.

SCHOOL FACILITIES AND PUPILS

Hamburg

The **primary school Leuschnerstrasse in Hamburg Bergedorf** participated in the BALTIPLAST project from the very beginning in May 2023. The school management and teachers became interested in further exploring the concept the project was offering – reducing plastic usage through awareness rising. Very soon, the project partners started working together with the school and organized several joint activities at the school.

Key actions and results:

- A series of school workshops were performed at different classes targeting the plastics issues
- The children were engaged to watch a film that highlighted the problems of plastic waste in the sea and how it harms animals and the environment.
- A "Sustainability Week" focusing on "Plastic in your daily life and how to avoid it" gathered 350 pupils.
- Field visits to the Bergedorf recycling centre were organised for school pupils to learn about what happens to waste after it is thrown away.
- After the opening week, the pupils (together with their teachers) conducted their own plastic inventory at the school and classrooms, using the "collecting sheets" produced by the BALTIPLAST project experts.
- Children were also engaged through hands-on events such as Sustainable Xmas Week and Easter Egg Hunt Week, engaging over 500 pupils where they also learned about the Sustainable Development Goals

Challenges:

Including the plastic inventory at school level proved more challenging than offering lectures, workshops and non-formal educational activities. The time factor was the most challenging as the existing school programme (curricula) is demanding and there is no flexibility to integrate such project topics into the teaching plan, nor time for non-compulsory activities.

Daugavpils

The Daugavpils Zinatnu Secondary School and the Vienibas Elementary School were invited to participate in testing the BALTIPLAST innovative inventory tool. Project experts prepared detailed materials to explain the process and benefits, which sparked interest among the schools. Teachers were eager to tackle topics like plastic pollution and polymers, aligning perfectly with their curriculum. The students implemented the plastic inventory and a self-defined reduction goal.

Key actions and results:

- Engaging presentations on plastic pollution, educational videos, and interactive workshops on sorting single-use plastics were performed.
- Students were introduced to the inventory tool and given a chance to practice using it
- Zinatnu Secondary School reduced their plastic waste by 78%,
- Vienibas Elementary School achieved a 68% reduction

Challenges and achievements:

No specific challenges were noted. Teachers played a crucial role in the success of the project. Their active involvement and motivation were key factors in getting the schools to participate. Overall, this pilot not only significantly reduced plastic waste but also educated and empowered students to make a positive environmental impact

Valmiera

The Valmiera School of Design and Art found the project well aligned with their academic focus on waste management and were motivated to introduce sustainable waste practices into the first-year curriculum.

They also went through the BALTIPLAST inventory process starting with a training session on plastic and its environmental impact. For the next two weeks, students sorted the plastic waste they generated and analysed it using the BALTIPLAST tool. Further on, the students set goals to reduce the amount of waste generated, implemented new habits and measured the plastic waste again to compare the results.

Key actions and results:

- Training session on plastic and its environmental impact, was led by experts from the Baltic Environmental Forum.
- Students sorted the plastic waste they generated in their daily lives. The collected waste was analysed using a special tool, and students set goals to reduce the amount of waste generated.
- Achieved significant waste reductions, including **67% fewer candy wrappers, 100% reduction of chocolate bar wrappers, tissue packaging,** and **PET water bottles,** alongside a **50% decrease in plastic bag waste.**

Challenges and achievements:

The pilot also faced challenges, such as difficulties in local waste management communication and the lack of centralised environmental management within the school. Despite these challenges, the pilot demonstrated that with proper education and motivation, students could significantly reduce plastic waste and contribute to a more sustainable school environment. The school received the Latvian Eco-Schools Recognition Award for their participation in the international Eco-Schools educational program for the 2024/2025 academic year.

2.3.3 Evaluation/Assessment of the Soft Solution for Organisations

Assessment of feasibility, social acceptability and replicability

The following presents a summary of the feasibility, social acceptability, and replicability assessment of the soft solution based on pilots in different types of organisations/activities.

Table 8. Assessment of the Soft Solution - Businesses

	Tallinn (EE)	Kaunas (LT)	Valmiera (LV)	Daugavpils (LV)	Utena (LT)	Evaluation score*
Feasibility legal technical financial	No legal barriers were encountered, though existing broader sustainability reporting frameworks might have negatively impacted the willingness of businesses to focus on plastics. Besides, current business practices prioritize economic factors and therefore deprioritise social or environmental factors. Technical challenges included language barriers since some products are not used across all piloting countries. Some businesses created additional items to adapt the Plastic Inventory to their internal processes. Supplier engagement helped businesses integrate the inventory into procurement processes. Financial feasibility was positive, as businesses managed with minimal costs and found the tool scalable. However, guidance was needed throughout the Inventory Process.					2
Social accept-ability	Overall, the Plastic Inventory was received well, especially where environmental values are already high. Businesses valued data-driven decision-making and waste reduction plans, making them more likely to continue using the inventory tool. The Excel-based format makes the tool widely applicable, even if surely less user-friendly than a web-based application. Employee engagement increased where businesses actively involved staff in tracking waste and adopting reduction measures.					2
Replic-ability	Yes	Yes	Yes	Yes	Yes	2

**Is the solution legally, technically and financially feasible; is the solution socially acceptable; is the solution replicable in other BSR municipalities?*
2 = yes, 1 = partially, 0 = no

Table 9. Assessment of the Soft Solution – Municipalities and green events

	Tallinn (EE)	Kaunas (LT)	Västerås (SE)	Valmiera (LV)	Daugavpils (LV)	Hamburg-Bergedorf (DE)	Utena (LT)	Evaluation score*
Feasibility legal technical financial	Partner municipalities report no legal obstacles to carrying out the inventories and the piloting process. When measures are to be taken, national legislation can either support implementation (for example in Västerås) or make it more difficult (reported by Valmiera, if there is no law at the municipal or national level that obliges caterers to participate in a deposit-return system during events). Partners report no technical barriers as limited piloting process. Partners' estimates of the amount of human and financial resources required vary from low to high. This shows differences in how extensive the piloting process has been and how alternatives to plastics have been financed.							2
Social accept-ability	Partners report enthusiasm and support from managers, staff and employees as well as from visitors and participants in events. But there are also reports showing that difficulties occur when it comes to changing habits and implement new ideas and measures.							2
Replic-ability	Yes	Maybe	Yes	Yes	Yes	Yes	Yes	2

**Is the solution legally, technically and financially feasible; is the solution socially acceptable; is the solution replicable in other BSR municipalities?*
2 = yes, 1 = partially, 0 = no

Table 10. Assessment of the Soft Solution – School facilities and pupils

	Tallinn (EE)	Kaunas (LT)	Västerås (SE)	Valmiera (LV)	Daugavpils (LV)	Hamburg-Bergedorf (DE)	Utena (LT)	Evaluation score*
Feasibility legal technical financial	No legal challenges in connection with the piloting process have been reported. One partner (Västerås) did the inventory of purchased plastic articles. This approach requires data availability, which can be a technical constraint. No other technical issues have been reported. Teachers are often overloaded with work, so any additional responsibilities to them, like organizing pilot in their classes will cause human resource constraints. No financial constraints were reported.							2
Social accept-ability	Partners report that teachers at the schools supported the pilot project, although it brought them additional responsibilities. Teachers pointed out that they got lot of new knowledge about plastic waste through the lectures and training provided as part of the pilot project. The teachers were very active, and it is the key factor why schools agreed to participate in project activity. Teachers were motivated and they motivated pupils to collect and count plastic waste, fill in the inventory tool, present the results and implement reduction measures. The main target group in Västerås was administration staff at schools. The tool was hard for them to understand, but they saw the value.							2
Replic-ability	Yes	Yes	Yes	Yes	Yes	Yes	Yes	2

**Is the solution legally, technically and financially feasible; is the solution socially acceptable; is the solution replicable in other BSR municipalities?*
2 = yes, 1 = partially, 0 = no

MAIN CONCLUSIONS

Key findings and need for fine-tuning
The implementation of the **soft solution** in pilot organisations highlighted the importance of leadership engagement, clear **internal communication,** and **integration into daily workflows.** Success was often driven by personal motivation, existing networks, and management support. Where roles were clearly defined and sustainability tasks were embedded into regular operations, plastic reduction efforts progressed more effectively. These actions often led to **co-benefits,** such as reduced biowaste and improved resource efficiency, with creativity and innovation playing a key role in rethinking conventional practices.

However, challenges remain. Data gaps, especially regarding **packaging weights,** hindered inventory accuracy, and organisations lacked consistent guidance. The current legal and policy environment often prioritises economic or GHG-related metrics, **reducing the perceived urgency** of plastic reduction. While the inventory tool proved useful, there is a need for a more intuitive, web-based version that integrates with existing sustainability systems. Strengthening executive buy-in, **improving supplier collaboration,** and developing supportive policies are essential to scaling up this solution.

Evaluation conclusion
The plastic inventory tool has proven effective across different business sectors, offering a structured, data-driven approach to reducing plastic waste. Despite minor technical and recruitment challenges, businesses found the tool useful, practical, and scalable, with many planning to continue and expand their reduction measures. Fine-tuning the tool, particularly addressing translation gaps and integrating procurement tracking – will further enhance its impact and support wider adoption across the Baltic Sea region.

Considering the experience of the pilots and evaluation summary, it can be concluded that the solution is applicable to most businesses and supports informed decision-making towards a measurable reduction of plastic use.

2.3.4 Environmental Impact Assessment of the Soft Solution for Organisations

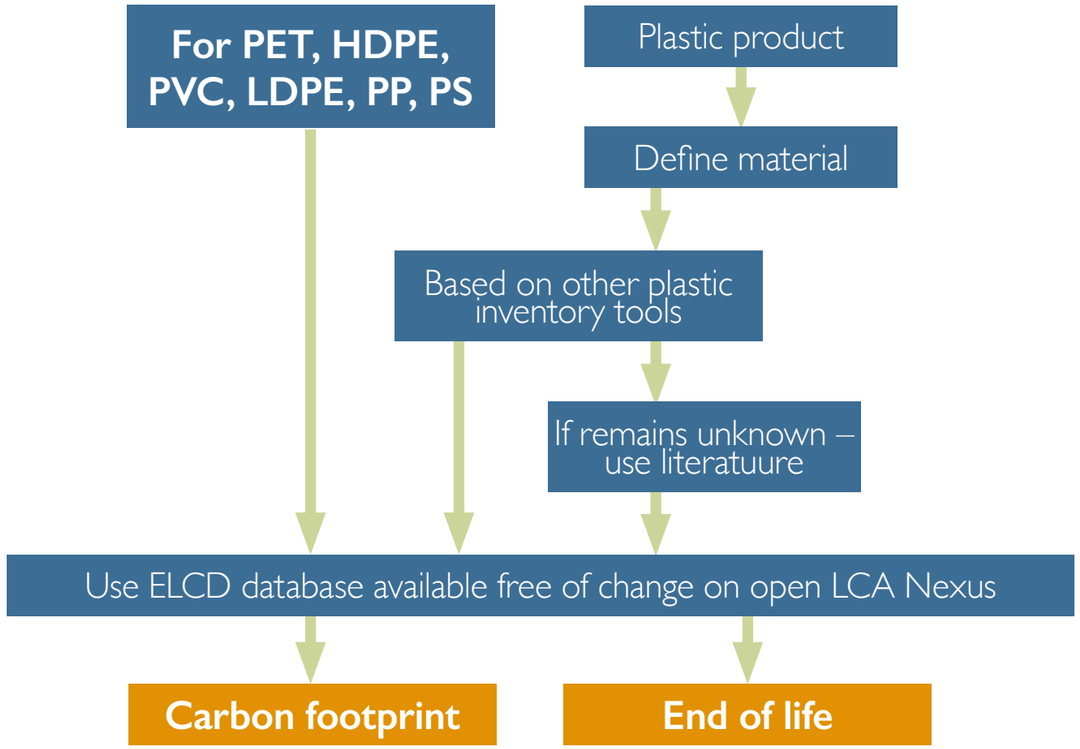
Data processing
To conduct the EIA, we used the data that was gathered through two different tools: the preliminary prepared Microsoft Excel plastic inventory tool for municipal facilities, schools, and businesses, and the questionnaire specifically composed for green events.

In the plastic inventory tool, the following data was collected:
- information about the organization (contacts, number of employees, etc.)
- types of plastic products used (differentiated by office rooms)
- amounts of the products that automatically were recalculated to kg/year
- type of plastic/material
- type of the bin used for disposal of the product
- reduction measures, indication the amount that the product usage is being reduced by

In the questionnaire for green events the following data was collected:
- Information on the event (place, dates)
- number of the participants
- amount and type of the SUP dishware used (material, volume, weight, etc.)
- amount and type of the reusable dishware used (material, volume, weight, etc.)
- type of the dishwasher used for the reusable dishware and data on the process (number of washing cycles possible, amount of rejected dishware in percent, etc.)
- EoL options for reusable dishware

EIA METHODOLOGY (BUSINESSES, MUNICIPALITIES, SCHOOLS)

Figure 6. Methodology for EIA calculations (municipalities, schools, businesses)



The methodology for proceeding with the EIA calculations is summarised in Figure 6 above. Knowing the amount and type of material, the environmental impact for material production was calculated. Similarly, the end-of-life stage environmental impact is also covered: incineration was chosen for the items going to the residual bin and recycling for those going to the recycling (separate collection bin). Then the reduction measures were evaluated by subtracting the potential environmental impact for the reduced/avoided items from the environmental impact calculated before the measures were implemented.

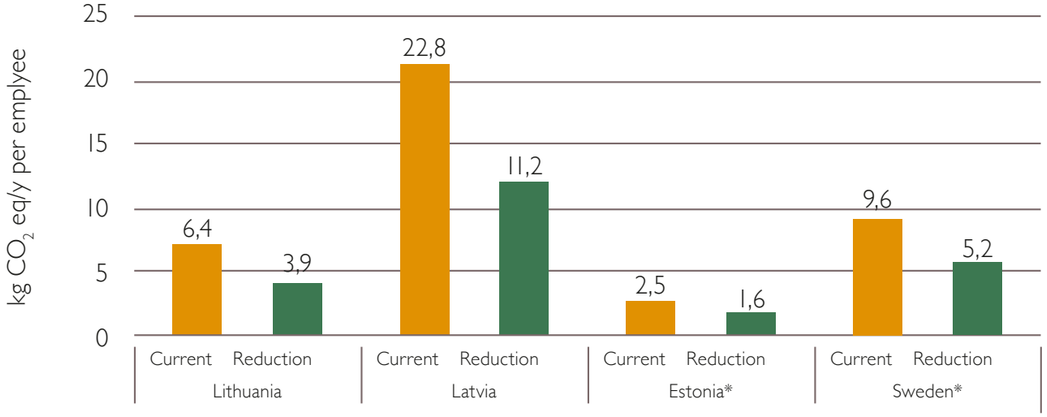
BUSINESSES

EIA was conducted for the following businesses:

- Latvia (7 companies)
- Lithuania (9 companies)
- Estonia (5 companies)
- Sweden (1 company)

The figure 7 illustrates the current and achieved carbon dioxide equivalent (CO_2 eq) emissions per employee (in kilograms per year) on average for Estonia, Lithuania, Latvia, and Sweden.

Figure 7. Average CO_2 eq emissions per country per employee for businesses per year



In Estonia, the current emissions are 2.5 kg CO_2 eq/year per employee, with a potential reduction to 1.6 kg.
In Sweden, data from one company indicate emissions of 9.6 kg CO_2 eq/year per employee in the current situation, with a potential reduction to 5.2 kg.
In Lithuania, emissions decreased from 6.4 kg to 3.9 kg CO_2 eq/y per employee. Latvia shows the highest initial emissions at 22.8 kg CO_2 eq/y per employee, with an achieved reduction to 11.2 kg. One company from Lithuania also included data based on sales, reporting a current value of 511.4 kg CO_2 eq/y and a reduced value of 475.8 kg CO_2 eq/y. The data represents the situation before and after the implementation of reduction measures in businesses.

The reductions were mainly achieved through reduction or avoidance of products (mainly food packaging). The reduction value for Estonia and Sweden is marked with an asterisk (*) to indicate that it is based on an assumption that data was extrapolated from the reduction trends observed in Latvia and Lithuania.

Table 11 shows marginal prevention costs of CO_2 emissions from businesses (EUR/kg per year) in Lithuania, Latvia, Estonia and Sweden, comparing current and reduced scenarios. Lithuania's emissions dropped from €21.30 to €15.80 per pilot, Latvia's from €84.20 to €51.7. Estonia's from €16.30 to €10.30 – though Estonian figures are based on estimates from neighbouring countries. Similarly, Sweden's values declined from €29.30 to €15.90, also based on estimations. Additionally, one Lithuanian (**) company reported data including sales, with €1020.15 per kg at current situation and 949.31 kg CO_2 per year after the reduction measures, which was not included in the table.

Table 11. Marginal prevention costs of CO_2 emissions from businesses (EUR/kg) per year

	Current Situation, €		After Reduction, €	
	Per pilot	Total	Per pilot	Total
Lithuania**	21,3	170,33	15,8	126,16
Latvia	84.2	589.7	51.7	361.96
Estonia*	16,3	81,39	10.3	51.58
Sweden*	29.3	29.3	15.9	15.9

Carbon footprint reductions ranged from 7% (based on sales) to 39–51% per employee on average across companies. Estimated reductions were 36% in Estonia and 45.8% in Sweden, based on trends observed in neighboring countries. Due to the implementation of reduction and avoidance measures, cost savings ranged from 26% to 46%.

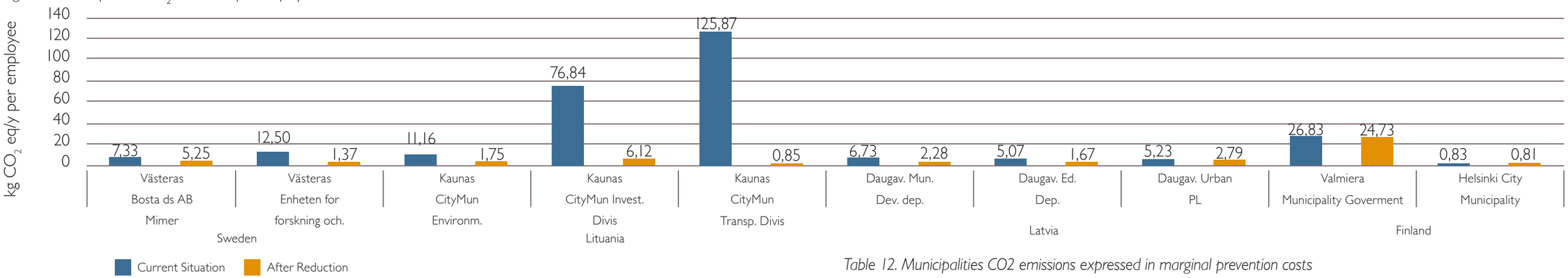
MUNICIPALITIES

EIA was conducted for the following municipalities:

- Daugavpils Municipality, Latvia (3 departments)
- Valmiera Municipality, Latvia
- Kaunas Municipality, Lithuania (3 departments)
- Helsinki Municipality, Finland
- Västerås, Sweden (2 public companies).

The results are summarised below. As we can see from Figure 8, the environmental impact differs a lot for different municipalities, as well as the amount of CO_2 eq after the reduction measures. For some municipalities, the implemented reduction measures provide a substantial change, reducing the impact by 1.5–2 times (Kaunas, Västerås Ench.), and almost no change for others (Valmiera, Helsinki). This is because of the differences in the implemented reduction/ avoidance measures. For instance, in Kaunas Municipality Administration division a lot of single use products were substituted with reusable ones. On the other hand, Västerås AB Mimer replaced only one item (singles wipes). Valmiera Municipality also indicated only three items they removed from usage.

Figure 8. Municipalities' CO_2 emissions per employee.



The data can be expressed in monetary values. To express the results in an alternative way, marginal prevention costs were also calculated, i.e. the amount of investment needed to prevent the calculated CO_2 emissions. This can be observed in Table 12. It shows a substantial decrease in marginal prevention costs after the implementation of CO_2 reduction measures across most municipalities. The most significant reductions per employee were observed in Kaunas (e.g., the Transport Division dropped from € 16.740 to € 0.113) and in Västerås, Enheten för forskning och skol. in Sweden (from € 1.663 to € 0.182). It can be interpreted that the implemented reduction measures in Kaunas and Västerås contribute the most to the overall reduction in the need for additional investments to prevent the CO_2 emissions (e.g., building offshore windmills).

Most municipalities show a substantial decrease in CO_2 related costs following reduction efforts. Kaunas Municipality stands out as the difference between the current and the reduction state reaches around 90%. In Sweden, Västerås and Latvia, Daugavpils notable cost drops were seen – around 30–90%. However, Valmiera and Helsinki municipalities didn't show significant reduction – roughly 2–7%. It was achieved through the reduction/ avoidance measures such as replacement of the single-use products with reusable alternatives (e.g, washable cutlery instead of SUP) or completely avoiding some items (digitising all the documents, thus no need to use paper plastic pockets).

Table 12. Municipalities CO2 emissions expressed in marginal prevention costs

		Current Situation, €		After Reduction, €	
Country	**Company**	**Total**	**Per employee**	**Total**	**Per employee**
Sweden	Västerås, Bostads AB Mimer	165,807	0,975	118,691	0,698
	Västerås, Enheten för forskning och skol.	41,573	1,663	4,555	0,182
Lithuania	Kaunas CityMun Environm. Divis.	16,333	1,485	2,555	0,232
	Kaunas CityMun Invest. Divis	81,759	10,220	6,513	0,814
	Kaunas CityMun Transp. Divis	150,663	16,740	1,014	0,113
Latvia	Daugav. Mun., Dev.dep.	12,529	0,895	4,250	0,304
	Daugav. Ed. Dep.	16,852	0,674	5,568	0,223
	Daugav. Urban Pl.	14,617	0,696	7,791	0,371
	Valmiera, Municipality Government	453,199	3,568	417,658	3,289
Finland	Helsinki, City Municipality	221,557	0,111	216,220	0,109

SCHOOLS

EIA was conducted for the following schools:

- Tallinn, Estonia (3 schools – pupils, 4 classes)
- Valmiera, Latvia (1 school – pupils)
- Daugavpils, Latvia (2 school – pupils)
- Hamburg, Germany (1 school – pupils)
- Västerås, Sweden (3 schools – facility)
- Kaunas, Lithuania (2 schools – facility)

Figure 9 presents the average carbon dioxide equivalent (CO_2 eq) emissions per pupil (a) and facility (b) per year for schools in Estonia, Latvia and Germany, showing results before and after the implementation of reduction measures.

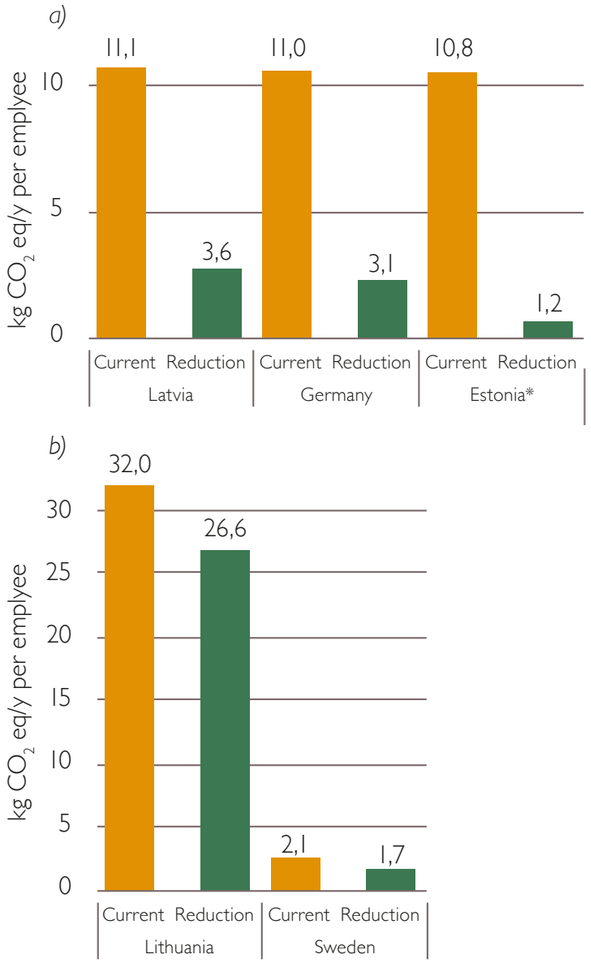


Figure 9. a) CO_2 eq emissions per pupil for schools - pupils per year
b) CO_2 eq emissions per employee and pupil for schools - facility per year

For the "schools – pupils", in Estonia, the current emissions are 10.8 kg CO_2 eq/y per pupil, with a reduction to 1.2 kg after measures were implemented. In Latvia, emissions decreased from 11.1 kg to 3.6 kg CO_2 eq/y per pupil, while in Germany, emissions decreased from 11.0 kg to 3.1 kg CO_2 eq/y per pupil. The reductions were mainly achieved through reduction or avoidance of products (mainly food packaging). The asterisk (*) for Estonia indicates that the data also includes two classes where no reduction measures were applied; in these cases, the reduction values were calculated based on an assumption that data was extrapolated from the reduction trends observed in Estonian, Latvian and German schools.

The Figure 9 presents the average carbon dioxide equivalent (CO_2 eq) emissions both per employee and pupil per year for schools in Lithuania and Sweden, showing results before and after the implementation of reduction measures.

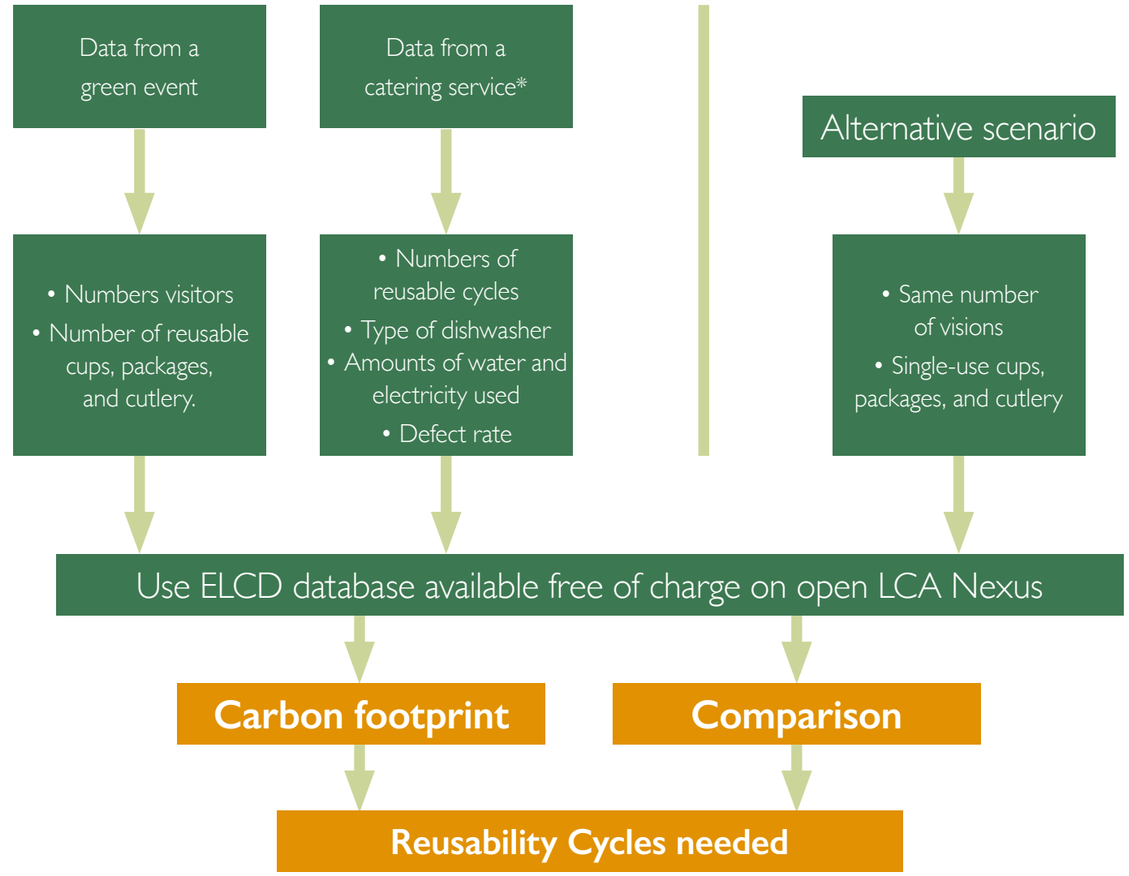
For the "schools – facility", in Lithuania, the current emissions are 32.0 kg CO_2 eq/y, with a reduction to 26.6 kg after measures were implemented. In Sweden, emissions decreased from 2.1 kg to 1.7 kg CO_2 eq/y. The reductions were mainly achieved through the use of reusable options and products with less plastic, such as envelopes without windows.

Among school pupils, carbon footprint reductions ranged from 68% to 89%, while for school facilities, reductions were more modest, ranging from 17% to 19%.

The most challenging aspects were data availability and comparability. For some municipalities and companies, data on material types was lacking, thus, average emission factors were used, which reduced the accuracy of the results. In the case of businesses, the unknown material types further impacted the accuracy. Additionally, schools' facilities tend to use materials purchased a year ago and keep reserves for future periods, which also affects the results.

METHODOLOGY (GREEN EVENTS)

Figure 10. Methodology for EIA calculations (Green events)



** in case applicable*

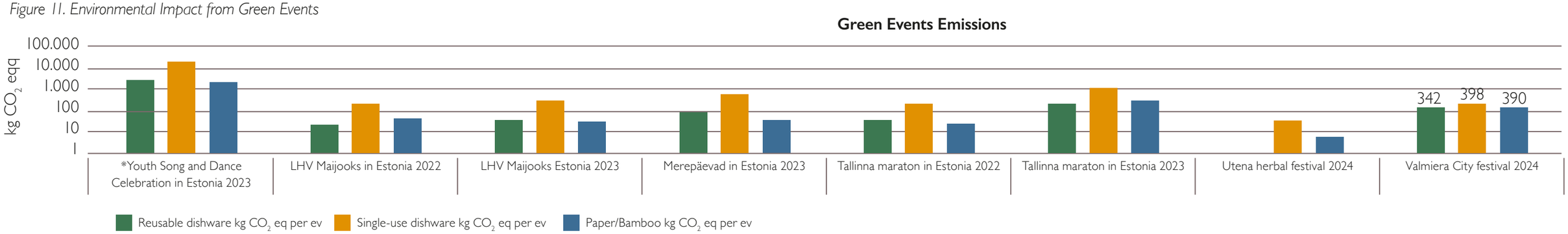
The methodology for proceeding with the EIA calculations for green events is summarised in Figure 10. The analysis considered current reusable dishware, sometimes in combination with other materials, with two alternative scenarios: full reliance on single-use plastic (SUP) and paper-based options. To account for reusability of the dishware, the model assumes that after each use, the items are washed, some defect dishware is rejected, and the left amount of dishware was sent to the next event. The process was iterated until the maximum number of usable washing cycles is reached. In parallel, the environmental impact of the SUP and paper-based scenarios was calculated: for every iteration SUP/paper dishware options were considered in parallel, but instead of washing, end of life was option was applied.

GREEN EVENTS

The results of the green event calculations are summarised in Figure 11. The single-use plastic (SUP) option showed the highest environmental impact in terms of CO_2 emissions. The current reusable plastic option and the paper-based alternative had comparable impacts, with the reusable option performing slightly better or worse depending on the specific case. These variations are mainly due to small differences in the material mass of dishware with similar volume (e.g., paper vs. reusable plastic).

For reusable dishware, the main source of environmental impact was the washing process, specifically electricity consumption, which was converted into CO_2 emissions based on energy source data.
In contrast, the dominant impact for SUP products came from end-of-life treatment, primarily incineration.

Figure 11. Environmental Impact from Green Events



Challenges (Green Events)

When speaking about the green events calculations, similarly to other soft measures, the data aspect was quite challenging. As the first data was gathered from the Estonian events, it was easy to calculate in the same process and then compare the results. However, with the data from the other events, it was challenging to determine how to make the calculations comparable with the previous ones.

At the same time, for some events the dishware characteristics weren't provided fully, which required additional assumptions. Also, one event (Västerås, Sweden) was excluded from the comparison, as they provided only the results from their own EIA calculations. However, due to the lack of information on the methodology, it was not possible to carry out any comparison.

2.4 Soft Solution for Households: The plastic diet programme

2.4.1 Short description of the solution

Aim and target groupss

Our solution proposed for households is named "The Plastic Diet Programme for Households" as it consists of a task-based programme with tips and tricks fostering behaviour change regarding consumption patterns of single-use plastic and plastic packaging. This solution is targeted to private households and individuals who are willing to take over plastic reduction at their own homes.

Description of the solution

The Plastic Diet Programme was developed to address single-use plastic (SUP) and packaging waste by empowering households to reduce their consumption. At the heart of the programme is the Plastic Inventory Tool, which measures and tracks plastic waste consumption and reduction. The tool is complemented by a DIY Plastic Reduction Guide, educational materials, workshops, and events, all designed to raise awareness and foster sustainable behaviour.

2.4.2 Piloting the solution for households

LIST OF PILOTS

Below are pilots conducted in the BALTIPLAST project and the number of pilot households who tested the tool.

Table 13. Summary of pilot recruitment and key actions

Pilots	Households Reached	Recruitment & Engagement Methods
Helsinki	44	Influencer campaign on social media; internal campaign for city employees
Tallinn	23	Facebook promotion; invitation via schools and businesses; in-troduced to 8-week "Plastic Diet"
Kaunas and Utena	71 (51 in Kaunas / 20 in Utena)	Events to introduce "Plastic Diet"; external NGOs contracted
Valmiera	30	City Festival 2024; educational exhibition; direct messages to 578 colleagues; social media
Daugavpils	40	Public events; direct emailing; personal consultations offered
Hamburg – Bergedorf	31	Climate Week Hamburg; cross-recruiting via school; online in-put form; stakeholder network; information materials
Vasteras	81	Local and social media (reach ~20,000); emailing; online and face-to-face events; structured 3-step pilot

RESULTS & LESSONS LEARNED

Finland

In Finland, the most effective outreach was through an online and anonymous platform, which helped lower entry barriers. Messaging framed as "observe your plastic usage" proved more engaging than calls for immediate change. However, key barriers included the time investment required, limited appeal of the tool's design, and the fact that plastic waste is often deprioritized compared to other environmental issues.

Estonia

Estonia's success stemmed from personal contacts and face-to-face events, which fostered trust and engagement. However, participants faced technical limitations: data entry errors were irreversible, and they could not track their progress, limiting motivation. Anonymity, while lowering entry barriers, also prevented follow-ups and user support.

Lithuania – Kaunas and Utena

In both Kaunas and Utena, effective outreach included school engagement, events, and personal contacts, with weekly reminders boosting motivation. However, there were challenges with student involvement, tool usability, and data management. As in other locations, anonymity hindered follow- up support, reducing the potential for longer-term behaviour change.

Latvia – Valmiera and Daugavpils

In Valmiera, outreach efforts focused on personalised engagement and emotional appeal, using local events like the City Festival. However, technical difficulties, poor brochure usability, and low knowledge of recycling practices presented barriers. Real-time entry improved accuracy but required strong guidance. In Daugavpils, the most effective methods included event-based outreach and personal consultations, while cold emails and web posts proved ineffective. Time constraints, information overload, and the complexity of waste sorting were the primary challenges.

Sweden

Sweden successfully reached a broad audience through local media, social media posts, and targeted paid ads, generating a reach of over 20,000 people. Despite this, dropout rates were difficult to analyse, and tool usability was flagged as a limiting factor. Nonetheless, their structured three-step pilot offered a clear path for participants.

Germany

In Germany, engaging users was particularly challenging. Barriers included the lack of access to proper scales, ID recovery issues, and anonymity preventing assistance. Many people questioned the value of separating waste or felt overwhelmed by other priorities. Outreach at events was often ineffective, while direct, personal engagement was more successful. Motivating people in the moment proved most impactful. It was also observed that food packaging remains the dominant source of plastic waste across households.

Key findings across pilots included:

- Direct and personalised outreach was consistently the most effective recruitment method.
- Motivation to use the tool continuously was low due to its complexity and time demand.
- Food packaging was identified as the main source of plastic waste.
- Tool anonymity helped with participation but limited support and follow-up potential.
- Real-time data entry and frequent reminders improved user experience and accuracy.

5: The tool can be found here: https://baltiplast.check-ed.eu/en/

2.4.3 Assessment of feasibility, social acceptability and replicability

The summary of the assessment of feasibility, social acceptability and replicability of the soft solution for households is presented below based on the pilots in 8 municipalities.

Table 14. Assessment of the Soft Solution – Household implementation

	Helsinki (FI)	Tallinn (EE)	Daugavpils (LV)	Valmiera (LV)	Kaunas (LT)	Utena (LT)	Hamburg (DE)	Vasteras (SE)	Evaluation score*
Feasibility legal technical financial	The piloting of the plastic reduction tool encountered a range of legal, technical, and financial challenges across countries. Legal concerns around data privacy led to the tool being anonymous, which limited user follow-up and support. Technically, issues included non-editable entries, device compatibility problems, and confusion due to varying national recycling regulations. Countries like Finland, Estonia, and Latvia also reported data entry errors, loss of user IDs, and misunderstandings about sorting rules. Financially, the time commitment for data tracking and lack of resources for personalised support hindered participation. Additionally, there was a need for clearer guidance, more engaging communication, and improvements to the tool's usability to better meet participants' needs and ensure wider adoption.								1
Social acceptability	Limited acceptance: the tool's plastic-only focus and tracking effort reduced motivation, especially due to food packaging packaging challenges	Generally positive; participants appreciated waste tips and preferred in-person engagement for better understanding.	Likely positive; personal contacts and events supported recruitment, complemented by follow-up emails to businesses and municipalities	Likely positive; Effective personal and municipal outreach strategies	Positive; school partners-hips and personal outreach fostered interest, despite tool usability issues and higher eco-product costs.	Positive; school involve-ment and direct engage-ment encouraged participation, though some challenges and cost barriers remained.	Limited; privacy concerns, tool complexity, and low awareness of waste issues hindered broader engagement, despite some individual individual efforts	Moderate; regular emails with tips and challenges helped maintain interest, but commitme nt levels varied among households	1
Replicability	The inventory tool has the potential for broader replication within the pilot countries, but only if key challenges are addressed. Success depends on recognizing differences in national waste management systems, leveraging personal contacts, and maintaining motivation through reminders and knowledge sharing. However, obstacles such as lack of household access to scales, anonymous check-ID losses, and low engagement from cold outreach or social media hinder effectiveness. The tool also requires improvements in user-friend-liness, product data accuracy, and participant communication—currently limited by data privacy restrictions. Suggested improvements include integrating contact data, creating a more intuitive, web-based app with automated tracking, making surveys mandatory, and adopting a more flexible and less demanding approach to encourage participation.								1
Average score									**1**

**Is the solution legally, technically and financially feasible; is the solution socially acceptable; is the solution replicable in other BSR municipalities? 2 = yes, 1 = partially, 0 = no*

MAIN CONCLUSIONS

Key findings and need for fine-tuning
The Soft Solution for households highlighted both **successful engagement** strategies and **key challenges** in implementation. One of the most important findings was the need to tailor approaches to local waste management systems, as variations across countries significantly influence participation and effectiveness. While digital outreach achieved wide visibility, **direct personal contact** proved to be the **most effective for driving actual participation** and engagement. In addition, face-to-face events and frequent reminders helped maintain motivation among participants and encouraged continued **plastic reduction efforts.**

Households found the Plastic Inventory Tool **helpful for tracking their plastic use** in a more structured and organised way. However, challenges included the lack of access to weighing scales, which affected data accuracy. Motivation to continue tracking waste regularly tended to decrease over time. The programme also encountered dropouts and limited insight into user behaviour, due in part to the anonymity of the tool and insufficient data collection. Other challenges included missing product data within the tool and a lack of user-friendliness in its design.

To improve the tool and increase its long-term impact, **fine-tuning actions** include revising the tool's data policy to allow basic behavioural surveys and user tracking while still protecting privacy. The tool's design should be simplified and made **more intuitive**. Messaging should be adjusted to be more inviting and less demanding, reducing pressure on participants. Finally, the process for joining the challenge and receiving regular updates should be streamlined to lower entry barriers and support sustained engagement.

Evaluation conclusion
The plastic tool was effective for measuring reductions but must be **adapted for different countries** and cultures. For long-term impact, personal engagement and continuous support through smaller challenges and in-person events are essential. The piloting phase confirmed that the **Plastic Inventory Tool is effective** for visualising plastic reduction and can be adapted for wider use. However, country-specific barriers and preferences need to be addressed for successful replication.

2.4.4 Environmental Impact Assessment

Environmental Impact Assessment differs for households from other solutions, as the initial data was gathered in a different way: the online tool developed by the BALTIPLAST project was used. The tool works as an online form, where the users (household dwellers) can fill in the form fields several times, so based on the differences between the entries the trend of the plastic product usage can be detected. The types of information that is collected:

- Date
- Country
- City
- Age of household dwellers
- Type of household (single/multi)
- Living space area
- Amount of reusable PET bottles/PET bottles with deposit/single-use PET bottles used per week
- Grams of plastic in recycling bin per week, with specified plastic part for food-packaging and non-food-packaging
- Grams of waste in residual bin per week, with specified weight of plastic part
- Other information that is not related to EIA

Despite the data being gathered in a convenient and unified way, the EIA team faced several issues:
- Big parts data were missing for some entries; thus, they couldn't be used
- Some households had several entries showing the changes in their behaviour, however they were made on the same day, therefore considered not trustworthy for the analysis
- Some data fields had impossible values, such as million grams per week, etc.

Therefore, the data needed additional refining, and the initial number of rows (332) was reduced to 178. After, the EIA was performed. The impact was assessed based on the production stage of the plastics (amount used by the study participants). To perform the calculations, average emission factor was used.

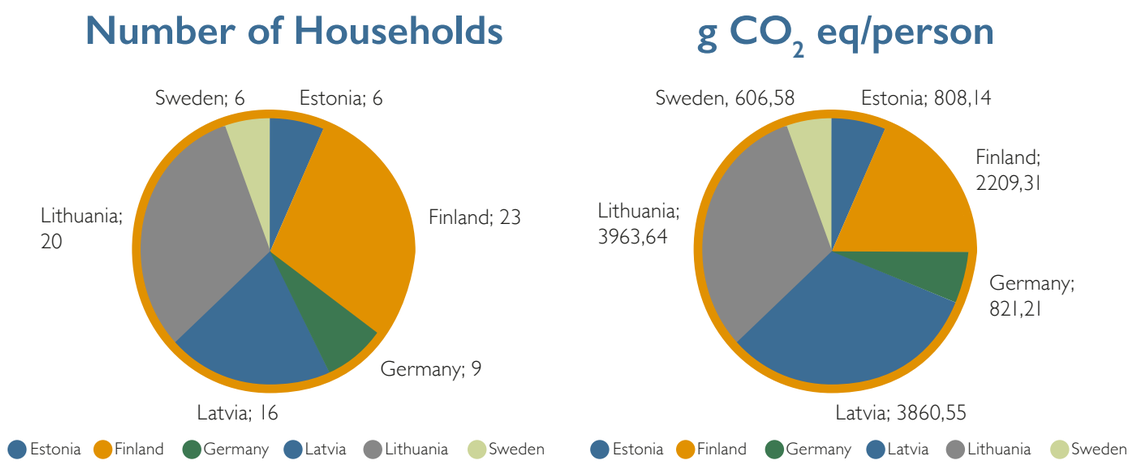


Figure 12. Number of households after the data refining (left), amount of g CO2 eq per person (right)

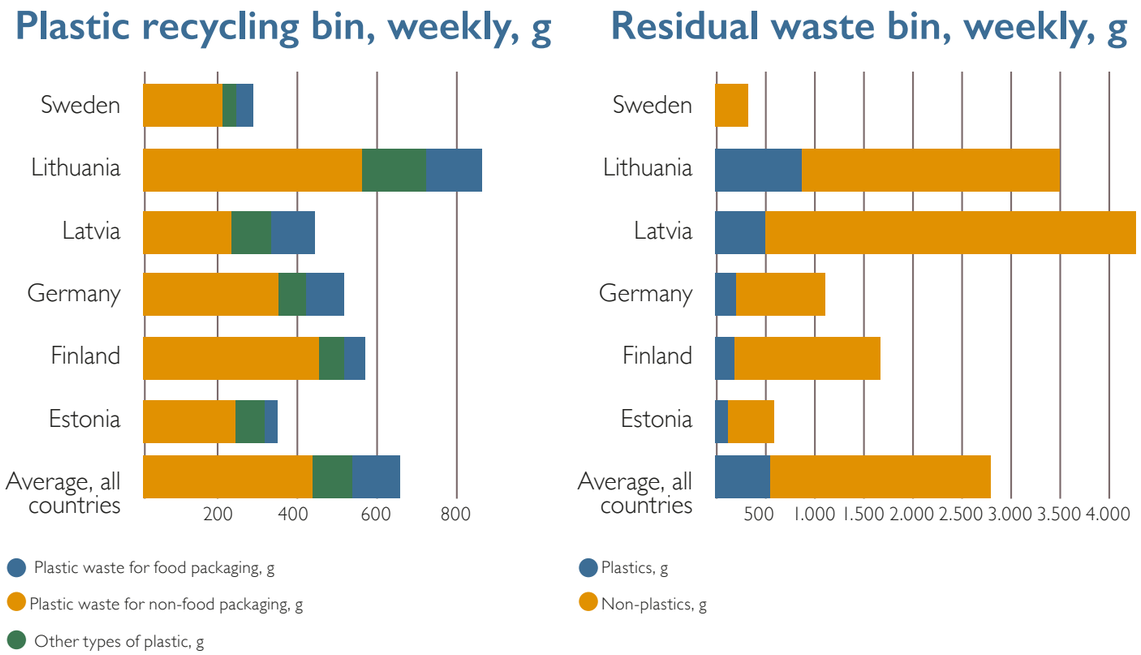


Figure 13. Amount of plastic waste (g) collected in recycling bin (left) and grams of waste collected in residual bin (right) on average per household per country.

The results of the EIA, presented in Figures 12 and 13, cover six countries: Estonia, Finland, Germany, Latvia, Lithuania, and Sweden. In Figure 12, the left pie chart shows the number of surveyed households, with Finland having the most (23), followed by Lithuania (20), Latvia (16), Germany (9), and Estonia and Sweden (6 each). The right chart shows average greenhouse gas emissions from plastic use, where Lithuania and Latvia had the highest values (3963.64 and 3860.55 g CO_2 eq/person, respectively). Finland's emissions were lower (2209.31), and Germany, Estonia, and Sweden had the lowest and similar levels, all below 850 g CO_2 eq/person. These results suggest regional differences in consumption patterns, waste management, and plastic product use.

Figure 13 compares weekly plastic waste disposal in recycling and residual bins. Lithuania had the highest plastic waste in recycling, followed by Latvia and Finland, while Sweden and Estonia showed the lowest. For residual waste, Latvia and Lithuania again stood out, each exceeding 3.5 kg per household per week – double that of the other countries – with substantial amounts of recyclable plastic still found in these bins. Finland and Germany had moderate residual waste levels and similar, relatively low plastic content. Estonia and especially Sweden generated the least residual waste, with Sweden showing almost no plastic in this stream.

Overall, the data reveal notable cross-country differences in plastic waste generation and sorting efficiency. Sweden and Estonia show effective waste separation and low volumes, while Latvia and Lithuania, despite active recycling, still discard large amounts of plastic in residual waste. These findings highlight the need for improved sorting practices and greater public awareness in countries with higher waste volumes and lower separation efficiency.

The households were also surveyed on their usage of PET bottles. The results can be seen in table 15. When comparing single-use bottles with no deposit, Estonia reports the highest average use at 1.63 bottles per week, followed by Lithuania (1.50) and Latvia (1.31). In contrast, Finland (0.43) and Germany (0.50) show the lowest usage of this type, with Sweden in the middle at 1.00 bottle per week. It can be concluded that single-use, non-deposit bottles are more commonly used in the Baltic states than in the Nordic countries or Germany.

For PET bottles with a deposit, Lithuania leads with the highest usage at 4.91 bottles per week, followed closely by Latvia (4.45). Germany also shows relatively high use (2.90), whereas Finland (1.90) and Estonia (2.13) report lower consumption. Sweden again sits in the middle range with 2.43 bottles per week.

Table 15. Average amount of plastic bottles used per week per country

Bottle type	Estonia	Finland	Germany	Latvia	Lithuania	Sweden
Single-Use Bottles with No Deposit Weekly	1,63	0,43	0,50	1,31	1,50	1,00
PET Bottles with Deposit Weekly	2,13	1,90	2,90	4,45	4,91	2,43

The Environmental Impact Assessment for households, based on data collected via the BALTIPLAST online tool, revealed significant cross-country differences in plastic use and waste management. Baltic states, particularly Latvia and Lithuania, showed higher plastic consumption, greenhouse gas emissions, and poor sorting efficiency compared to Nordic countries and Germany, highlighting the need for better waste separation and reduced reliance on single-use plastics.

ORGANISATIONS

7

municipalities in the BSR piloted the soft solution in different types of organisations

Pilots done with 13 businesses, 8 municipal entities, 14 schools, and 4 green events

53%

reduction in plastic waste was reported by companies in Kaunas

UP TO 89%

reduction was achieved by municipal entities and schools

UP TO 51%

carbon footprint reductions were achieved per employee on average across companies

BETWEEN 26–46%

cost savings were reached due to the implementation of reduction and avoidance measures

Soft tools improved awareness, leadership buy-in, and daily workflow integration.

Schools achieved strong pupil engagement; teachers reported new knowledge acquisition.

Encouraged creative procurement and circular solutions (e.g., reusable food containers, returnable packaging)

Allowed companies to track plastic use and calculate relative/absolute reductions.

Businesses valued data-driven reduction strategies and long-term usability.

Demonstrated viability across sectors: education, hospitality, events, consulting.

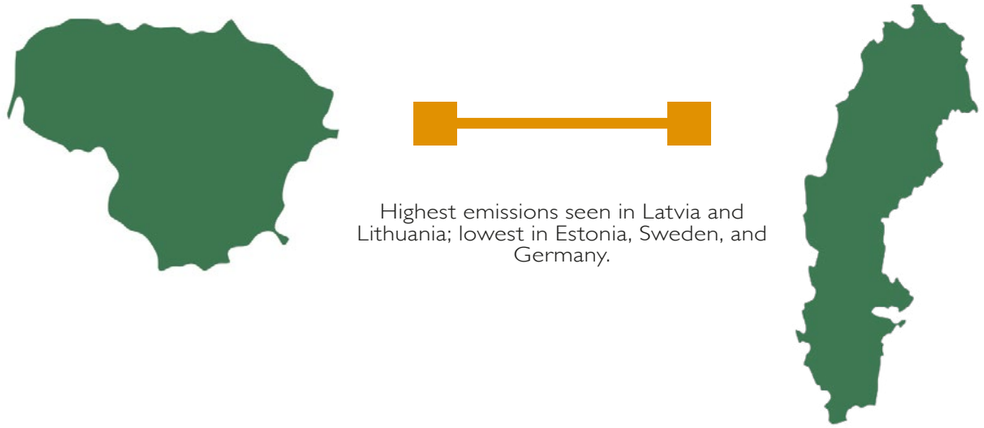
HOUSEHOLDS

320

households engaged across 7 cities. Participating countries: Estonia, Finland, Germany, Latvia, Lithuania, and Sweden.

0.85–4 kg CO_2

GHG emissions ranged from 850 g to nearly 4000 g COz-eq/person/year in households across 6 countries, highlighting major regional differences in plastic consumption and waste management practices.



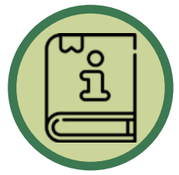
Highest emissions seen in Latvia and Lithuania; lowest in Estonia, Sweden, and Germany.

Demonstrated potential to influence daily habits through participatory challenges.

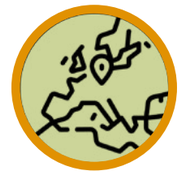
Participating households showed increased awareness on plastic waste issues.

Some households reported intent to maintain behavior change beyond pilot period.

Tool enabled households to connect actions with measurable impact.



Brochures and DIY guides complemented the tool by offering practical actions.



Enabled cross-country comparison of behavior and consumption patterns.

3. SYNTHESIS AND CONCLUSIONS

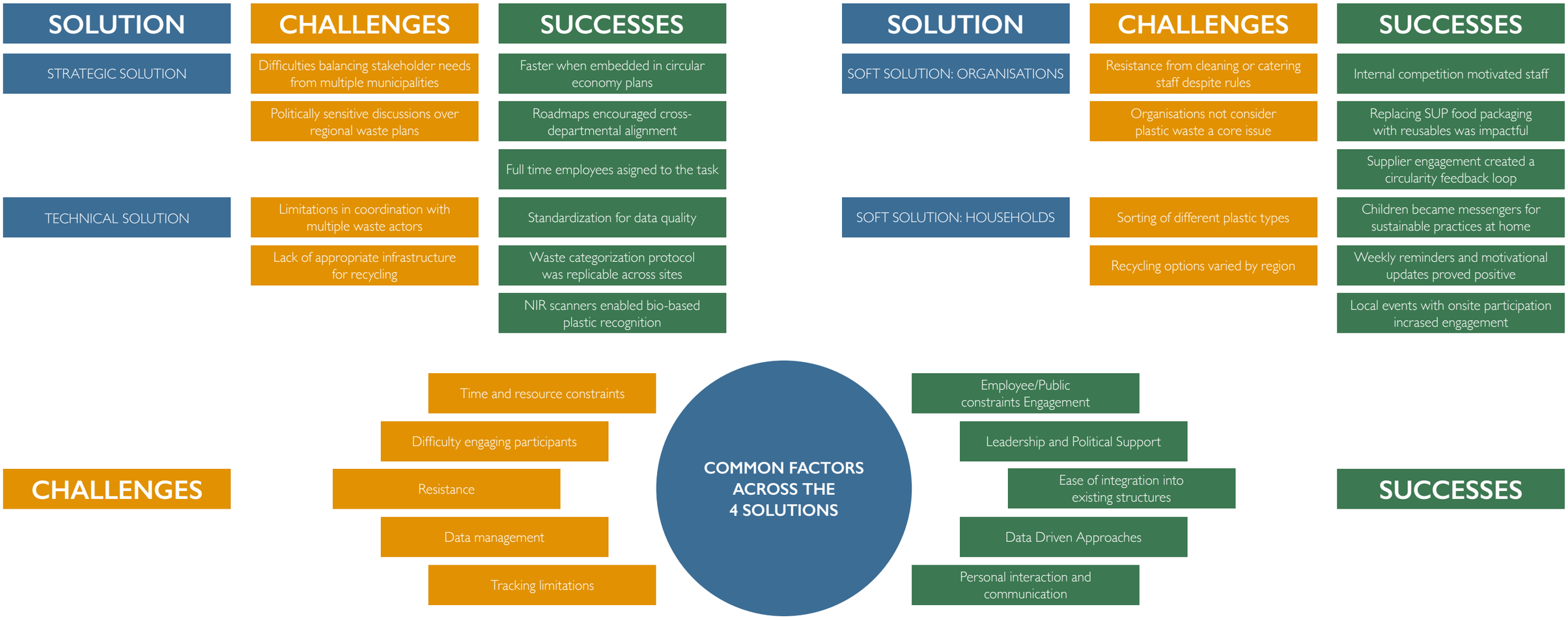
This section synthesizes the key findings, synergies, and impacts emerging from the BALTIPLAST project's solutions across the Baltic Sea Region. Building on its core goal to reduce single-use plastics (SUP), the project engaged municipalities, organisations, and households through the implementation of strategic, technical, and soft measures.

The transnational collaboration with the different stakeholders enabled mutual learning, adaptation, and transfer of practices tailored to diverse local contexts. The conclusions highlight the relevance of each solution, the added value of cross-border cooperation, and pathways for future action to support longterm behavioural, institutional, and policy change.

3.4 Key findings

Figure 14 presents an overview of the key challenges and successes identified for the four solutions implemented in the BALTIPLAST project. Each solution is analysed individually, highlighting specific factors that either supported or hindered implementation. Additionally, the common challenges and success factors shared across all solutions are also outlined, reflecting cross-cutting insights gained during the project. The categorisation provides a clear and structured view of what contributed to or constrained progress, offering valuable input for future replication and upscaling efforts in the Baltic Sea Region and beyond.

Figure 14. Challenges and success factors for the BALTIPLAST solutions



In line with its objectives, the BALTIPLAST project addresses plastic pollution through a circular economy lens and a holistic approach that combines solutions at three operational levels: strategic and management, technical/technological, and communication/behavior change. Recognizing that no single measure can trigger systemic transformation, the project tested the solutions across municipalities, schools, businesses, and households. This multi-dimensional strategy allowed for the identification of synergies among solutions, ensuring that progress in one area could reinforce and accelerate change in others. The insights gained provide a strong foundation for replicating integrated plastic reduction strategies throughout the Baltic Sea Region.

Figure 15. Synergies among the BALTIPLAST Solutions

CROSS-SETTING-SYNERGIES

Policy-Technology-Behavior Feedback Loop:
Strategic documents set recycling targets – Technical tools measure progress – Organizations/households implement changes – Data feeds back into policy updates.

Transnational Learning:
Pilot results (e.g., Tallinn's business engagement vs. Kaunas' school programs) are shared across the Baltic Sea Region, accelerating replication.

Cross-sector governance and interdepartmental cooperation are key
(e.g., municipal departments, waste authorities, procurement offices).

Pilots use **behavior change** and public engagement tools to reach households and stimulate bottom-up change.

3.5 Impacts

The BALTIPLAST project has piloted and demonstrated a range of solutions to reduce single-use plastics (SUP) across the Baltic Sea Region, each showing a wide range of impacts and levels of transferability. The project's comprehensive approach, covering strategic planning, technical aspects, and behavioural change, has provided a strong foundation for sustainable plastic reduction across various governance and community settings.

Strategic Solutions
The strategic solutions proposed, such as local plastic reduction strategies and the integration of SUP targets into existing policy frameworks, have proven highly impactful in guiding long-term change. These approaches provide a necessary foundation for aligning infrastructure investment, procurement practices, and community engagement. While their adoption often depends on political will, regulatory priorities, and stakeholder alignment, they are essential for scaling up systemic change. Due to their complexity, the full impact of these solutions is expected to become visible over time, beyond the duration of the project.

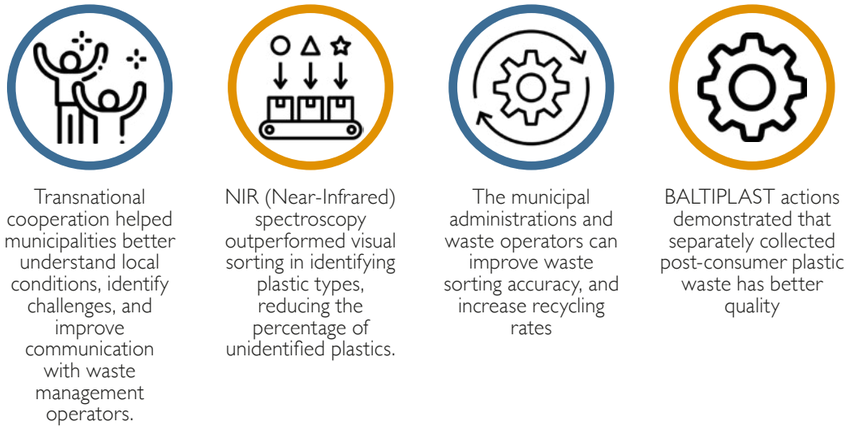
Technical Solutions
The project tested an innovative plastic sorting technology, integrating the use of near-infrared (NIR) spectroscopy. The technology proposed significantly improved the identification of plastic types, which is crucial for increasing recycling rates and material recovery. However, technical solutions tend to be more resource-intensive and require dedicated investment and supportive procurement frameworks. Nonetheless, the simplified version of this technology was piloted within the project, making it more applicable for BSR-wide replication.

Soft Solutions
Behavioural and awareness-raising approaches, such as the organisational and household-level plastic inventories, educational campaigns, and small-scale interventions, proved the most immediately effective and widely replicable. These low effort, low investment actions fostered behavioural change, helped reduce plastic consumption in daily life, and engaged diverse groups. While their individual impact may be more modest compared to infrastructure or policy change, they play a key role in building social acceptance and momentum for broader sustainability efforts. Tailored engagement approaches and inclusive communication strategies were identified as crucial for reaching different social groups.

Replication and Transfer Strategy
To ensure lasting impact, the project has adopted a threefold replication strategy:

1. **Transfer between local actors**: Pilot-tested solutions are being adapted by other municipalities and stake-holders through peer exchange and the development of new local use cases, including in schools, festivals, and public institutions.
2. **Expansion to new target groups:** Successful initiatives are being scaled to reach additional schools, kinder-gartens, sports venues, and culturally diverse communities, demonstrating the adaptability of the solutions across different societal contexts.
3. **Regional and EU-wide dissemination:** The project is actively working with regional networks, academic institutions, and communication platforms to ensure the transfer of knowledge and tools to a broader au-dience across the Baltic Sea Region and potentially beyond.

Through this integrated strategy, BALTIPLAST has built a strong foundation that ensures a long-term impact in the prevention and reduction of SUPs and contributing to the European Union's goals for a circular, climate-neutral, and pollution-free economy.



3.6 Concluding remarks and potential future actions

The BALTIPLAST project has demonstrated that reducing SUPs requires a multi-faceted approach that combines strategic planning, technological innovation, and behavioural change. While strategic and technical solutions provide the structural foundation for systemic impact, soft solutions have proven essential for engaging communities and triggering immediate action. The project has validated the importance of tailoring solutions to local contexts and identified the need for more inclusive, accessible, and user-friendly tools to enhance replication. Moving forward, the momentum gained through pilot activities should be leveraged to scale successful models across sectors and countries, supported by improved policy alignment, targeted funding, and stronger stakeholder networks.

Looking ahead, the focus must shift from piloting to scaling. Future actions should include: .

- **Mainstreaming soft solutions** such as the plastic inventory and reduction guide into municipal services, public procurement, and educational programs to encourage daily behavioural change.
- **Adapting and simplifying digital tools** for broader public use, with added functionality like auto-tracking, multi-language interfaces, and integration into sustainability platforms.
- **Expanding replication across sectors –** including green public events, cultural institutions, housing facilities, and parks—through tailored guidance and stakeholder-specific materials.
- **Leveraging regional networks** to promote cross-country learning and facilitate the uptake of strategic and technical solutions in other EU regions.
- **Engaging underserved and diverse communities,** ensuring culturally sensitive approaches that foster inclusion in plastic reduction efforts.
- **Aligning policy and funding frameworks** to incentivize circular economy practices, while also encouraging public-private partnerships and long-term monitoring.

BALTIPLAST has laid a strong foundation for reducing single-use plastics in the Baltic Sea Region. To sustain and expand this impact, coordinated commitment is needed from policymakers, practitioners, businesses, and citizens to embed plastic reduction into everyday decision-making and help future-proof our societies against plastic pollution. Continued efforts should focus on mainstreaming plastic reduction into procurement, education, and municipal planning, while also expanding to new areas such as public events, cultural institutions, and green spaces. Ensuring long-term impact will require dedicated actions beyond the project's lifetime through policy integration, institutional learning, and cross-border collaboration across the Baltic Sea Region and beyond.

Impressum
Project Partners

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Layout: Nadine Rybaczyk

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We thank the photographers for these fantastic photos and for making them available through platforms that allow free and unlimited use.

STRATEGIC FRAMEWORK SOLUTION

WHAT IS OUR SOLUTION ABOUT?

GUIDELINES FOR DEVELOPING STRATEGIC DOCUMENTS TO REDUCE SINGLE-USE PLASTICS AND PLASTIC PACKAGING AT THE MUNICIPALITY LEVEL.

1 Strategic Framework For The Prevention and Reduction of Plastic Waste

First Level: Strategies & action plans: Goals, targets, direction.

Second Level: Legal framework: Rules, bans, waste regulations.

Third Level: Guidance documents: For target groups (e.g., event organisers, procurers).

2 Step-By-Step Guidance For Developing A Strategic Framework for Plastic Waste Prevention and Reduction

STEP 1 GET ORGANISED

Secure political support, appoint a coordinator and working group, define the legal status of the document, and approve the rules and work plan.

Challenges	Recommendations
Gaining political/high-level support.	Engage leaders gradually, link to goals, showcase examples.
Integrating plastic reduction into existing strategies.	Integrate actions into existing policies.
Coordinating internal and external stakeholders.	Highlight benefits, involve stakeholders early, provide guidelines, clarify roles.

STEP 2 ASSESS THE CURRENT SITUATION

Review the strategic and legal context, perform a stakeholder analysis, and collect data on plastic usage and waste generation.

Challenges	Recommendations
Gaps in legislation and strategies for plastic waste reduction.	Identify gaps and benchmark best practices.
Engaging diverse stakeholders.	Map stakeholders by influence and interest.
Limited or inaccurate data on plastic use and waste.	Conduct studies, data collection, run surveys, and use data tools.

STEP 3 FORMULATE THE STRATEGIC DOCUMENT

- **Plastics strategy should include:** Vision, objectives, targets, KPIs, focus areas, measures, and resources.
- **Key legal considerations:** Align with national laws, keep it simple, and define enforcement.
- **Municipal guidelines should:** Collaborate with target groups, align with strategies and regulations, apply the waste hierarchy, and raise awareness.
- **Stakeholder engagement** is essential for effective local plastic waste prevention.

Challenges	Recommendations
Deciding on the right scope.	Keep it manageable and impactful; use SWOT and waste hierarchy.
Engaging key stakeholders.	Create a stakeholder engagement plan with clear roles and timelines.
Securing sufficient resources & Limited experience with new incentives and measures.	Assess financial and other needs. Pilot activities to test feasibility.

STEP 4 ENDORSE AND IMPLEMENT THE STRATEGIC DOCUMENT

Review the strategic and legal context, perform a stakeholder analysis, and collect data on plastic usage and waste generation.

Challenges	Recommendations
Ensuring stakeholder alignment for final approval.	Conduct early consultations through working groups and meetings.
Communicating the approved document effectively.	Implement a communication strategy (press releases, newsletters, etc.).
Overcoming resistance to change.	Provide awareness, training, incentives, and define accountability structures.

3 Illustrative Examples

- City of Västerås'action plan for the sustainable use of plastics and guidelines for toxin-free preschools.
- City of Stockholm's plastics strategy.
- City of Helsinki's action plans and guiding documents related to the sustainable use of plastics.
- City of Tallinn'sstrategicand legal framework on single-use plastic products.
- City of Hamburg's green procurement guidelines.
- Valmiera Municipality's guidelines on the sustainable use of plastics.
- City of Kaunas'recommendations on the use of single-use plastics.
- Latgale Regional Waste Management Plan and Daugavpils' guidelines on avoiding SUP at municipality events and public events.

GREEN ORGANISATION SOLUTION

THE PLASTIC INVENTORY PROCESS

1 THE INVENTORY TOOL

The practical tool allows for measuring plastic consumption, identifying potentials for reductionand tracking reductions. It is adapted to businesses, schoolsand municipal entities, including an environmental assessment feature.

2 DATA ON PLASTIC USES

The data collected throughout the Plastic Inventory process feed two key insights to reduce plastic consumption within an organisation:

IDENTIFICATION OF PLASTICFOOTPRINT

The data indicates an organisation's most common sources of plastic consumption by weight and number.

IDENTIFICATION OF REDUCTION MEASURES

The tool will also point to effective and feasible measures to reduce previously identified consumption of products or packaging.

TRACKING PLASTIC REDUCTION

The tool servesas a database of the organisation's reductions per product as well as the sum of all reductions achieved.

3 MEASURABLE PLASTIC REDUCTION

In combination, the Plastic Inventory Process guidesan organisation in identifying and implementing their individual leverages and low-hanging fruits to achievea measurable reduction of plastics.

PLEASE NOTE
The term "plastic(s)" refers to all kinds of single- use plastics (SUP) and plastic packaging.

STEPS FOR BUSINESSES

Phase 1:DATA COLLECTION

Month 1 KICK-OFF

The **business** downloads the inventory tool and written introduction. A contact person from the business is identified to lead the Plastic Inventory.

Optional: introductory workshop with an expert partner.

Month 2 ENGAGE STAFF

Engaging staff to participate in the Plastic Inventory is decisive for its success.

Suggestion: Organize the inventory in teams.

Tips:

- Start with a survey via email.
- Set up a pin board or letter box in common spaces to receive suggestions.
- Organize regular staff events to announce results.

Adapt your engagement strategy to the existent infrastructure within your organisation.

Month 01-02 PLASTIC INVENTORY

For a measurable reduction addressing individual leverage points, a baseline of consumption is needed. Two methods help to gain an overview of which kinds and how much plastic packaging and single-use plastics are currently consumed by the organisation:

- **Regularly examining** the organisation's waste bins and entering products or packaging and their quantities into the light blue columns of the tool.
- **Procurement data** (if accessible) can also help to identify purchased products made from plastics, e.g. waste bags.

Phase 2:PLASTIC REDUCTION

Month 2 REDUCTION PLAN

When the main sources of plastics in the organisation have been identified during the first phase of data collection, measures to reducethis plastic consumption are more easily made. The Plastic Inventory tool suggests more sustainable alternatives for many common products, taking into account the waste hierarchy.

While drafting a plan for reducing single-use plastic and plastic packaging, special attention should be given to "low-hanging fruits" where relatively low effortis needed for impact.

Month 3 IMPLEMENTATION

Starting with the **"low-hanging fruits"** (measures thatcan be implemented easily/ without additional costs), the organisation adopts tailored measures to reduce the identified sources of plastic.

Month 3+ EVALUATION

If it is not possibleto estimate the plastic reduction generated by the reduction measures (e.g. from number of ordered alternative products), a second shorter scrutiny of the waste bins can be conducted to gain insightinto the effectiveness of their measures.

The observations are documented as savings in the inventory tool (light green columns).

GREEN ORGANISATION SOLUTION

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PLEASE NOTE
The term "plastic(s)" refers to all kinds of single- use plastics (SUP) and plastic packaging.

STEPS FOR SCHOOLS

Phase 1:DATA COLLECTION

1 KICK-OFF

The **school** downloads the inventory tool and written introduction. A contact person from the school is identified to lead the Plastic Inventory.

Optional: introductory workshop with an expert partner

2 ENGAGE STAFF

Engaging staff to participate in the Plastic Inventory is decisive for its success.

Suggestion: Organize the inventory in teams.

Tips:

- Start with a survey via email.
- Set up a pin board or letter box in common spaces to receive suggestions.
- Organize regular staff events to announce results.

Adapt your engagement strategy to the existent infrastructure within your organisation.

3 PLASTIC INVENTORY

For a measurable reduction addressing individual leverage points, a baseline of consumption is needed. Two methods help to gain an overview of which kinds and how much plastic packaging and single-use plastics are currently consumed by the organisation:

- **Regularly examining** the organisation's waste bins and entering products or packaging and their quantities into the light blue columns of the tool.
- **Procurement data** (if accessible) can also help to identify purchased products made from plastics, e.g. waste bags.

Phase 2:PLASTIC REDUCTION

4 REDUCTION PLAN

When the main sources of plastics in the school have been identified during the first phase of data collection, measures to reducethis plastic consumption are more easily made. The Plastic Inventory tool suggests more sustainable alternatives for many common products, considering the waste hierarchy.

Typical measures can be providing unpackaged school food at canteens, kiosks and vending machines, avoiding (single-use) plastic teaching materials, sports equipment and interior/equipment of classrooms and plastic- free management of the schoolbuilding and bathrooms – e.g. avoidplastic bags forbins, hygiene products, soaps & detergent packaging.

5 IMPLEMENTATION

Starting with the **"low-hanging fruits"** (measures thatcan be implemented easily/ without additional costs), the school adopts tailored measures to reduce the identified sources of plastic.

6 EVALUATION

If it is not possibleto estimate the plastic reduction generated by the reduction measures (e.g. from number of ordered alternative products), a second shorter scrutiny of the waste bins can be conducted to gain insightinto the effectiveness of their measures.

The observations are documented as savings in the inventory tool (light green columns).

GREEN ORGANISATION SOLUTION

THE PLASTIC INVENTORY PROCESS

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The practical tool allows for measuring plastic consumption, identifying potentials for reductionand tracking reductions. It is adapted to businesses, schoolsand municipal entities, including an environmental assessment feature.

2 DATA ON PLASTIC USES

The data collected throughout the Plastic Inventory process feed two key insights to reduce plastic consumption within an organisation:

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3 MEASURABLE PLASTIC REDUCTION

In combination, the Plastic Inventory Process guidesan organisation in identifying and implementing their individual leverages and low-hanging fruits to achievea measurable reduction of plastics.

PLEASE NOTE
The term "plastic(s)" refers to all kinds of single- use plastics (SUP) and plastic packaging.

STEPS FOR MUNICIPAL ENTITIES

Phase 1:DATA COLLECTION

1 KICK-OFF

The **municipality** downloads the inventory tool and written introduction. A contact person from the school is identifiedto lead the Plastic Inventory.

Optional: introductory workshop with an expert partner

2 ENGAGE STAFF

Engaging staff to participate in the Plastic Inventory is decisive for its success.

Suggestion: Organize the inventory in teams.

Tips:

- Start with a survey via email.
- Set up a pin board or letter box in common spaces to receive suggestions.
- Organize regular staff events to announce results.

Adapt your engagement strategy to the existent infrastructure within your organisation.

3 PLASTIC INVENTORY

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- **Regularly examining** the organisation's waste bins and entering products or packaging and their quantities into the light blue columns of the tool.
- **Procurement data** (if accessible) can also help to identify purchased products made from plastics, e.g. waste bags.

Phase 2:PLASTIC REDUCTION

4 REDUCTION PLAN

When the main sources of plastics in the organisation have been identified during the first phase of data collection, measures to reduce this plasticconsumption are more easily made. The Plastic Inventory tool suggests more sustainable alternatives for many common products, taking into account the waste hierarchy.

Typical measures can be avoiding plastic bags in waste bins in municipal buildings, reducing plastic items in office materials and utensils (e.g. toner cartridge, plastic foils), avoiding single-use plastic packaging of soaps, detergents etc. (introducing refillable devices) or banning single-use cups/dishes in office kitchens and canteens.

5 IMPLEMENTATION

Starting with the **"low-hanging fruits"** (measures thatcan be implemented easily/ without additional costs), the school adopts tailored measures to reduce the identified sources of plastic.

6 EVALUATION

If it is not possibleto estimate the plastic reduction generated by the reduction measures (e.g. from number of ordered alternative products), a second shorter scrutiny of the waste bins can be conducted to gain insightinto the effectiveness of their measures.

The observations are documented as savings in the inventory tool (light green columns).

TECHNICAL FRAMEWORK SOLUTION

ADVANCING POST-CONSUMER PLASTIC SORTING

1

THE PLASTIC TYPE IDENTIFICATION TOOL
A mobile near-infrared (NIR) spectroscopy tool that quickly and accurately identifies plastic types on-site, enabling better sorting into valuable material streams and supporting the circular economy.

2

APPLICATIONS
Data from plastic categorization with the identification tool can be used:

- By small/medium facilities as a flexible alternative to stationary sorting plants, helping estimate potential sorting improvements (e.g. recycling yards).
-
- By large facilities as a process control tool for management to validate industrial plastic sorting accuracy.

3

PLASTIC INVENTORY
The piloting phase will measure the amounts of identified plastic waste (by type). The plastics identification portfolio supports the following applications:

- Differentiation between 30 different plastic types (for improvement of mechanical and chemical recycling).
- Compostable plastics (find fraction of biodegradable plastics).

STEP-BY-STEP GUIDANCE

PHASE 1:ASSESSMENT AND PLANNING

This diagnostic phase reveals current performance, limitations, and opportunities, ensuring future decisions are data-driven, context-specific, and aligned with operational realities.

1 EVALUATE EXISTING SYSTEMS

- Review the number, distribution, and type of collection points (door-to-door, drop-off, buy-back) and service frequency to ensure broad coverage and citizen participation.
- Assess sorting facilities for capacity, technology (manual vs. automated), and separation quality.
- Evaluate stakeholder roles, including municipalities, waste operators, private contractors, and SMEs.

2 IDENTIFY GAPS

- Upgrade existingplastic sorting facilities by investing in advanced equipment such as optical sorters, near-infrared (NIR) scanners, and robotic systems.
- Introduce digitaltracking systems to monitor plastic waste flows, contamination rates, and equipment performance, enabling data-driven decision-making and continuous improvement.
- Implement comprehensive policies for plasticwaste collection backed by sustained public education, awareness campaigns, and behavioral incentives.

STEP-BY-STEP GUIDANCE

PHASE II: TESTING

This phase validates technological interventions to improve plastic waste sorting, with the trinamiX NIR tool enhancing polymer identification and accuracy. Results will show the practical benefits of upgrades and guide data-driven decisions.

3 INTRODUCE TRINAMIX TOOL

- Train staff to operate, maintain, and calibrate the trinamiX tool for accurate plastic identification.
- Integrate the handheld tool into sorting facilities, ensuring setup and compatibility with existing infrastructure.

4 COLLECT SAMPE AND IDENTIFY TYPE OF PLASTIC

- Set up collection points and gather representative plastic waste samples.
- Identify and classify items by polymer type using spectral signatures (e.g., PET, HDPE, LDPE, PP, PS).
- Record results to build a dataset reflecting local waste composition and condition (clean vs. soiled).

5 ASSESS PROGRESS

- Use the trinamiX tool to collect plastic type data and compare with manual categorization.
-
- Measure precision gains by tracking increased correct identifications and reduced errors.

STEP-BY-STEP GUIDANCE

PHASE III:SCALING AND OPTIMISATION

This phase expands proven plastic sorting solutions for long-term impact through three actions: scaling across municipalities, optimizing with field data, and fostering stakeholder collaboration.

6 EXPAND IMPLEMENTATION

- Identify municipalities for program expansion based on population, waste volume, and infrastructure readiness.
- Provide tailored training for staff and operators to integrate new tools into existing workflows.
- Share standardized, context-adapted operating procedures based on lessons learned.

7 OPTIMISE PROCESES

- Develop a system to collect, analyze, and act on key performance data (accuracy, throughput, contamination) to refine sorting practices.
- Use data analytics for predictive maintenance and material flow management.

8 PROMOTE COLLABORATION

- Keep stakeholders, including local officials and the community, informed about the progress and outcomes of the trinamiX-based piloting.
- Collect and report resultsand best practices in a catalogue.

THE PLASTIC DIET PROGRAMME

Step 1 YOUR STARTING LINE

Week 1 & 2

Begin by reading the guide or using the tool right away. Record your starting point by measuring or estimating your plastic waste on the same day each week. Enter your data in the tool or the attached sheet, continue measuring regularly, and explore the guidebook—or proceed to Step 2 when ready.

Scan the QR Code to start the survey

Step 2 SET GOALS AND PLAN ACTIONS

Week 3 & 4

Nowthat you've startedtracking your plasticuse, it's time to take action!

With your plastic use tracked, explore our tips for easy swaps and bigger changes. Set clear, achievable goals—like avoiding bottled water, using reusable bags, or choosing plastic-free products—and record them in the tool or sheet to track progress.

Remember: small steps add up! You don't have to do it all at once—focus on what works for you and build from there.

Step 3 IMPLEMENT TIPS

Put your plans into action—swap single-use items, choose plastic-free options, and try refill stations. Observe what works, adjust as needed, and share your progress with friends to stay motivated. Celebrate every small success—it's a win for you and the environment.

Week 5 & 6

Step 4 CHECK YOUR PROGRESS

Week 7

Time for a reality check—let's see how far you've come!

Review your packaging waste like in Step 1—weigh or estimate it and record the results. Compare with your starting point to see any reduction. Even small drops show your efforts are making a positive impact and can be very motivating.

Step 5 CONGRATULATIONS. YOU DID IT!

Week 8

Evaluate your progress by completing Part 2 of the survey to see your journey from start to finish. Celebrate your achievements, keep reducing plastic, and share your story to inspire others.

Overall content

We have developed a set of materials to accompany you throughout your journey of plastic reduction. It is a task-based programme, with tips and tricks fostering behaviour change, containing:

1. A guidebook.
2. A little pocket information material.
3. A digital inventory tool for you to fill out and a lit.

We're proud that you decided to start your plastic-free journey. Let's do it!

Make your first inventory of plastic consumption. Scan the QR code—it only takes 3–5 minutes!

SCAN ME