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Case study: Increasing the Recycling Rate of Ship Waste

A Pilot from the Port of Tallinn within the FIN-EST Green Corridor

Work Package 1, Activity 1.1

Authors

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1. Description of the pilot aim

1.1 Aim of the pilot

The aim of the pilot is to improve how passenger ship waste is managed and recycled on board ships and after it is delivered to port reception facilities. Passenger ships generate a range of waste streams, including food waste, packaging and mixed materials, which require consistent and high-quality source separation in order to achieve higher recycling rates.

The pilot therefore focuses on understanding how waste from passenger ships is generated and handled in practice, how effectively it is currently sorted, and where improvements in source separation could realistically increase the share of waste directed to recycling instead of disposal.

The overall objective is to increase the recycling rate of waste from ships and to support more circular waste management practices in maritime transport. As a horizontal topic, the pilot also follows emerging solutions such as onboard carbon capture technologies, recognising that these developments may play a role in future emission and waste management practices in ports and shipping.

The pilot is implemented within the framework of the FIN-EST Green Corridor, a cooperation initiative between Estonia and Finland aimed at promoting more sustainable and climate-neutral maritime connections between the two countries.

1.2 Context of the pilot

The Port of Tallinn is one of the main passenger ferry hubs in the Baltic Sea region. In 2025, approximately 8.3 million passengers travelled through the port, while before the COVID-19 pandemic annual passenger numbers exceeded 10 million. Passenger traffic is concentrated in the Old City Harbour, which serves frequent ferry connections between Tallinn and Helsinki.

The pilot focuses on five RoPax-type passenger vessels operating from the Old City Harbour and one vessel from Muuga Harbour, operated by Tallink, Viking Line and Eckerö Line. These vessels operate regular services within the FIN-EST Green Corridor and generate a continuous and predictable waste stream due to high passenger volumes and short turnaround times.

The total annual volume of ship-generated waste delivered at the Port of Tallinn, including waste from passenger vessels, cargo vessels and cruise ships, is approximately 4,000 tonnes. Passenger vessels account for the majority of this volume. The concentration of waste flows within a defined corridor and a limited number of high-frequency vessels creates favourable conditions for analysing waste handling practices and assessing opportunities to increase recycling rates through improved source separation.

2. Description of implementation

2.1 Current R-level and targets

As part of the pilot, the distribution of waste from ships across circular treatment, incineration and landfill routes was reviewed in order to describe the current situation and recent development trends.

In 2025, approximately 58% of the collected waste from ships was directed into circular economy processes, 39% went to incineration with energy recovery and around 3% ended in landfill. Data from previous years indicated a gradual increase in the share of waste directed towards circular treatment.

In this context, circular treatment refers to waste streams that are recycled or otherwise recovered as secondary raw materials, thereby supporting circular economy objectives and reducing reliance on virgin resources.

To support the overall aim of increasing recycling rates within the FIN-EST corridor, the pilot set a target of reaching **70% circular treatment by 2030**. Achieving this requires improvements in on-board sorting, closer coordination between ports and shipping companies and the development of new recycling opportunities.

2.2 Mapping and data collection for the expert study

As part of the pilot implementation, waste handling practices related to passenger ship waste were mapped and documented. This work focused on how waste was collected, sorted and stored on board ships and how it was delivered to port reception facilities. In addition, waste handling in passenger terminals and the broader city context was also reviewed to capture the full waste flow associated with passenger traffic.

The mapping and data collection were carried out to ensure that the pilot is built on a clear and realistic understanding of existing practices. This step was essential for the expert study, as the quality and relevance of its analysis depend directly on the accuracy and completeness of the mapped information.

Data collection included onboard visits, observations and the review of relevant operational information, in cooperation with shipping companies and waste management and treatment companies. The mapped material was provided as input for an external expert study carried out by SEI Tallinn (Stockholm Environment Institute Tallinn Centre), which was selected through a procurement process. The study represented a central component of the pilot and provided the analytical basis for identifying development opportunities and realistic pathways to increase recycling rates.

The full expert study report is included as Annex 1 to this document.

3. Summary of stakeholder input and feedback

Stakeholder involvement was a core element of the pilot and continued throughout the mapping and expert study process. The engagement aimed to ensure that the analysis

reflected actual operational practices and that the resulting recommendations were realistic and applicable within the FIN-EST Green Corridor context.

Stakeholder engagement took place in two main phases.

The first group consisted of direct operational partners who were closely involved in the mapping and data collection stage. This core group included the Port of Tallinn, the Port of Helsinki, shipping companies (Tallink, Viking Line and Eckerö Line) and waste management and treatment companies (Green Marine and Enefit). Their role was to provide practical and operational input on how waste from passenger ships is collected, sorted and handled on board vessels, how it is delivered to port reception facilities and how it is treated further. Their input was gathered through onboard visits, bilateral meetings and the exchange of operational documentation. This ensured that the expert study was built on a realistic and corridor-wide understanding of existing practices.

Once the expert study had been completed, the engagement expanded to include the wider port community within the FIN-EST Green Corridor framework. In addition to the core operational partners, this broader group included representatives of the City of Tallinn and the City of Helsinki.

A draft version of the SEI Tallinn report was shared with partners for written feedback prior to finalisation. After incorporating comments where relevant, one joint stakeholder workshop was organised to present the final results and discuss their practical implications and possible next steps.

In this second phase, the operational partners and the wider port community came together as a joint discussion platform. It was generally acknowledged that further progress depends on closer cooperation between ports, shipping companies and cities. Participants recognised that the recommendations require coordinated implementation efforts and agreed on the importance of continuing collaboration within the FIN-EST Green Corridor framework in order to translate analytical findings into practical measures.

4. Lessons learnt

The pilot provided several practical lessons related to both the analytical process and stakeholder cooperation.

First, the mapping phase demonstrated that collecting operational information from multiple actors can take more time than initally anticipated. Response times vary, and this has shown the importance of allowing flexibility in the timeline and maintaining regular communication throughout the process.

Another lesson has been the need to support the expert study with additional information once the initial mapping was completed. As the analysis progressed, it became clear that certain aspects required further clarification. Close cooperation with the study team has helped ensure that they receive all the information needed and that the work remains aligned with the objectives of the pilot.

The pilot has also highlighted that carbon capture from ships is still at a very early stage. While carbon capture technology has been applied in land-based contexts, its use in maritime operations remains relatively novel, with limited operational experience and no established

infrastructure to support implementation in ports. Nevertheless, it represents a broader development that ports and shipping companies may need to monitor in parallel with core waste management improvements.

Finally, **the main challenge identified during the pilot relates to ensuring coordinated implementation across all actors involved**. Improvements in waste separation and recycling require aligned action by ports, shipping companies and other partners within the corridor. If measures are implemented unevenly, the overall system impact remains limited. Ensuring consistent and harmonised application across ships, terminals and cities is therefore a key implementation challenge.

5. Next Steps

Following the completion of the expert study and the stakeholder workshop, the focus of the pilot shifts towards coordinated implementation within the FIN-EST Green Corridor.

The next phase will focus on jointly reviewing and prioritising the recommendations of the SEI study and agreeing on a feasible and coordinated approach for implementation. Particular attention will be given to measures related to improved source separation and harmonisation of waste separation systems across ships and terminals.

Further steps will be defined in cooperation with ports, shipping companies and other relevant partners to ensure that implementation is aligned across the corridor and supports progress towards the 70% circular treatment target.

While this pilot and the expert study focused specifically on the FIN-EST Green Corridor, the **recommendations are not corridor-specific and may also be applicable in other green corridors and passenger ports** facing similar challenges. Ports can create strong organisational and economic drivers for shipping companies and other relevant stakeholders to collectively improve waste collection and treatment practices. In this way, the experience gained within the FIN-EST Green Corridor may contribute to broader efforts to increase recycling rates and strengthen circular practices in maritime transport.

5.1 Work plan for the WP2

Overall objective: Implement the recommendations identified in WP1 and assess the impact of agreed measures on the recycling share within the FIN-EST Green Corridor.

❖ **Phase 1 – Preparation (Months 1–3)**

- Confirmation of participating vessels and terminals
- Agreement on harmonized source separation principles
- Agreement on how impact will be assessed at the end of WP2
- Clarification of WP1 results at the level of participating vessels (reference point)

Milestone (End of Month 3): Readiness to launch sandbox implementation.

❖ **Phase 2 – Sandbox Implementation (Months 4–10)**

- Implementation of harmonized waste separation practices on vessels and in terminals
- Staff guidance and improved communication measures
- Practical application of agreed measures during the defined testing period

Milestone (End of Month 10): Completion of sandbox implementation period.

❖ **Phase 3 – Evaluation and Next Steps (Months 11–12)**

- Consolidation of results and comparison with WP1 reference data
- Assessment of change in recycling share
- Stakeholder discussion of results
- Decisions on further scaling

Milestone (End of Month 12): Final WP2 implementation review and agreement on next steps

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Study on Increasing the Share of Recycling of Ship Waste and Passenger Waste in the FIN-EST Green Corridor

Work Package 1, Activity 1.1

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Introduction

The FIN-EST Green Corridor[1] is a green maritime corridor connecting Helsinki–Tallinn and Vuosaari–Muuga harbours. The joint initiative of the cities and ports of Helsinki and Tallinn, shipping companies and other stakeholders aims to reduce the carbon footprint of ferry journeys between Finland and Estonia.

Source: Port of Tallinn

The objective of the study is to provide an overview of the current situation regarding the collection and recycling of ship waste and passenger waste on vessels operating within the FIN-EST Green Corridor, and to analyse opportunities for increasing the recycling rate of such waste.

The study focuses on the analysis of municipal solid waste (hereinafter also referred to as "Waste") generated by relevant ships and passenger terminals, including both mixed and separately collected fractions, such as paper and cardboard, glass, metals, plastics, biowaste, wood, textiles, waste electrical and electronic equipment, batteries and accumulators, and bulky waste.

Based on the study's findings, perspectives for advancing circularity and recommendations are provided to enhance and guide waste collection and recycling in the FIN-EST Green Corridor.

The study is carried out for FIN-EST Green Corridor and co-financed by the EU Baltic Sea Region Programme project "Circular Ports – Deploying circular economy in port environments".

[1] The FIN-EST Green Corridor project was launched in October 2023, when a Memorandum of Understanding (MoU) was signed between representatives of Finland and Estonia. This agreement laid the foundation for creating a climate-neutral customer journey and establishing a green maritime transport corridor between Helsinki–Tallinn and Vuosaari–Muuga.

The main partners of the MoU are the Ports and Cities of Helsinki and Tallinn, Rederi AB Eckerö, Tallink Grupp, Viking Line, and the Estonian Ministry of Climate, with support from the Finnish Ministry of Transport and Communications. Together, the partners are committed to implementing various projects that promote sustainability, enhance competitiveness, and increase passenger and cargo flows between the two countries.

1. Methodology

The **objective of this study** is to provide a structured overview of the current situation regarding the collection and recycling of ship-generated waste and passenger-related waste on vessels and in passenger terminals operating within the FIN-EST Green Corridor. The study further aims to analyse key performance drivers, identify best practices, gaps, and improvement opportunities, and formulate practical recommendations to increase the recycling rate of such waste.

The geographical scope of the analysis covers the Port of Tallinn (Old City Harbour Terminals A and D, and Muuga Harbour[2]) and the Port of Helsinki (West Terminal 2 and Katajanokka Terminal), as well as passenger ferries and ro-pax vessels operating on the Tallinn–Helsinki route.

The thematic scope focuses on municipal solid waste, including both mixed and separately collected fractions (e.g. paper and cardboard, packaging waste, biowaste, glass, metals, wood, hazardous waste, and electronic waste). Other ship-related waste streams (e.g. oily waste, construction waste, and mineral waste) are excluded.

The analysis is based **on a combination of quantitative waste data and qualitative information** obtained from key stakeholders. The main data sources include:

- Waste collection and delivery statistics provided by the Port of Tallinn
- Waste treatment and recycling data from relevant waste management companies
- Information provided by shipping companies operating within the FIN-EST Green Corridor
- Data and documentation from the Ports of Tallinn and Port of Helsinki
- Municipal waste management information from the cities of Tallinn and Helsinki

A list of data sources is provided in Chapter 5.

The methodology combined several complementary **analytical steps**:

- Descriptive analysis of waste flows
  Waste collection and recycling statistics were analysed to describe current waste volumes, waste composition, levels of separate collection, and recycling outcomes. Particular attention was given to differences between ships, terminals, and ports, as well as trends over recent years. Where necessary, volume-based data (m^3) were converted into mass (tonnes) using established volumetric mass coefficients to allow comparability between datasets.

- Assessment of waste collection systems
  Separate waste collection practices were reviewed on board ships and in passenger terminals, covering both passenger areas and operational areas (e.g. kitchens). This included an assessment of technical solutions (e.g., centralised food waste systems and compactors), organisational arrangements, and labelling and information practices.

- Comparison of performance and identification of best practices
  Selected ships and terminals were compared to identify differences in performance, enabling factors for higher levels of source separation, and operational or technical solutions associated with better outcomes. This comparative approach was used to distinguish best practices from areas requiring improvement.

[2] This study primarily covers the Old City Harbour of Tallinn and the ships using it. Muuga Harbour is only partially included in the study, mainly through the ro-pax ferry Finbo Cargo.

- Review of waste treatment and recycling capacity
  The study analysed the further treatment of collected waste streams, with a focus on recycling performance and technical capacity on both the Estonian and Finnish sides of the corridor. Bottlenecks related to pre-treatment, sorting capacity, and specific waste fractions were identified.

- Development of recommendations
  Based on the findings of the data analysis and comparisons, structured recommendations were developed. These recommendations focus on measures that ports/terminal operators and shipping companies can realistically influence.

The recommendations are organised thematically and are grounded in identified gaps, observed best practices, and the regulatory and operational context of the FIN-EST Green Corridor.

2. Waste collection and recycling statistics in FIN-EST Green Corridor

This chapter provides an overview of waste volumes and waste management data and statistics to present the current status and recent trends in separate collection and recycling within the FIN-EST Green Corridor. The focus is on the Port of Tallinn and its waste statistics. The majority of ships operating between Tallinn and Helsinki deliver their waste at the Port of Tallinn; only Viking Line hands over its waste in Helsinki. Ships operating regular liner services in Helsinki conclude their waste management agreements directly with waste management companies. The Port of Helsinki does not collect statistics on these quantities of ship waste[3].

The waste statistics, collected by the Port of Tallinn, cover nine ships (Table 1). It should be emphasised that waste delivered by ships at the Port of Tallinn is recorded on a per-ship basis by volume (m^3), while the overall waste management data are recorded by mass (tonnes). Also, the waste collected in terminals is reported by volume (see Chapter 3.2). As a result, it is difficult to assess, on a uniform basis, the quantities of waste generated on board ships and to compare these with the reported aggregated data.

[3] The Port of Helsinki provides waste management mainly to international cruise ships and cargo ships.

Table 1 Vessels covered in the statistical overview

Shipping company	Vessel	Type of vessel	Waste reception harbour	Years of waste data
Tallink	Megastar	Passenger ferry	Old City Harbour	2020–2025
	MyStar	Passenger ferry	Old City Harbour	2022–2025
	Regal Star	Ro-pax ferry	Old City Harbour, Muuga Harbour	2022
	SeaWind	Ro-pax ferry	Old City Harbour, Muuga Harbour	2020–2021
	Silja Europa	Passenger ferry	Old City Harbour	2020–2022
	Star	Passenger ferry	Old City Harbour	2020–2023
	Victoria I	Passenger ferry	Old City Harbour	2020–2025
Eckerö Line	Finbo Cargo	Ro-pax ferry	Old City Harbour, Muuga Harbour	2020–2025
	Finlandia	Passenger ferry	Old City Harbour	2020–2025

2.1 Waste collection statistics

The waste types and quantities received from the above-listed nine ships (Finbo Cargo, Finlandia, Megastar, MyStar, Regal Star, SeaWind, Silja Europa, Star, Victoria I) at Old City Harbour are presented in Table 2.

Table 2 Types and quantities of ship waste received at Old City Harbour, Port of Tallinn, (m3), 2020–2025

Waste type	2020	2021	2022	2023	2024	2025
1. Glass packaging	**320,58**	**254,76**	**453,68**	**772,94**	**860,14**	**910,62**
2. Plastics	**361,92**	**241,36**	**396,18**	**841,44**	**966,88**	**1 069,24**
Plastic packaging	360,92	236,86	396,18	841,44	966,88	1 069,24
Film	1,00	4,50	0,00	0,00	0,00	0,00
3. Paper and cardboard	**2 020,28**	**908,54**	**1 358,84**	**1 666,64**	**1 890,20**	**1 902,36**
5. Metal	**175,89**	**144,18**	**281,57**	**526,54**	**621,48**	**682,07**
Metal packaging	163,49	142,38	276,37	526,54	621,48	681,11
Contaminated metal packaging	0,00	0,00	0,00	0,00	0,00	0,66
Scrap metal	12,40	1,80	5,20	0,00	0,00	0,30
4. Wood and wooden packaging	**89,85**	**33,06**	**71,70**	**90,60**	**66,60**	**58,21**
6. Biowaste	**1 179,86**	**1 164,37**	**1 405,45**	**1 996,51**	**2 173,24**	**2 377,71**
Food waste	1 036,72	1 019,54	1 243,62	1 813,31	1 998,04	2 193,28
Cooking oil	143,14	144,83	161,83	183,20	175,20	184,43
7. Electronics	16,34	14,91	11,47	12,73	17,43	12,41
8. Hazardous waste	**227,81**	**218,08**	**186,02**	**176,14**	**172,00**	**165,29**
Hazardous waste	135,58	171,66	121,04	136,85	134,49	126,83
Pharmaceuticals	0,04	0,44	0,02	0,00	0,01	0,06
Oily rags	92,19	45,98	64,96	39,29	37,50	38,40
9. Bulky waste	**10,50**	**0,00**	**3,00**	**3,00**	**64,00**	**34,33**
Bulky waste	0,00	0,00	0,00	0,00	5,00	11,25
Furniture	9,50	0,00	0,00	3,00	5,00	6,40
Mattresses	1,00	0,00	3,00	0,00	54,00	16,68
10. Ceramics	**0,48**	**0,10**	**0,02**	**0,00**	**1,00**	**1,50**

11. Other	**103,30**	**63,10**	**65,75**	**30,24**	**30,30**	**22,85**
12. Mixed municipal waste	**8 305,80**	**5 837,78**	**6 269,58**	**5 696,38**	**8 914,62**	**9 557,32**
Total (m³)	**12 812,61**	**8 880,24**	**10 503,26**	**11 813,16**	**15 777,89**	**16 793,91**
Separately collected waste	35,17%	34,26%	40,31%	51,78%	43,50%	43,09%

Source: Port of Tallinn

The volume of waste (m³) at Old City Harbour has increased over recent years, reaching 16 793,9 m³ in 2025. Waste generation in earlier years was affected by the Covid-19 pandemic. The share of separately collected waste, based on waste volume, increased by an average of 5,6% per year in 2020–2025, remaining at 43% in the last two years.[4]

2.2 Waste recycling statistics

According to reports from waste management companies, the total amount of waste delivered by ships operating between Helsinki and Tallinn at Old City Harbour was 3766,6 tonnes in 2024. Of this amount, 2164 tonnes were ultimately recycled, corresponding to a recycling rate of 57,45%). Thus, not all separately collected waste fractions are recycled (see also Chapter 3.3).

Table 3 Types and quantities of waste received from ships (including imported), waste left in storage previous year at Old City Harbour, Port of Tallinn, and the treatment of waste, 2024

Waste type	Waste generation	Recycling	Recovery (incineration)	Landfilling
	tonnes	tonnes	tonnes	tonnes
Glass packaging	234,39	234,39	0,00	0,00
Plastic packaging	41,33	41,33	0,00	0,00
Paper and cardboard packaging	248,55	248,55	0,00	0,00
Paper and cardboard	0,56	0,56	0,00	0,00
Metal packaging	96,99	96,99	0,00	0,00
Wooden packaging	40,26	10,76	29,49	0,00
Mixed packaging	518,50	217,77	248,88	51,85
Biowaste (food waste)	1 309,79	1 178,91	130,88	0,00
Cooking oil and fat	125,54	125,54	0,00	0,00
Electronics	1,22	0,98	0,20	0,05
Hazardous waste	46,80	8,22	37,94	0,64
Bulky waste	51,46	0,00	40,14	11,32
Mixed municipal waste	1 051,25	0,00	1 051,25	0,00
Total	**3 766,63**	**2 163,99**	**1 538,77**	**63,86**
Share of waste treatment		**57,45%**	**40,85%**	**1,70%**

Source: Port of Tallinn

The Port of Tallinn has set a target in its environmental policy to recycle 70% of waste[5].

[4] At Muuga Harbour, the average share of separately collected ship waste (from the vessels Regal Star, SeaWind and Finbo Cargo) in 2020–2025 was 27,55%.
[5] https://www.ts.ee/en/sustainability/

3. Analysis of the current situation of waste management in the FIN-EST Green Corridor

3.1 Waste collection on vessels

3.1.1 Separate collection of waste on vessels

This chapter provides a more detailed overview and analysis of the separate collection of waste on six vessels sailing in the FIN-EST Green Corridor, based on data from shipping companies.

Out of the six vessels covered by this chapter, five depart from Old City Harbour in Tallinn and one from Muuga Harbour. In Helsinki, four vessels depart from West Terminal 2, one from Vuosaari Harbour and one from Katajanokka Terminal (Table 4).

Table 4. Ships covered in the analysis of separate waste collection

Shipping company	Vessel	Type of vessel	Terminal in Tallinn	Terminal in Helsinki
Tallink	Megastar	Passenger ferry	Old City Harbour, Terminal D	West Terminal 2
	MyStar	Passenger ferry	Old City Harbour, Terminal D	West Terminal 2
	Victoria I	Passenger ferry	Old City Harbour, Terminal D	West Terminal 2
Eckerö Line	Finlandia	Passenger ferry	Old City Harbour, Terminal A	West Terminal 2
	Finbo Cargo	Ro-pax ferry	Muuga Harbour	Vuosaari Harbour
Viking Line	Viking XPRS	Passenger ferry	Old City Harbour, Terminal A	Katajanokka Terminal

All of the vessels analysed have waste management procedures/guidelines in place. However, the collection systems for waste classified as municipal waste differ between vessels. Separate waste collection depends primarily on the technical characteristics of the ship, which largely determine the possibilities for centralised waste collection and handling. In addition, the type and operational profile of the vessel influence the level and structure of separate collection. For example, MS Finbo Cargo differs from the mainly passenger-oriented vessels operating between Tallinn and Helsinki, as it functions primarily as a car and truck carrier. This results in different on-board consumption patterns and passenger flows, which in turn affect the composition and volume of generated waste streams and the practical organisation of waste separation.

In addition, slightly different waste separation principles are applied on different vessels, including variations in collection equipment (incl. waste bins and containers) and labelling (pictograms and text). These differences reflect the overall waste management arrangements and background of each shipping company, as well as how, whether, and to what extent separate collection is organised in different areas of the ship (e.g. passenger areas, kitchens, bathrooms, service rooms).

Below is a brief overview of the arrangements for the separate collection of municipal-type waste on six vessels operating between Tallinn and Helsinki. Since Megastar is a sister ship to MyStar, their waste management procedures are similar and analysed together (Table 5).

Table 5. Main waste fractions collected on board the ships

Waste type	MyStar/ Megastar	Victoria I	Finlandia	Finbo Cargo	Viking XPRS
1. Glass packaging	x	x	x	x	x
2. Plastic packaging	x	x	x	x	x
Plastic film					x
Plastic pallets			x	x	x
3. Paper, cardboard	x	x	x	x	x
5. Metal packaging	x	x	x	x	x
4. Wood	x	x	x	x	x
Wooden pallets	x	x	x	x	x
6. Biowaste	x	x	x	x	x
Food waste	x		x	x	x
Cooking oil	x	x	x	x	x
Coffee grounds					x
7. Electrical and electronic equipment waste	x	x	x	x	x
8. Hazardous waste	x	x	x	x	x
9. Porcelain/ceramics			x	x	x
10. Textile, carpets					x
11. Mixed municipal waste	x	x	x	x	x

In general, all vessels collect packaging waste, paper, wooden pallets, cardboard, and bio-waste/cooking oil separately. Hazardous waste and electronic waste are also collected separately on all vessels.

Separate waste collection in passenger areas is organised to some extent on all vessels (see Table 6). However, the number and type of waste bins intended for separate collection vary between vessels. The same applies to waste-prevention measures (e.g., reducing single-use items and promoting reuse). Single-use cups are still in use in ship cabins.

Table 6. Separate waste collection in passenger areas

Waste type	MyStar, Megastar, Victoria I	Finlandia, Finbo Cargo	Viking XPRS
Bins for separate waste collection	In a few places	In many places	In several places
Packaging waste	Bins for plastic, metal and glass packaging	Bins for cans, bottles and plastic waste	Bins for metal and glass packaging
E-cigarettes	x		
Batteries			x

The following provides a summary of the separate collection of waste by ship. It should be noted that the waste data is presented on a volume basis (except for Viking XPRS), and since waste types differ in volumetric weights, this data does not reflect the actual share of separate collection, which is measured on a weight basis.

MS MyStar

MyStar started operating on the Tallinn–Helsinki route in December 2022. The share of separately collected waste (volume-based) between 2023 and 2025 ranged from 48,6% and 50,8%, with an average of 49,9% (*Figure 1*).

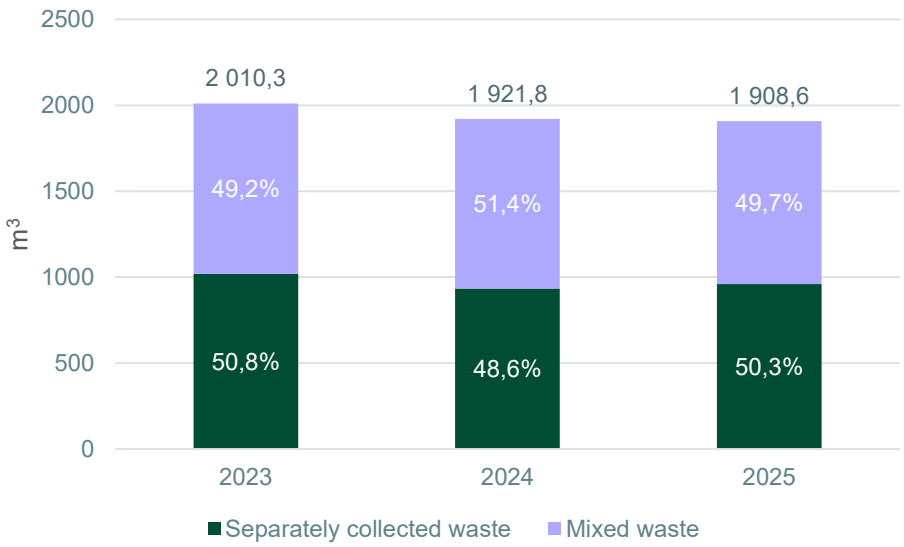


Figure 1. Total ship waste (m^3) collected on MS MyStar, shares of separately collected waste and mixed waste, 2023–2025

MS Megastar

The share of separately collected waste (volume-based) between 2020 and 2025 ranged from 50,4% and 57,1%, with an average of 53,2%. However, in the last two years, the separate collection rate has been lower than the average (*Figure 2*).

Figure 2. Total ship waste (m^3) collected on MS Megastar, shares of separately collected waste and mixed waste, 2020–2025

MS Victoria I

The operation of Victoria I was suspended from January 2021 due to the Covid-19 pandemic situation. The service between Tallinn and Helsinki started again on 12 October 2023. The average rate of separately collected waste (volume-based) in the last two full years of operation, 2024 and 2025, has been 20,6% (*Figure 3*).

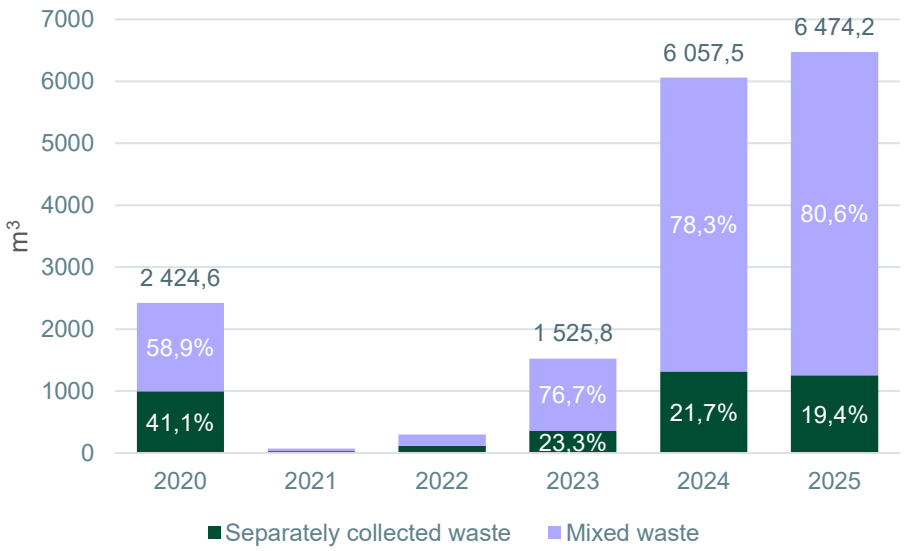


Figure 3. Total ship waste (m^3) collected on MS Victoria I, shares of separately collected waste and mixed waste, 2020–2025

MS Finlandia

The share of separately collected waste at MS Finlandia significantly increased from 30,4% in 2020 to 62,4% in 2025 (*Figure 4*).

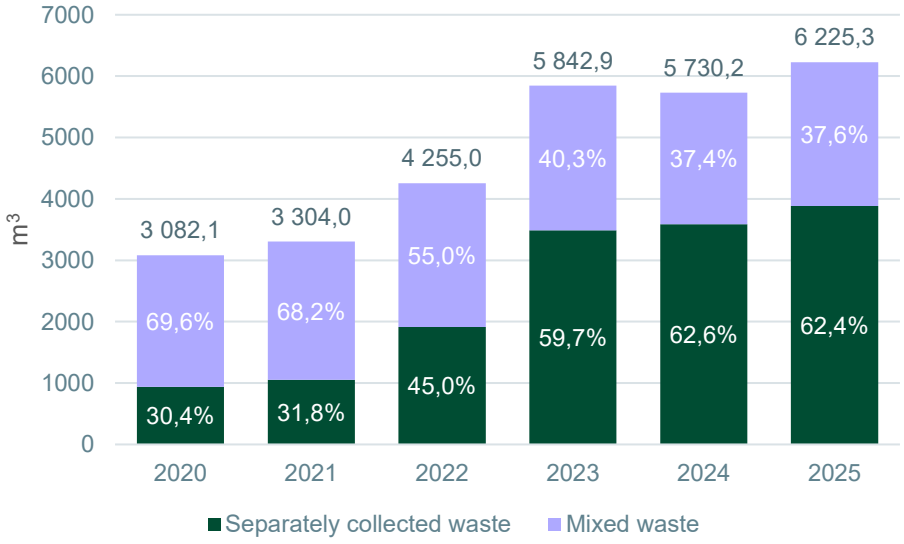


Figure 4. Total ship waste (m^3) collected on MS Finlandia, shares of separately collected waste and mixed waste, 2020–2025

MS Finbo Cargo

The share of separately collected waste (volume-based) 2020–2025 ranged from 23,4% to 42,9%, with an average of 29,9%. However, since 2022, the separate collection rate has been below 30% (*Figure 5*).

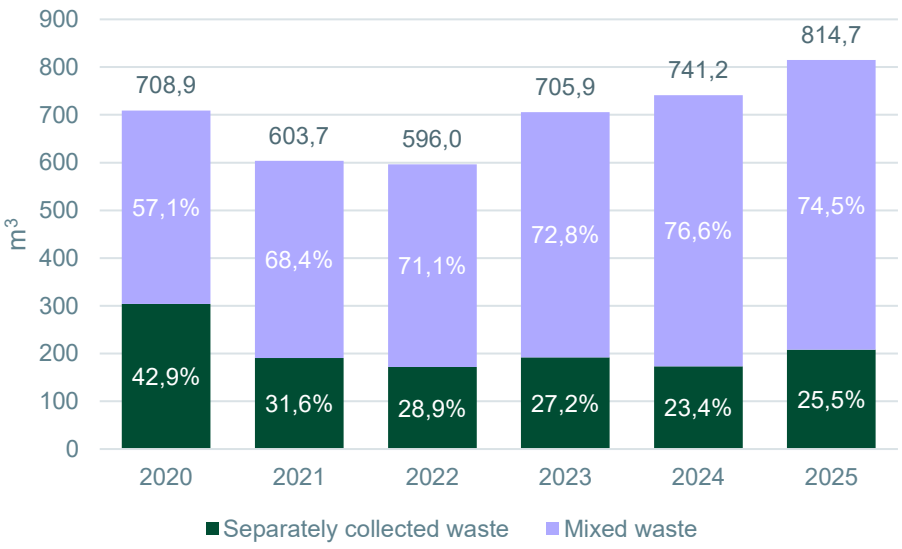


Figure 5. Total ship waste (m^3) collected on MS Finbo Cargo, shares of separately collected waste and mixed waste, 2020–2025

MS Viking XPRS

For Viking XPRS, the waste data was available for 2022–2025 on a weight basis. The share of separately collected waste in these years ranged from 63,4% to 70,2%, with an average of 67,9% (*Figure 6*). In addition, approximately 7000 kg of used cooking oil and 16 000 kg of used coffee grounds have been collected annually on Viking XPRS since 2024, separate from the other waste fractions.

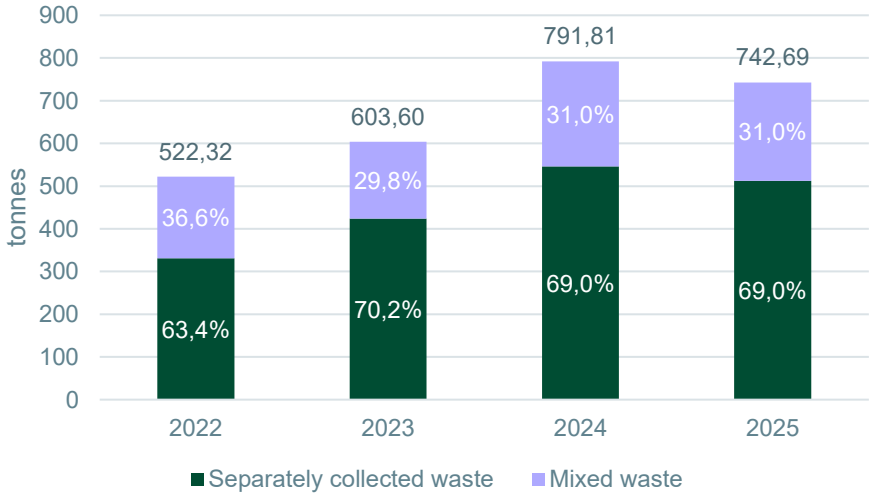


Figure 6. Total ship waste (t) collected on MS Viking XPRS, shares of separately collected waste and mixed waste, 2022–2025

Sorting instructions for ships provided by ports

Both ports also provide sorting instructions for ships. The instructions for sorting waste types at Old City Harbour and the Port of Helsinki are summarised in

Table 7.

Table 7. Waste sorting instructions for passenger ships at Old City Harbour and the Port of Helsinki

Waste type	Old City Harbour, Sorting manual for passenger ships	Port of Helsinki, Sorting instructions
Glass	Glass	Glass packaging: - empty bottles - empty jars no crystal, porcelain, ceramics, window or mirror glass, light bulbs, bottle caps or jar lids
Plastic	Plastic wrappers, plastic boxes and bottles	Clean plastic packaging
Cardboard	Cardboard and boxes	No paper, wet or dirty cardboard, foliated packs, expanded polystyrene or plastic.
Paper	Waste paper (newspapers, magazines, etc.)	
Metal packaging	Tins	- tins - aluminium tins and foil - metal lids - crown and screw caps - soft drink tins no paint tins, aerosols, batteries or other hazardous waste, cables or tubes
Scrap metal	Scrap metal	Metal pipes and cables, wire ropes, taps, fittings, pullers, nails, metal containers, furniture hardware, machinery and equipment made of metal
Wood	Pallets and other timber	No broken pallets
Food waste	Food waste	Food waste
Cooking oil	Cooking oil	Cooking oil
Electrical and electronic equipment waste	Electrical and electronic equipment waste	Discarded information and communication equipment, household appliances, consumer electronics, lighting fixtures, electrical and electronic tools, monitoring and control equipment, vending and slot machines
Hazardous waste	Oily rags, paint, varnishes, solvents, oil filters, batteries and accumulators, lamps, fluorescent and energy saving light, dirty/soiled packaging, medicines and other medical waste	Batteries, fluorescent tubes, paints, solvents, photographic material, dry cleaning chemicals, medicines and x-ray materials
Mixed waste	Mixed domestic waste and non-recyclable waste: mixed domestic waste sorting leftovers (dirty/soiled paper and cardboard, dirty/soiled plastic and wrappers; ropes, etc.) pottery and porcelain (tableware, vases, ashtrays, etc.)	Mixed waste

Sources: Port of Tallinn[6], Port of Helsinki[7]

Comparison of separate waste collection outcomes

The data illustrating source separation on board ships show that the level of separation depends not only on technical solutions but also on how waste separation is organised in different areas of the vessel. For example, technical possibilities such as the centralised collection of food waste (see also Chapter 3.1.2), as well as the availability of separate waste collection facilities in different ship areas (see also *Table 6*), can increase the overall share of separately collected waste.

To analyse the efficiency and outcomes of separate waste collection on board ships, a comparison was conducted between the similar vessel types operated by two companies, Tallink and Viking Line. The Tallink vessels Megastar and MyStar, and the Viking Line vessel Viking XPRS, are broadly comparable in terms of technical design and centralised

[6] https://www.ts.ee/wp-content/uploads/2020/03/Sorting-manual-Old-City-Harbour.pdf
[7] https://www.portofhelsinki.fi/en/professionals/information-for-port-users/instructions/waste-handling-instructions/

waste-collection systems for the main waste streams. For example, all three vessels are equipped with modern biowaste collection systems, in which food waste is shredded using a disposer and directed to a designated centralised collection tank. In addition, the vessels are equipped with compactors for separately collected waste streams, such as paper and cardboard (see also Chapter 3.1.2). While the technical design of waste collection systems is generally similar, differences exist in the organisation and implementation of separate waste collection on board.

Table 8 presents a comparison of waste collection practices on Viking XPRS, Megastar, and MyStar.[8]

Table 8. Separate collection of waste and mixed waste (tonnes, %) on Viking XPRS, Megastar and MyStar, 2025

Waste type	Viking XPRS*	Megastar**	MyStar**
Glass packaging	30,44	43,05	44,91
Plastic packaging	6,98	3,02	2,69
Paper and cardboard packaging	81,56	17,10	26,25
Metal packaging	12,94	12,35	11,58
Biowaste (excl. cooking oil)	367,44	158,30	164,70
Hazardous waste	2,15	30,83	19,13
Electronic waste	0,74	2,00	0,37
Other	10,38	4,61	2,60
Mixed waste	230,06	181,08	170,82
Total (t)	**742,69**	**452,34**	**443,05**
Share of separately collected waste	69,02%	59,97%	61,44%
Share of mixed waste	30,98%	40,03%	38,56%

*Sources: *Viking Line, **volumetric mass coefficients are based on HSY and Keskkonnaministeerium 2006*

Although the comparative analysis is based on volume-to-mass conversions and should therefore be interpreted with caution, the results indicate that Viking XPRS achieves a higher share of separately collected waste than the Tallink vessels Megastar and MyStar. This difference may be partly explained by a more efficient organisation of source separation on board, especially in kitchens, shops, and other specific areas where waste generation is intensive. On Viking XPRS, there are more waste bins with separate compartments in public areas than on the Tallink vessels, where only a limited number of separate collection bins are available, with the majority intended for mixed waste. Additional organisational factors may also contribute to the more effective source separation observed on Viking XPRS. For example, weight-based delivery of collected waste streams provides economic incentives for separating waste.

3.1.2 Best practices applied on vessels

Separate waste collection in passenger areas

All ships operating between Tallinn and Helsinki have some level of separate waste collection in passenger areas (see also Chapter 3.1.1). The photographs below illustrate the waste bins used for separate collection, including their compartments and labelling (pictograms and text).

[8] To estimate the weight of waste fractions for Megastar and MyStar, conversion coefficients from HSY and the Estonian Ministry of the Environment were applied. As both Tallink vessels reported zero quantities of paper and cardboard in 2024 and 2025, the 2023 data were used to estimate the approximate annual amounts of the paper and cardboard fraction.

Source: Port of Tallinn

Photo 1. Separate waste collection bin with three compartments for plastic packaging, metal packaging and mixed waste, ***on board MS MyStar***

Source: Port of Tallinn

Photo 2. Separate waste collection bins for plastic packaging, metal packaging, glass packaging and mixed waste, ***on board MS Victoria I***

Source: Port of Tallinn

Photo 3. Separate waste collection bin with three compartments for cans and bottles, plastic waste and mixed waste, ***on board MS Finlandia and Finbo Cargo***

Source: Port of Tallinn

*Photo 4. Separate waste collection **bins on board MS Viking XPRS** (on the left: for paper, biowaste and mixed waste, on the right: for glass packaging, aluminium cans and mixed waste)*

In some ships (MyStar, Megastar, Victoria I, Viking XPRS), it is possible to collect e-cigarettes and batteries separately.

Source: Port of Tallinn

*Photo 5. Battery recycle bin **on MS Viking XPRS***

Use of waste compactors

Several ships use waste compactors, which significantly reduce the volume of waste generated on board. Compactors are used for paper and cardboard waste (Finbo Cargo, Finlandia, MyStar/Megastar, Victoria I), for metal packaging (Finlandia), for plastic waste (Victoria I) and for mixed waste (MyStar/Megastar).

Source: Port of Tallinn

*Photo 6. Waste compactors on **MS MyStar** (on the left: for paper and cardboard, on the right: for mixed waste)*

Source: Port of Tallinn

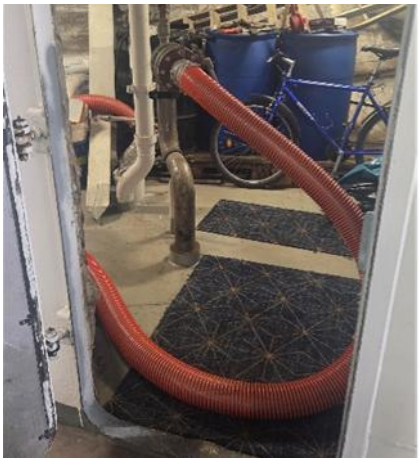
*Photo 7. Waste compactors for paper and cardboard (on the left: **MS Finlandia**, on the right: **MS Finbo Cargo**)*

Centralised food waste collection

On three ships (MyStar/Megastar and Viking XPRS), food waste is collected through a centralised system. Food waste generated in kitchens is shredded in a disposer and directed to a central collection tank on the car deck, from which it is pumped into a tanker truck. This system makes food waste collection significantly easier than conventional collection with separate bins.

In addition, the system enables a substantially higher share of food waste to be collected and allows pulped biowaste to be sent directly to biogas plants for biological (anaerobic) treatment. As evidenced by waste data from different vessels, this system results in higher amounts of food waste being collected and recycled.

Viking XPRS has also introduced a separate collection of used coffee grounds, which is recycled to plant soil.



Source: Port of Tallinn

*Photo 8. Food waste collection solutions (on the left: directing food waste from the kitchen to a storage tank on the car deck, from where it is pumped into a tanker truck, **MS Viking XPRS**; on the right: disposer in the kitchen of **MS MyStar**).*

Incentives to encourage separate waste collection on ships

The ports of Tallinn and Helsinki apply different waste collection and treatment fee systems to incentivise separate waste collection on board ships and to promote higher recycling rates.

Port of Helsinki

The Port of Helsinki offers a 5% discount on the waste management charge for vessels demonstrating environmentally sound on-board waste management. The discount is granted based on the use of equipment or operational practices that reduce waste generation and ensure sustainable waste management.

To qualify for the discount, vessels must meet one of the following criteria:

- On-board waste segregation:
  Waste must be segregated in accordance with Resolution MEPC.295(71) and delivered to adequate port reception facilities in compliance with Article 4(2)(d) of Directive (EU) 2019/883. Compliance must be demonstrated through at least one of the following verification methods: Green Award, ISO 21070, Blue Angel, Green Marine, Waste Delivery Receipt, a vessel-specific Garbage Management Plan approved by the vessel's classification society, or an ISO 14001 Environmental Management System.

- Environmentally sustainable purchasing policies:
  Measures include reducing packaging materials (e.g. through bulk packaging) and avoiding single-use plastics. Compliance must be demonstrated through one of the following verification methods: Green Award, ISO 21070, Blue Angel, Green Marine, a vessel-specific Waste Management Plan approved by the vessel's classification society, or an ISO 14001 Environmental Management System.

Port of Tallinn

At the Port of Tallinn, a preferential tariff (approximately a 10% reduction) applies only to cruise ships that deliver their waste, sorted by type, to the port.

3.1.3 Areas for improvement

Although all ships operating between Tallinn and Helsinki have implemented a certain level of separate waste collection, several areas for improvement remain.

Passenger areas:

- **Lack of harmonisation in waste collection systems.** Different ships use different types of waste bins in public areas, apply varying waste fraction divisions, and use different labels (pictograms and text). In addition, waste separation systems differ between ports and passenger terminals. This lack of harmonisation does not support a clear and consistent understanding of waste separation requirements among passengers and may reduce the effectiveness of source separation. It can also lead to confusion, incorrect disposal, and lower-quality waste collected separately.
- **Inconsistent availability of bins with separate compartments.** The use of waste-collection bins with separate compartments is inconsistent across vessels. On several ships, the majority of waste bins in public areas are intended

only for mixed waste, which limits passengers' opportunities to segregate waste types at source.

Kitchens:

- **Uncertainty about how to handle dirty food packaging leads to overuse of mixed waste fractions.** Instead of rinsing, plastic packaging and wrapping film are often thrown directly into the mixed waste container because they can be dirty.

General:

- **Using black garbage bags for sorted waste on some vessels.** In non-transparent bags, the waste is not visible, so the collected waste type may end up in the wrong container, or it may take longer to find the right one.
- **Inconsistent approach to labelling of central waste containers on some vessels**. The stickers on the containers indicating the type of waste being collected and the labels on the wall above the containers do not match, creating confusion and making proper waste sorting difficult.
- **Uncertainty regarding the quality and fate of separately collected waste.** It is unclear to what extent separately collected waste maintains sufficient quality for recycling and whether it is consistently delivered separately for further treatment. Indirect evidence suggests that, for various operational reasons, waste intended for separate collection may ultimately be mixed with or collected as mixed waste.

3.2 Waste collection in terminals

In addition to ship-generated waste, waste is also collected at the passenger terminals.

3.2.1 Separate collection of waste in terminals

At the Port of Tallinn, waste collected at passenger terminals is handed over to waste management companies selected by the city through public tender, as the terminals are included in the City of Tallinn's organised waste collection system.

Waste collected at the **Old City Harbour passenger terminals** (Terminals A and D) is reported on a volume basis (m^3). In order to estimate total waste generation at the Old City Harbour, including both ship-generated and terminal waste, the terminal waste volumes were converted into mass using volumetric mass coefficients (*Table 9*, see also Chapter 3.1.1).

Based on this approach, total waste generation at the Old City Harbour terminals is estimated to be approximately 142 tonnes annually. The share of separately collected waste (i.e. potentially recyclable waste) is estimated at approximately 21% (volume-based 36%), which is significantly lower than the separate collection and recycling rate for ship-generated waste (volume-based separate collection 43% and weight-based recycling 57,45%; see Table 2 and Table 3).

The passenger terminals at the Old City Harbour, as well as the public areas, are equipped with waste collection bins with separate compartments for source separation (see also Chapter 3.2.2). Also, companies operating and renting premises in terminals have to sort their waste.

Table 9. Estimated annual waste generation in Terminals A and D of Old City Harbour, Port of Tallinn, by volume (m^3) and weight (t)

Waste type	Annual volume of waste (m^3)*	Volumetric mass coefficient (t/m^3)**	Annual weight of waste (t)
Paper and cardboard	62	0,15	9,36
Mixed packaging	260	0,05	13,00
Biowaste	25	0,3	7,49
Mixed waste	624	0,18	112,32
Total	**971**	**-**	**142,17**
Separately collected waste	**35,76%**	**-**	**20,99%**

*Sources: *Port of Tallinn, **HSY; Keskkonnaministeerium 2006*

At the Port of Helsinki, waste collected is reported on a weight basis. *Table 10* shows the comparison of separately collected waste at the terminals of the Port of Helsinki. Since Katajanokka Terminal also services other lines besides the Tallinn–Helsinki line, the amount of waste in this terminal has been recalculated based on the share of passengers on the Tallinn–Helsinki line (Viking XPRS). The results indicate that in 2025, the share of separately collected waste at Katajanokka Terminal was approximately 2,5 times higher than at West Terminal 2 (*Table 10*).

Table 10. Waste generation in West Terminal 2 and Katajanokka Terminal, Port of Helsinki, by weight (t), 2024–2025

Waste type	EWC Code	West Terminal 2		Katajanokka Terminal*	
		2024	2025	2024	2025
Plastic packaging	15 01 02	-	-	0,18	0,60
Glass, glass packaging	15 01 07	2,4	2,59	4,23	4,04
Absorbents, filter materials	15 02 02*	-	0,24	-	-
Paper and cardboard	20 01 01	9,42	6,48	2,69	2,95
Biowaste	20 01 08	8,4	6,84	13,57	13,35
Fluorescent tubes	20 01 21	-	-	0,04	-
Metal	20 01 40	0,32	0,40	0,41	1,18
Energy waste for incineration	20 01 99	1,52	1,39	-	-
Mixed waste	20 03 01	63,75	62,26	19,44	20,69
Total (tonnes)		**85,81**	**80,20**	**40,55**	**42,81**
Separately collected waste		**23,94%**	**20,64%**	**52,07%**	**51,66%**

*Source: Port of Helsinki, * based on the share of Viking XPRS passengers in total passengers*

At the passenger terminals of the Port of Helsinki, waste collection bins with separate compartments for source separation are currently not available in public areas, indicating that there is still scope for improvement. Waste data show that the share of separately collected waste at the Port of Helsinki terminals is somewhat higher than at comparable terminals in the Port of Tallinn, with particularly higher figures observed at the Katajanokka terminal. This difference may partly be explained by more effective waste sorting practices by terminal operators during internal handling at Katajanokka. However, this does not eliminate the need to further improve source separation in public areas, as the absence of separate collection options for passengers limits the potential for higher-quality separation at source.

3.2.2 Best practices applied in terminals

The Port of Tallinn has installed waste collection bins with separate compartments in both the passenger terminals and the surrounding outdoor areas (see examples below). All such bins are clearly marked with pictograms and textual labels in both Estonian and English.

Source: Port of Tallinn

Photo 9. Separate waste collection bin with three compartments for packaging waste, paper waste and mixed waste, Terminal D, Tallinn

Source: Port of Tallinn

Photo 10. Separate waste collection bin with three compartments for packaging waste, paper waste and mixed waste, outside area of Terminal D, Tallinn

Source: Port of Tallinn

Photo 11. Separate waste collection bin with three compartments for packaging waste and mixed waste, Terminal A, Tallinn

3.2.3 Areas for improvement

Waste bins with separate compartments at the Old City Harbour terminals are not standardised. In different terminals, waste bins with different designs and pictograms are used. It is also unclear whether waste collected in separate compartments is ultimately handled separately or mixed during collection (see Chapter 3.2.1).

Furthermore, the design of waste bins, the division by waste fractions, and the information provided on the bins (pictograms and text) are not harmonised with the separate waste collection systems used on ships.

At the West Terminal of the Port of Helsinki, waste in public areas and outdoor spaces is collected using single-compartment bins intended solely for mixed waste (see examples below).

Source: Port of Tallinn

Photo 12. Waste bins, West Terminal 2 (on the left: inside the terminal, on the right: outside area), Helsinki

3.3 Waste recycling

This chapter provides a brief overview of further treatment of waste collected from ships and terminals, with a particular focus on recycling. In addition, it presents a summary of current municipal waste treatment capacities, as well as planned and potential near-term capacities, based on the development plans of relevant regions (including Tallinn and Helsinki cities) on both coasts of the FIN-EST Green Corridor.

3.3.1 Recycling of ship waste received at the Port of Tallinn and at the Port of Helsinki

Port of Tallinn

AS Green Marine, a subsidiary of the Port of Tallinn, is responsible for the reception of waste from ships at the harbours of the Port of Tallinn. The company manages the collection and transport of ship-generated waste and organises its further treatment in cooperation with other

waste management companies that provide sorting, recycling, recovery (including incineration), and disposal services.

Table 11 shows the end-handlers by waste type, along with the quantities of waste received at the Old City Harbour, Port of Tallinn, as of 2024.

Table 11. Recycling of ship waste received at the Old City Harbour, Port of Tallinn, 2024

Waste type	Waste quantity (tonnes)	End-handlers/recyclers
Glass packaging	234,39	Eesti Keskkonnateenused OÜ, RP Pakend OÜ, Ragn-Sells AS
Plastic packaging	41,33	RP Pakend OÜ, Eesti Keskkonnateenused OÜ, Ragn-Sells AS
Paper and cardboard packaging; paper and cardboard	249,11	Eesti Vanapaber OÜ, RP Pakend OÜ, Ragn-Sells AS;
Metal packaging	96,99	Kuusakoski OÜ, Cronimet OÜ
Wooden packaging	40,26	Woodexpo OÜ, Puidukäitlus OÜ, Käitlusexpert OÜ, TH Hake OÜ
Mixed packaging	518,50	Paikre OÜ, RP Pakend OÜ, Ragn-Sells AS
Biowaste	1435,33	Aravete Biogaas OÜ, EKT Ecobio OÜ, Tallinna Jäätmete Taaskasutuskeskus OÜ
Hazardous waste (incl. electronics, contaminated materials, chemical waste)	48,02	Epler&Lorenz AS, OÜ EcoPro, Ragn-Sells AS
Bulky waste	51,46	AS Green Marine, Tallinna Jäätmete Taaskasutuskeskus OÜ
Mixed waste	1 051,25	Enefit Green AS, Paikre OÜ

Source: Port of Tallinn

Separately collected recyclable waste streams are sent for pre-treatment prior to final recycling. During this process, a portion of the materials and impurities is removed; as a result, the final amount of material recycled may be lower than the mass of waste entering the process. This outcome depends on several factors, including the purity of the source-separated materials, the available technical capacity for pre-treatment (in particular, sorting capacity), and economic considerations such as the market value of secondary materials and the availability of recycling outlets.

As shown in *Table 12*, the greatest losses during pre-treatment occur in the mixed packaging stream (approximately 40% of the input is recycled), followed by wooden packaging (approximately 27%) and hazardous waste (approximately 17%). In contrast, higher final recycling rates are achieved for biowaste (approximately 90%) and electronic waste (approximately 80%). Other recyclable waste streams are fully recycled.

Based on this information, it can be concluded that the existing technical recycling capacity is generally sufficient to ensure high recycling rates for most separately collected waste streams. Mixed packaging – particularly mixed plastic packaging –remains the waste stream with the greatest potential for further improvement. This challenge has also been highlighted by several waste management companies, including AS Green Marine and Enefit Industry AS.

In Estonia, the main bottleneck in achieving higher recycling rates for (mixed) packaging waste is the limited availability of modern sorting facilities capable of delivering higher sorting quality and producing higher-quality separated materials. In addition, the relatively

small volumes of waste currently treated reduce economic incentives to invest in advanced pre-treatment and recycling solutions for specific waste fractions, particularly mixed plastics.

There have been discussions in Estonia about enhancing plastic packaging recycling through chemical recycling based on existing pyrolysis technologies. However, according to recent information, the chemical recycling facility under development by AS VKG was cancelled at the end of 2025. Nevertheless, interest in chemical recycling remains, and another company is reportedly planning to invest in a chemical recycling facility using plastic packaging waste as input. If realised, such an investment could increase recycling capacity for this difficult-to-recycle waste stream in the near future.

As the collection and treatment (including recycling) of packaging waste are organised under Extended Producer Responsibility (EPR) schemes in both Estonia and Finland, further improvements in recycling performance for packaging waste streams depend in part on the development of these systems. However, pre-treatment opportunities in Estonia are expected to improve in the coming years, as plans have been agreed to construct a new modern sorting facility with a capacity of approximately 25 000 tonnes per year.

Table 12. Recycling by materials, Old City Harbour, Port of Tallinn, 2024

Waste type	Waste generation	Recycling	
	tonnes	tonnes	%
Glass packaging	234,39	234,39	100,00%
Plastic packaging	41,33	41,33	100,00%
Paper and cardboard packaging	248,55	248,55	100,00%
Paper and cardboard	0,56	0,56	100,00%
Metal packaging	96,99	96,99	100,00%
Wooden packaging	40,26	10,76	26,74%
Mixed packaging	518,50	217,77	42,00%
Biowaste (food waste)	1 309,79	1 178,91	90,01%
Cooking oil and fat	125,54	125,54	100,00%
Electronics	1,22	0,98	80,00%
Hazardous waste	46,80	8,22	17,56%
Bulky waste	51,46	0,00	0,00%
Mixed municipal waste	1 051,25	0,00	0,00%
Total	**3 766,63**	**2 163,99**	**57,45%**

Source: Port of Tallinn

Port of Helsinki

Among the passenger ships operating between Tallinn and Helsinki, only Viking Line delivers waste in Helsinki. Viking Line has direct contracts with waste management companies Envor Group (biowaste), Rasmix Oy (cooking oil and coffee grounds) and Ekopartnerit Oy, which is responsible for the collection, transport, and treatment of ship-generated waste. Separately collected recyclable waste streams are sent for further treatment, including pre-treatment and recycling. Biowaste is used as a feedstock for biogas production, while used cooking oil is processed into hydrotreated vegetable oil (HVO) and coffee grounds are converted into plant soil. Residues from sorting processes, as well as mixed waste, are incinerated for energy recovery. According to data provided by Viking Line, no waste is directed to disposal (landfilling).

Overall, adequate technical capacity exists on the Finnish side to ensure high recycling rates for most separately collected waste streams. Biowaste treatment capacity is sufficient, with biowaste from businesses mainly processed in private biogas plants and biowaste from households treated at HSY's biowaste sorting facility, where it is converted into biogas and organic fertiliser.

In the case of plastic packaging, however, sorting capacity has been limited, and plastic packaging waste has therefore been exported to other Nordic countries for sorting. Additional sorting capacity is expected to become available in Finland in 2026. Furthermore, ongoing technological developments (particularly in chemical recycling) are increasing recycling rates for plastic packaging types that are otherwise difficult to recycle.

3.3.2 Waste management systems in the cities of Tallinn and Helsinki

The waste management systems of the two cities, Tallinn and Helsinki, within the FIN-EST Green Corridor play an important role in the functioning and further development of waste management and recycling systems, as well as in shaping port-related infrastructure – particularly passenger terminals – and the operational context for ships sailing between the two cities. This is because city waste management systems are an integral part of the Corridor's common operational environment, where ships, terminals, passengers, and service providers interact on a daily basis.

At the same time, it should be recognised that cities have only a limited and mostly indirect influence on the design and day-to-day operation of waste collection and recycling systems on board ships and within ports.

City of Helsinki

In Finland, municipalities are legally responsible for organising the collection and treatment of municipal solid waste generated by households and municipal activities. Municipal waste management covers waste streams such as mixed household waste, separately collected recyclables, and biowaste, as well as the provision of waste management services and guidance to residents. This responsibility is defined in the Finnish Waste Act and applies to all municipalities, including the City of Helsinki.

In the Helsinki metropolitan area, municipal waste management services are organised by the Helsinki Region Environmental Services Authority (HSY), which is responsible for the collection, transport, and treatment of municipal waste for residents of Helsinki and neighbouring municipalities (Espoo, Vantaa, Kauniainen) as well as Kirkkonummi.

Under the Finnish Waste Act, businesses generally have primary responsibility for organising the collection and treatment of the waste they generate. Companies are therefore required to ensure that their waste is collected and properly treated, through recycling, recovery, or disposal, in accordance with legal requirements. As a result, the City of Helsinki is not obliged to provide waste collection services for business waste. Instead, businesses typically contract directly with private waste management companies. This arrangement also applies to the Port of Helsinki and to ships delivering waste there. As described above (see Chapter 3.3.1), both shipping companies and passenger terminals at the Port of Helsinki have direct contracts with waste management companies that organise waste treatment and ensure compliance with legal recycling requirements and targets.

Consequently, the City of Helsinki has limited direct influence over waste management systems, especially the recycling performance of ships and port operations. Nevertheless, the city plays an important role in supporting the development of a harmonised waste

collection system within the FIN-EST Green Corridor. This includes taking into account current and future developments in waste collection systems, supporting information provision and awareness-raising activities, and ensuring compatibility between municipal waste systems and waste streams generated at ports and terminals (see Chapter 4.1). In addition, the municipal waste treatment system could provide recycling opportunities for several separately collected recyclable waste streams originating from ships and terminals.

According to information provided by the City of Helsinki, existing recycling and treatment capacity is generally not a significant barrier to achieving higher recycling rates. As stated above, the main challenges relate instead to effective source separation and the quality of pre-treatment of collected waste. In the case of plastic packaging, sorting capacity has been insufficient, and further development of pre-treatment and recycling capacity depends largely on the producer responsibility system. By contrast, existing capacity for treating separately collected biowaste is sufficient.

City of Tallinn

In Estonia, municipal waste management is based on an organised waste collection system, under which all waste generators within a defined service area, households, public institutions, and businesses, are required to hand over their municipal waste to a waste management company selected by the local municipality through a public tender. This system also applies in the City of Tallinn and ensures uniform service provision, tariff/fee setting, and compliance with waste separation requirements. In Tallinn, the city procures waste collection services separately from waste treatment services for different waste fractions, allowing greater flexibility in selecting treatment solutions.

This approach differs from the waste management system in Finland, where businesses are generally not obliged to use municipal waste management services and are instead responsible for organising the collection and treatment of their municipal-type waste themselves, typically through direct contracts with private waste management companies.

Until today, organised waste collection in Estonia has covered the following municipal waste fractions: mixed municipal waste, paper and cardboard and biowaste. However, recent amendments to the Estonian Waste Act adopted at the end of 2025 significantly expand the scope of mandatory separate collection. Under the updated legislation, organised waste collection must also include the separate collection of mixed packaging waste (plastic packaging, metal packaging, and composite (carton) packaging), as well as glass packaging. Final treatment and recycling of packaging waste are organised under extended producer responsibility schemes. As a result, the minimum set of separately collected municipal waste fractions in organised waste collection areas will include mixed waste, paper and cardboard (including packaging), biowaste, mixed packaging, and glass packaging. The new separate collection requirements will be enforced once new waste collection tenders are launched.

An important exception within the Estonian system applies to ship-generated waste. Infrastructure operators such as the Port of Tallinn are exempt from organised waste collection requirements with respect to ship waste, which is managed under dedicated port reception facility arrangements (see Chapter 3.3.1). However, passenger terminals and other port-based public facilities generating municipal waste (except separately collected mixed packaging) on land fall fully under the city's organised waste collection system. Consequently, waste generated at passenger terminals in the Port of Tallinn must be handed over to the waste management company selected by the City of Tallinn through organised waste collection and must comply with municipal requirements for separate collection of the relevant waste fractions.

The Estonian organised waste collection system provides the City of Tallinn with stronger regulatory and contractual tools to influence waste separation practices, service standards, and recycling performance across all waste generators, including passenger terminals. Similar to Helsinki, the City of Tallinn plays an important role in supporting the development of a harmonised waste collection system within the FIN-EST Green Corridor. This includes considering current and future developments in waste collection systems, supporting information provision and awareness-raising activities, and ensuring compatibility between municipal waste systems and waste streams generated at ports and terminals (see Chapter 4.1).

Compared to Finland and Helsinki, Tallinn also has greater opportunities to influence the development of recycling capacity, as treatment solutions can be steered through procurement and tendering processes. Nevertheless, the overall development of treatment and recycling capacity, particularly for additional packaging waste recycling, remains largely dependent on private sector investments. As discussed above, the main bottleneck to achieving higher recycling rates for (mixed) packaging waste in Estonia remains the limited availability of modern sorting facilities capable of producing high-quality separated materials. Planned increases in sorting capacity (see Chapter 3.3.1) are expected to benefit Tallinn as well, as Estonia's waste treatment infrastructure is planned at the national rather than city or regional level.

The City of Tallinn has initiated preparation of a new municipal waste management plan for the period 2027–2031. It is important that this plan takes into account waste generated by ships, as this waste accounts for a significant share of total waste flows handled in the city. Passengers and tourists travelling within the FIN-EST Green Corridor and the waste they generate should therefore be considered an integral part of the city's waste management system.

Finally, it is worth highlighting national regulations related to the mandatory use of reusable cutlery and packaging at events, which originated from initiatives and regulations taken by the City of Tallinn. The best practices and guidelines developed under this regulation, particularly those promoting reusable packaging and tableware, could also serve as valuable examples for ships and ports seeking to reduce waste generation at source.

4. Conclusions and recommendations for development opportunities for increasing recycling

Based on the analysis presented above, it can be concluded that **further increases in the recycling rates of ship-generated waste, as well as waste generated at harbours and passenger terminals within the FIN-EST Green Corridor, depend primarily on improving the level of separate waste collection**. Separate collection is a fundamental precondition for recycling.

The analysis shows that recycling capacity for most separately collected waste streams originating from ships and terminals is already relatively high on both coasts of the FIN-EST Green Corridor (see Chapter 3.3.1). Additional improvements may be achieved in the mixed

packaging stream, particularly for plastic packaging.[9] However, the overall impact of these improvements is limited, as this waste stream accounts for only a small share of total waste generation.

Consequently, the key factor for further increasing recycling rates is expanding the share of waste that is collected separately. Achieving higher recycling levels requires not only increased separate collection but also high-quality source separation, characterised by low contamination levels and efficient collection systems.

The share of separately collected waste on ships operating between Tallinn and Helsinki currently ranges from approximately 30% to 70% of total waste generated (see Chapter 3.1.1). Experience from certain vessels demonstrates that relatively high separation rates can be achieved through a combination of technical solutions and effective organisational arrangements (see Chapter 3.1.2). The potential for improving source separation at passenger terminals (both at Ports of Tallinn and Helsinki) is even greater, although the absolute quantities of waste generated at terminals are significantly lower than those generated on board ships. Across the terminals analysed, source separation rates range from approximately 20% to 50%, indicating substantial scope for improvement (see Chapter 3.2.1).

Based on data on separate collection on ships (see Chapter 3.1.1) and waste treatment and recycling outcomes (see Chapter 3.3.1, *Table 12*), it can be estimated that an average increase of 10% points in separate waste collection on ships operating between Tallinn and Helsinki could raise the recycling rate of waste delivered at the Port of Tallinn's Old City Harbour by approximately 8% points (from about 57% to 65%). If this improvement is combined with increased technical capacity for the pre-treatment and recycling of mixed plastic packaging (which will increase to 61%, see above), it can be assumed that an overall recycling rate of approximately 70% of ship-generated waste could be achieved.

Therefore, the recommendations presented in the following section focus primarily on measures to improve the efficiency and quality of waste separation. Unlike the development of waste treatment capacity, which largely depends on external stakeholders such as municipalities and waste management companies, waste separation is an area where the main actors of the FIN-EST Green Corridor, namely ports and shipping companies, have a direct and significant influence and can implement improvements relatively quickly.

The recommendations are structured around key thematic areas, including organisational measures (improvement and harmonisation of separate waste collection, strengthening staff training and internal capacity building, awareness-raising for passengers, providing port waste fee incentives) and technical solutions to enhance waste recycling.

This study focused on the FIN-EST Green Corridor; however, the recommendations can be applied to other ports as well, starting with partner ports in Circular Ports project. Ports can create strong organisational and economic drivers for shipping companies and other relevant stakeholders to improve collectively waste collection and treatment practices, thereby increasing recycling rates.

[9] In 2024, 42% of mixed packaging waste (217,8 tonnes) was recycled. If it is assumed that 70% of mixed packaging waste (363 tonnes) could be recycled – representing the optimal technical performance achievable by modern sorting plants – the overall recycling rate of ship-generated waste at the Old City Harbour would increase to 61,31% (see also Table 12).

4.1 Organisational measures that enhance the source separation of waste

Based on the main findings of the analysis, it is recommended to focus future efforts on improving the efficiency, consistency, and quality of separate waste collection across ships and passenger terminals within the FIN-EST Green Corridor. As ships and terminals together form a single functional passenger environment, improvements should be designed and implemented in a harmonised and coordinated manner.

Harmonise separate waste collection systems across ships and terminals

It is recommended to harmonise separate waste collection systems in public areas on board ships and in passenger terminals, treating ships and terminals as a single, continuous passenger environment.

Passengers move seamlessly between ships and terminals, yet currently encounter different waste bins and sorting instructions. This lack of harmonisation leads to confusion, incorrect disposal, and lower-quality separately collected waste, thereby reducing recycling potential. This gap has also been highlighted by the main waste management company, AS Green Marine, which is responsible for the collection and treatment of ship-generated waste delivered at the Port of Tallinn.

- Agree on a common waste separation concept applicable to both ships and terminals within the FIN-EST Green Corridor.
- Ensure consistency in waste fractions, bin types, and labels/pictograms across the entire passenger journey.
- Prioritise harmonisation in high-traffic public areas where passenger behaviour has the greatest impact

Harmonise waste fractions, bin design, and labelling

It is recommended to standardise the waste fractions collected, the design of waste bins, and all related labelling, including pictograms, colour codes, and text.

Currently, ships and terminals apply different waste fractions and labelling systems, and in some cases, labels on bins do not match surrounding signage. This creates uncertainty and sorting errors, directly affecting waste quality.

- Build on existing national and municipal standards already used in the cities. As the majority of ship-generated waste is handed over at the Port of Tallinn, it is recommended to use the waste fractions for source separation and the corresponding national labels that form the basis of the Estonian and Tallinn waste separation system (see examples below). These labels, in general terms, are similar both in shape and colour to the European Commission's proposed harmonised labelling under the Packaging and Packaging Waste Regulation (PPWR).
- Use harmonised pictograms, colour codes, and multilingual text (at least Estonian, Finnish, and English).
- Ensure consistency between labels on bins.

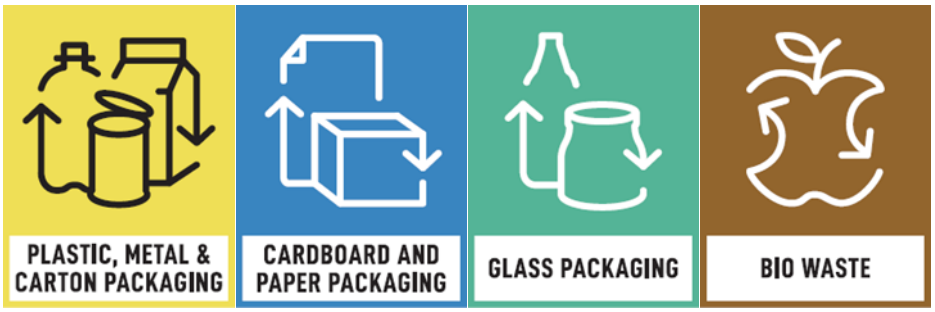


Photo 13. Examples of Estonian waste sorting pictograms

Define a standard set of waste fractions for passenger areas

It is recommended to adopt a standard minimum set of waste fractions for passenger areas on ships and in terminals. Different separation schemes and the absence of separate bins currently limit passengers' ability to sort waste correctly.

In this context, it should be taken into account that amendments to the Estonian Waste Act were adopted at the end of 2025. These amendments, among other provisions, introduce a minimum set of packaging waste fractions – paper and cardboard, mixed packaging, and glass packaging – that must be collected separately at all locations. This requirement applies in particular to passenger terminals at the Port of Tallinn.

- As a standard, it is recommended to provide compartments for: paper and cardboard packaging, mixed packaging (plastic, metal and carton), and glass packaging. In areas close to food service points, consider adding a separate compartment for biowaste.
- Base final decisions on the operational experience of shipping companies and ports.
- Carry out targeted waste composition and sorting surveys to assess the effectiveness of existing systems to refine fraction choices.

Ensure consistent availability of multi-compartment bins and avoid mixed-waste-only bins

It is recommended to increase the availability of multi-compartment waste bins and to avoid using single-compartment bins intended only for mixed waste in public areas. On several ships and in some terminals, most bins are intended only for mixed waste, limiting opportunities for source separation even when passengers are willing to sort.

- Replace (can be made gradually) mixed-waste-only bins with multi-compartment bins in public areas.
- Ensure that separate collection options are visible, intuitive, and conveniently located.
- Accept that behavioural change is gradual and that providing the opportunity to sort is a necessary first step.

Prevent mixing of source-separated waste during internal collection

It is recommended to introduce colour-coded collection bags for different waste fractions to prevent mixing during internal waste handling. The use of black or non-transparent garbage bags (in collection containers) makes it difficult to verify waste content and increases the risk that separately collected waste will be mixed during collection and transport.

- Use different-coloured bags for different waste fractions.

- Build on existing good practices, such as systems already piloted in Tallink Green Key hotels.
- Encourage sharing of experiences and best practices across shipping companies and ports.

Harmonise sorting instructions in operational areas (e.g. kitchens)

It is recommended to harmonise waste-sorting instructions in operational areas, particularly in kitchens, shops and storage areas. Experience from ships and terminals that achieve higher levels of waste separation shows that relatively high shares of sorted waste can be attained when sorting instructions are clear, easy to understand, and supported by staff motivation.

- Develop clear, practical instructions on how to handle common problem fractions.
- Base instructions on best practices already successfully applied on some vessels and terminals.
- Display instructions clearly at points where waste is generated.

Continue the activities of the FIN-EST Green Corridor working groups to harmonise waste separation systems

Three thematic working groups currently coordinate activities under the FIN-EST Green Corridor initiative: the Green Shipping Working Group, the Sustainable Port Working Group, and the Sustainable City Working Group. Since waste is a cross-cutting issue, it requires cooperation among all three groups.

It is recommended to further strengthen cooperation (e.g. through a task force) among the thematic working groups to ensure that waste-separation-related activities are aligned and mutually reinforcing. By using a task force or another coordination mechanism, the FIN-EST Green Corridor can more effectively drive harmonised solutions and achieve higher recycling performance.

Strengthen staff training and internal capacity building

It is recommended that all key actors (ports, shipping companies, and terminal operators) strengthen internal training related to waste separation. Well-designed waste separation systems require knowledgeable and engaged staff in order to function effectively in practice.

Ports, in particular, play an important role in driving and promoting improved waste separation across different actors, as they can set requirements, provide guidance, and create incentives through operational rules, contracts, and port waste management arrangements. By actively promoting harmonised training approaches and expectations, ports can help ensure more consistent implementation of waste separation practices across ships, terminals, and service providers.

To support this, it is recommended to:

- Prioritise training for key staff groups, including food service staff, cleaning personnel, and waste management staff.
- Focus training on practical sorting rules, contamination prevention, and internal logistics.

Implement joint awareness-raising and passenger communication campaigns

It is recommended to develop and implement joint awareness-raising and passenger communication campaigns once a harmonised waste separation system has been agreed and adopted. Passengers require clear, consistent, and easily understandable information in order to behave in an environmentally responsible manner, including sorting waste correctly during their journey.

Results from a recent FIN-EST Green Corridor customer survey conducted at passenger harbours in Tallinn and Helsinki in September–October 2025 highlight a significant gap between passengers' values and their level of awareness.[10]

Joint communication campaigns implemented by ports and shipping companies could therefore play a critical role in translating passenger values into concrete behaviour. Such campaigns should use harmonised messages and visuals across ships and terminals and be delivered through existing communication channels, including signage, on-board displays, announcements, mobile applications, and digital platforms. Clear, positive, and consistent messaging can significantly improve passenger participation in waste separation and contribute to higher recycling rates across the FIN-EST Green Corridor.

Therefore, it is recommended to:

- Develop common communication materials through the joint working group.
- Use existing information channels on ships and in terminals (signage, screens, announcements, digital platforms).
- Keep messages simple, visual, and consistent across the entire FIN-EST Green Corridor.

Use port waste fee incentives to promote high-quality waste separation on board ships

It is recommended to further develop and, where feasible, adopt incentive-based conditions for the delivery of ship-generated waste in ports, linking waste management fees to the quality and level of waste separation on board ships.

While technical solutions for waste separation are available on most vessels, organisational and economic incentives are crucial for motivating shipping companies to continuously improve waste-sorting practices. Current incentive schemes applied at the Ports of Tallinn and Helsinki already provide some motivation (see Chapter 3.1.2). However, experience from other European ports demonstrates that clearer, performance-based incentives can further enhance waste separation and recycling outcomes.

- Review existing incentive mechanisms in the ports (especially in Tallinn) and assess opportunities to strengthen them by linking fee reductions more explicitly to:
- The level of source separation achieved on board.
- The quality and purity of separated waste fractions.
- Consider adopting best practices from other European ports, such as:

[10] The survey showed that awareness of sustainability initiatives implemented by ferry operators is relatively low: 41% of passengers at the Port of Helsinki and 21% at the Port of Tallinn reported having no information about shipping companies' sustainability activities. At the same time, the majority of passengers consider sustainable travel to be important, with 84% of respondents at the Port of Helsinki and 78% at the Port of Tallinn identifying it as a key value. Furthermore, around 50% of respondents indicated that circular waste management measures – such as waste sorting, improved recycling, and waste reduction are important for reducing the carbon footprint of their journey. These findings indicate a strong willingness among passengers to support sustainability measures, provided that clear guidance and information are made available.

- **Ports of Stockholm**, where vessels that sort waste in accordance with clear, pictogram-based waste instructions are eligible for discounted waste fees.[11]
- **Copenhagen Malmö Port**, where only waste in clear plastic bags, not in dark plastic packaging, are accepted.[12]
- **Rostock Port**, which sets out arrangements for ship-generated waste at Rostock seaport and the passenger terminal in Warnemünde/Neuer Strom.[13]

- Ensure that any incentive scheme is transparent, easy to verify, and supported by clear guidance and communication to shipping companies.

By strengthening and harmonising incentive-based waste fee systems, ports can create a strong organisational and economic driver for shipping companies to improve waste separation practices, thereby increasing recycling rates without the need for major investments in new infrastructure

4.2 Technical solutions that enhance the source separation and recycling of waste

Technical solutions provide essential preconditions for efficient waste sorting, collection, and recycling. Appropriate technical design and equipment on board ships and at ports can significantly enhance the effectiveness of separate waste collection, reduce contamination of recyclable fractions, and improve the overall efficiency of waste handling and treatment. While not all technical solutions are feasible for every vessel or terminal, the wider adoption of proven best practices, particularly when planning new ships, refurbishments, or system upgrades, can substantially contribute to higher recycling rates along the FIN-EST Green Corridor.

It is important to ensure that technical solutions are always implemented in close coordination with organisational measures, training, and communication. Technical infrastructure alone is insufficient to achieve high recycling rates without proper organisation, staff engagement, and user understanding.

Further develop and expand centralised waste collection systems on board ships

It is recommended to further develop and, where feasible, expand the use of centralised waste collection systems on board passenger ships, building on best practices already implemented on several vessels operating in the FIN-EST Green Corridor.

The analysis demonstrates that technical solutions on board ships influence the efficiency and consistency of separate waste collection. Ships equipped with centralised systems, such as food waste disposers connected to dedicated storage tanks and compactors for dry recyclable fractions, achieve higher levels of source separation and biowaste recycling[14] (see Chapter 3.1.2). However, not all vessels can accommodate such systems due to space constraints or retrofitting limitations on older ships.

Therefore, it is recommended to further investigate the opportunities for installing:

[11] https://www.portsofstockholm.com/access-services/
[12] https://www.cmport.com/wp-content/uploads/2025/05/DKCPH-Waste-Management-Plan.pdf
[13] https://www.rostock-port.de/fileadmin/user_upload/2_Waste_management_plan_2026.pdf
[14] The biowaste slurry is directed to anaerobic digestion for biogas production, which generally offers greater environmental benefits than traditional composting due to energy recovery and reduced greenhouse gas emissions.

- Centralised food waste collection systems where food waste is shredded and pumped into dedicated tanks, enabling easy handling and high capture rates for biowaste.
- Compactors for paper, cardboard, plastic, metal packaging, and mixed waste, which reduce volume, improve logistics efficiency, and facilitate cleaner separation.

Other recommendations:

- Establish dedicated storage areas for different waste fractions, clearly separated from mixed waste.
- When new vessels are procured, or major refurbishments are planned, prioritise integrating these systems at the design stage.
- For existing ships where full centralised systems are not feasible, consider partial solutions, such as additional compactors, improved internal logistics, or decentralised pre-sorting points connected to central storage.
- In kitchens and food service areas, ensure adequate equipment (e.g. rinsing points, pre-collection containers) to support proper handling of packaging waste alongside biowaste.
- Share technical experiences and lessons learned across shipping companies to support wider adoption of effective solutions.

Support increased recycling and pre-treatment capacity for mixed packaging waste

It is recommended that ports and shipping companies actively support the development of additional pre-treatment and recycling capacity for mixed packaging waste, particularly plastics, even though such capacity lies largely outside their direct control. It is also recommended to align technical waste separation and collection systems on ships and in ports with ongoing and upcoming national and municipal waste management reforms.

While recycling rates for most separately collected recyclable waste streams are already high, mixed packaging (especially plastics) remains the main bottleneck due to limited sorting and recycling capacity. This constraint has been identified in both Estonia and Finland. In Estonia, amendments to the Waste Act adopted at the end of 2025 introduce stricter requirements for the separation of packaging waste. At the municipal level, the City of Tallinn is preparing a new Waste Plan for 2027–2031, which is expected to further strengthen separate collection, pre-treatment, and recycling. Aligning technical solutions early will reduce future adjustment costs and improve compliance.

Therefore, it is recommended to:

- Actively participate in national and regional discussions/working groups on waste management system development, including consultations related to waste legislation, waste management plans, and EPR (Extended Producer Responsibility) system reforms.
- Provide data and practical insights from ship and port operations to demonstrate current and future waste flows and justify investments in additional recycling capacity.
- Support pilot projects and innovation initiatives related to advanced sorting and recycling technologies.
- Engage with producer responsibility organisations to ensure that ship- and port-generated packaging waste is adequately considered in system planning.
- Ensure that technical solutions on ships and in terminals are compatible with the minimum required packaging waste fractions introduced by legislation, as well as

anticipate stricter requirements by designing systems that can accommodate additional fractions if needed.

- Monitor funding opportunities, such as financial support foreseen by the Estonian Environmental Investment Centre for projects that increase sorting and recycling capacity and explore opportunities for cooperation or co-investment.
- Coordinate technical planning between ports, shipping companies, and municipalities to ensure system compatibility.

It is important that ports and shipping companies position themselves as active enablers of improved recycling systems rather than passive waste generators. Although ports and shipping companies do not directly operate recycling facilities, they generate predictable and relatively homogeneous waste streams that can support investment decisions and system development.

5. Data sources and references

Additional information on waste data and collection systems was obtained from relevant actors via the Port of Tallinn during November 2025-January 2026.

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