

2026



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FROM BETTER BIN STICKERS TO BETTER WASTE SYSTEMS

LESSONS FROM A PASSENGER WASTE-
SEPARATION PILOT AT AMSTERDAM
AIRPORT SCHIPHOL

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Date

August 2026

Commissioned by

European Union Horizon 2020 Programme - Grant Agreement No. 101036996
Developed as part of the TULIPS (demonstrating lower polluting solutions for sustainable airports) Work Package 6: Circular Airports.

About TULIPS

This publication was developed within TULIPS (demonstrating lower polluting solutions for sustainable airports across Europe), a European innovation programme led by Schiphol and funded through the European Union's Horizon 2020 programme (Grant Agreement No. 101036996). TULIPS brings together a broad consortium of partners and accelerates the implementation of innovative and more sustainable airport solutions through demonstrations in live airport environments. Schiphol serves as the lighthouse testing ground for multiple demonstrations, enabling practical learning that can be scaled and replicated.

The circular airports work within TULIPS directly shaped this booklet, translating evidence and on-the-ground experience from operational waste pilots into clear, actionable principles that airport teams can apply.

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TULIPS

EXECUTIVE SUMMARY

Passenger waste separation is an important part of airport circularity ambitions, yet relatively little evidence exists on which interventions are truly effective. As part of the European TULIPS programme, Royal Schiphol Group and its partners tested whether improved passenger-facing communication on existing recycling bins could significantly improve waste separation in an operational airport environment.

The Schiphol pilot should be viewed as a successful learning pilot rather than a solution to scale as-is. By testing an assumption under real operating conditions, the project generated practical evidence that can help airports make better-informed decisions about future waste interventions.

WHAT WAS TESTED

The pilot evaluated whether clearer visual communication on existing FF3 bins could improve passenger waste separation. The intervention was implemented on 43 bins at G Pier during normal airport operations, without changing the waste streams, bin design, collection processes or downstream waste treatment.

HOW IT WAS TESTED

Rather than implementing a single solution immediately, the pilot followed a structured, phased approach. Sticker designs were developed and refined through small-scale testing before being implemented in the full-scale pilot. The results were evaluated using a combination of:

- Waste composition analyses;
- Passenger observations and interviews.

THE RESULTS WERE MIXED

Overall, the results showed that improved stickers alone do not consistently improve passenger waste separation.

- Contamination of the paper/cardboard stream decreased slightly from 87% to 82%.
- Residual waste contamination decreased from 15% to 10%.
- Contamination of the plastics, drink cartons and cans (PMD) stream increased from 40% to 53%.

EXECUTIVE SUMMARY

Main conclusion

The evidence suggests that improving passenger waste separation requires a broader systems approach, combining targeted nudges with upstream prevention and downstream resource recovery.

STRATEGIC LESSON

Passenger waste separation should be viewed as a system-design challenge rather than solely a communication challenge. Rather than depending on millions of individual passenger sorting decisions each year, airports are likely to achieve greater impact by:

- preventing waste upstream through procurement, concessions and packaging choices;
- simplifying material flows;
- improving downstream separation and material recovery;
- using behavioural interventions only where they add value.

PRACTICAL GUIDANCE

To help airports apply these lessons, this guide provides a practical six-tool toolkit. The first three tools help airports understand their passenger waste system by identifying stakeholders, analysing waste streams and mapping the products that contribute most to contamination. The remaining three tools support airports in designing, measuring and evaluating passenger waste separation pilots using practical methods and templates. Together, these tools help airports to move from assumptions to evidence and make informed decisions about where future investments will have the greatest impact.



HOW TO USE THIS GUIDE?

FROM LEARNING AT SCHIPHOL TO PRACTICAL TOOLS FOR YOUR AIRPORT

FROM LESSONS TO ACTION

Use the practical tools to understand your airport and take the right first steps.

PART 1

LEARNING FROM THE SCHIPHOL PILOT

What we tested, what happened and what airports can learn



The challenge

Understanding passenger waste in a complex airport environment.



The pilot

Testing whether clearer bin communication could improve waste separation.



The evidence

Mixed results from various checks:

- paper improved slightly,
- residual improved,
- plastics/drink cartons worsened.



The lessons

Passenger sorting is a system-design challenge, not a simple communication issue.



Key finding

Improved stickers alone did not consistently improve passenger waste separation.



Strategic direction

Reduce dependency on 70 million individual passenger sorting decisions by focusing more on:

- upstream prevention and circular; procurement;
- simplified material flows;
- smart downstream separation and recovery;
- targeted nudges where they add value.

PART 2

PRACTICAL TOOLKIT FOR AIRPORTS

Six practical tools to understand your waste system and evaluate passenger waste separation

PHASE 1 - Understand your waste system

Build a baseline and identify what matters most.



Tool 1 - Stakeholder mapping

- Identify who is involved, what waste they create and clarify roles and responsibilities.



Tool 2 - Waste Safari

- Identify the “Big Five” products, contamination hotspots and observed behaviours. Determine which waste streams have the greatest impact.



Tool 3 - Baseline Assessment Method

- Quantify which waste streams have the greatest environmental impact.

PHASE 2 - Evaluate passenger waste separation

Design, implement and evaluate your pilot.



Tool 4 - Bin pilot checklist

- A practical checklist to plan and execute your passenger waste pilot step by step.



Tool 5 - Waste composition analysis

- Measure the composition and contamination of each waste stream during the pilot.



Tool 6 - Observation & interview methods

- Observe and speak with passengers to understand behaviour and decision-making.



All tool templates, checklists and methods are available in the Annex.

Adapt the tools to your airport context and use them to make evidence-based decisions.

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PART 1

THE SCHIPHOL PILOT STORY



3.1 WHY PASSENGER WASTE SEPARATION MATTERS

Passenger waste is one of the most visible waste streams at airports. It is generated throughout the terminal by Food & Beverage outlets, retail and passengers themselves, making it a logical starting point for improving waste separation. Before designing the pilot, Schiphol first sought to understand what passengers actually dispose of and which waste streams deserve attention. Two complementary analyses were carried out:

- Waste Safari: A qualitative assessment of passenger waste bins to identify the most common products and understand disposal behaviour.
- Baseline Assessment: A quantitative analysis of airport waste streams to determine which streams have the largest operational and environmental impact.

The Waste Safari identified five products that consistently appeared in passenger bins: coffee cups, PET bottles, food bags, food boxes and cans. All are directly related to Food & Beverage consumption in the terminal and frequently contaminated multiple waste streams.

The Baseline Assessment showed that, from an airport perspective, the most relevant operational waste streams are Residual waste, CAT1 cabin waste, Swill, Paper/Cardboard and Plastics. Together, these streams account for most operational waste and environmental impact, providing a clear basis for prioritising future interventions.

For details of the Waste Safari and the baseline assessment, refer to [Tool 2 - Waste Safari](#) and [Tool 3 - Baseline Assessment method](#) of the practical toolkit in this document.



Based on the insights from these analyses, various pilots were performed during 2022-2025. The pilot presented in this guide focuses specifically on passenger-facing waste bins, where circular ambitions meet everyday passenger behaviour. Rather than introducing new infrastructure or changing waste collection processes, Schiphol explored whether a low-cost intervention — improving the visual communication of existing bins stickers — could help passengers separate waste more effectively.

3.2 AIRPORTS AS CLOSED ECOSYSTEMS

Airports are controlled environments where passengers consume, dispose of and leave behind large volumes of similar products every day. This makes terminals suitable locations for testing operational waste interventions. Many of the same characteristics are found in other transport hubs, such as railway stations, metro stations and passenger terminals in ports.

The Schiphol pilot was designed as a real-life operational test, rather than a laboratory experiment. The intervention was implemented in an active passenger terminal using existing airport

infrastructure and normal operational procedures.

This allowed the results to reflect actual passenger behaviour under everyday travel conditions.

The pilot focused on Schiphol's FF3 bins, which separate passenger waste into three streams:

- Paper & cardboard
- Plastics, drink cartons and cans (PMD)
- Residual waste



3.3 WHAT WAS TESTED - AND WHAT WAS NOT

The pilot assessed whether improved visual communication on existing waste bins could influence passenger waste separation behaviour under real operating conditions.

The full-scale pilot was carried out on 43 FF3 bins at Schiphol's G Pier. Measurements took place during regular airport operations, capturing waste disposal by thousands of international passengers across multiple days and different times of day. By testing in an active terminal, the pilot evaluated the effect of improved bin communication under real-world conditions rather than in a controlled laboratory setting.

To isolate the impact of the intervention, only the communication on the bins was changed. All other aspects of the waste system remained unchanged.

Within the scope of the pilot:

- Bin stickers and visual communication
- Passenger observations and interviews
- Waste composition analyses before and after the intervention

Outside the scope of the pilot:

- Bin design and openings
- Bin locations
- Procurement and products sold in the terminal
- Cleaning and collection procedures
- Back-of-house sorting and waste treatment

The results therefore demonstrate the effect of improved visual communication alone. They do not demonstrate the potential impact of broader waste-system interventions.

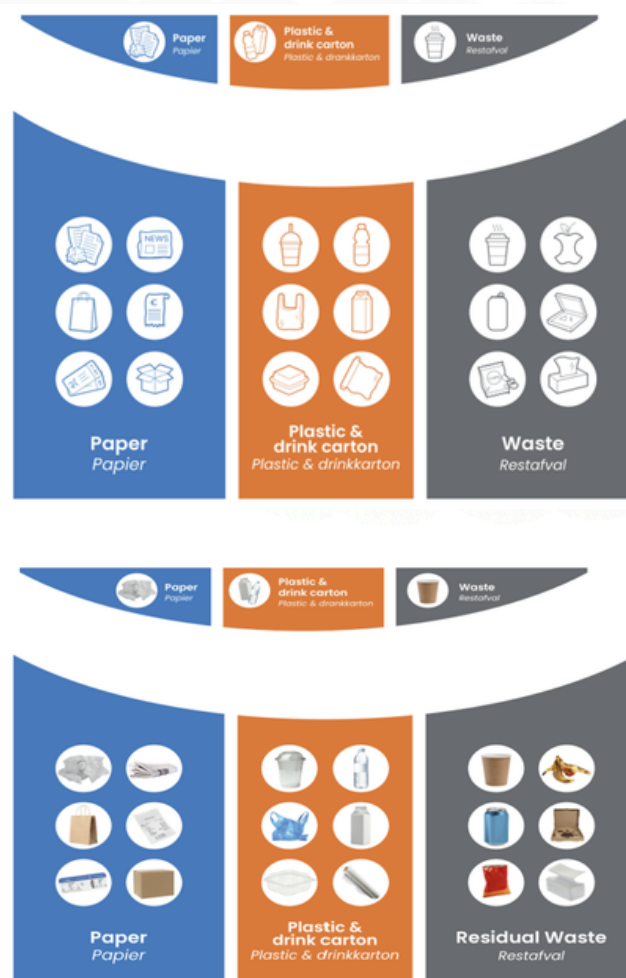
3.4 HOW THE PILOT WAS DESIGNED

Rather than implementing a single design immediately, Schiphol developed the intervention through a structured three-stage process. Each stage built on the findings of the previous one, allowing the visual communication to be tested, refined and validated before full-scale implementation.

PREPARATION PHASE

Stage A – Initial concept testing (Schiphol Plaza)

Building on [initial research](#) conducted by a TU Delft student, the sticker concept was further developed by Seenons. TU Delft subsequently designed two alternative sticker concepts—one using icons and one using photographs—to explore different ways of communicating the three waste streams. Early testing at Plaza Schiphol Airport, with two bins including stickers and one bin used as baseline without, focused on passenger interpretation and identifying common sources of confusion.



Stage B – Refinement and selection (Schiphol Plaza)

Based on the first test results, the poster with icons was excluded and the sticker design with photos was refined to improve clarity, particularly for commonly misclassified items such as coffee cups. The revised photo-based design was further refined and tested at Plaza Schiphol airport again before selecting the final version for operational deployment.



EXECUTION PHASE

Stage C – Full-scale pilot (G Pier)

The final sticker design was applied to 43 existing FF3 bins at G Pier. The intervention was evaluated during normal airport operations using waste composition analyses, passenger observations and short interviews to compare performance before and after implementation.



The Schiphol pilot was delivered through close collaboration between Royal Schiphol Group, Renewi, Vebego, Seenons, Excess Materials Exchange and TU Delft, combining operational expertise, waste management, behavioural research and circular economy knowledge throughout the project.

Please refer to **Tool 4** for a practical checklist to help airports prepare, execute and evaluate a comparable passenger waste-separation pilot within their own operational context.



3.5 HOW RESULTS WERE MEASURED

The pilot combined quantitative and qualitative methods to understand both what passengers did and why they did it.

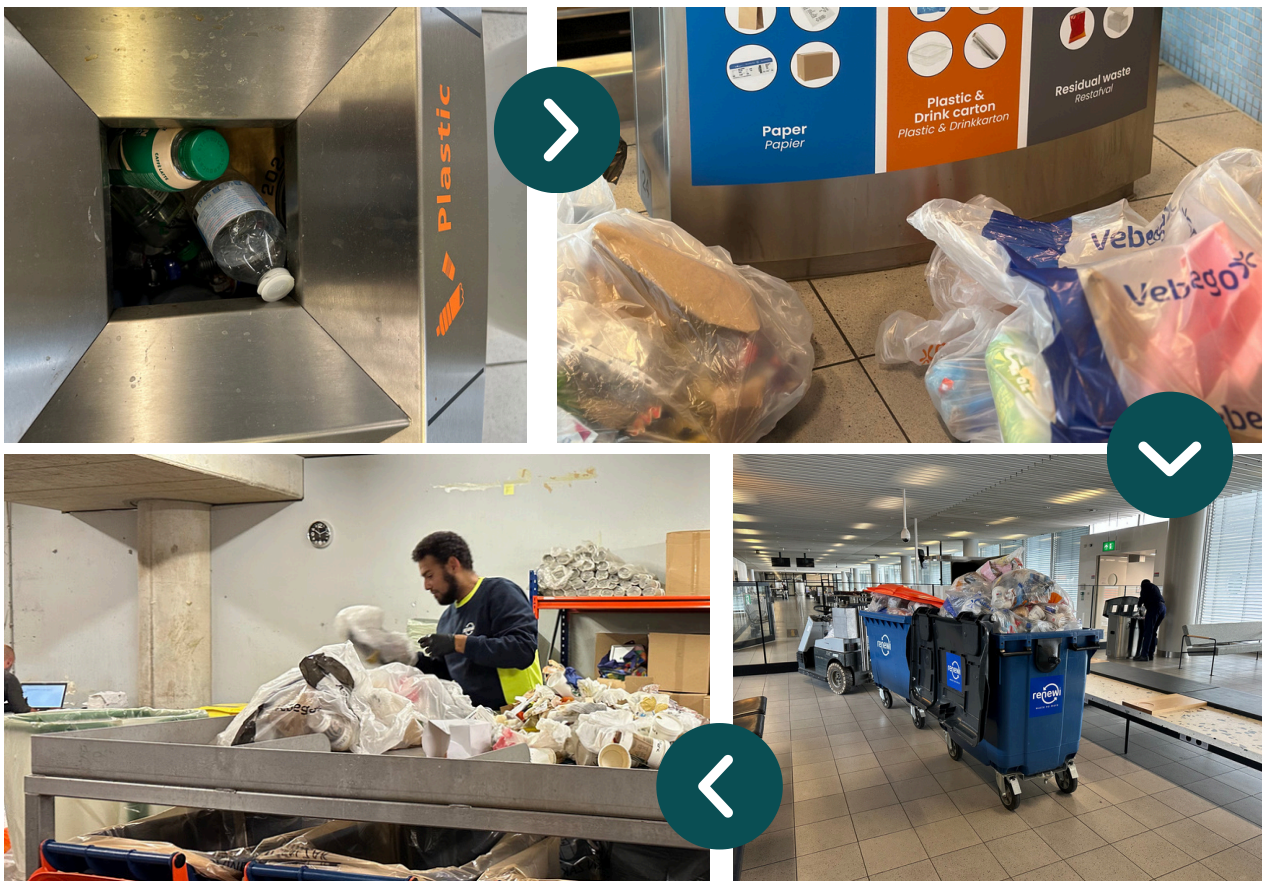
QUANTITATIVE

Waste composition analyses measured contamination levels for each waste stream before and after the intervention.

QUALITATIVE

Observations recorded passenger behaviour at the bins, while short interviews explored how passengers interpreted the waste streams and why they chose a particular bin.

Together, these methods provided a comprehensive picture of the pilot results by combining measurable changes in waste quality with insights into passenger behaviour. For details of both methods, see [Tool 5 - Waste composition analysis method](#) and [Tool 6 - Observation and interview method](#).



3.6 WHAT THE PILOT FOUND

The full-scale pilot at G-pier Schiphol Airport produced mixed results across the three waste streams. While contamination in the paper/cardboard and residual waste streams decreased slightly, contamination in the plastics, drink cartons and cans (PMD) stream increased.

STREAM	BASELINE	INTERVENTION
Paper & cardboard	87%	82%
PMD	40%	53%
Residual	15%	10%

Overall, the intervention did not consistently improve passenger waste separation across the three streams. Based on these results, the redesigned stickers alone cannot be considered an effective stand-alone intervention for improving waste separation in airport terminals.



3.7 WHY NUDGING PASSENGERS IS SO DIFFICULT

Passenger waste separation takes place in one of the most challenging behavioural environments imaginable. Every day, airports serve thousands of passengers from diverse cultural backgrounds, languages and waste-sorting habits.

Observations and short interviews showed that passengers often dispose of waste within a few seconds. Many were carrying luggage, travelling in groups, focused on finding their gate or simply in a hurry. Rather than carefully reading the stickers, many relied on habit or intuition.

Several products also remained difficult to classify. Coffee cups, juice cups and other composite packaging contain multiple materials, making it unclear which waste stream passengers should choose. Waste separation systems also differ between countries, meaning colours, categories and labels are not interpreted consistently by international travellers.

These findings suggest that improving passenger communication alone is unlikely to overcome the complexity of real-world airport behaviour.



3.8 KEY LESSONS FROM SCHIPHOL

Although the pilot did not demonstrate a consistent improvement in passenger waste separation, it successfully tested an important assumption under real operating conditions. This is precisely the purpose of a pilot: to generate evidence before scaling an intervention.

For airports, the results suggest that bin stickers alone should not be scaled as the primary solution for improving passenger waste separation. Greater impact is more likely to come from reducing the dependency on passenger decisions through system-level interventions, such as simpler material flows, circular procurement, product redesign, clearer waste-stream logic and improved downstream separation.

These types of interventions address the root causes of contamination rather than relying solely on behavioural change. This aligns with the broader conclusions from the TULIPS work package, which emphasise that nudges have limited impact when underlying operational and system conditions remain unchanged.

“A good pilot does not only show what works. It also shows what not to scale.”

This evidence provides a practical foundation for the toolkit presented in [Part 2](#), helping airports design future interventions based on tested experience rather than assumptions.



4. FROM LESSONS TO ACTION

The Schiphol pilot showed that improving passenger waste separation is not simply a communication challenge. Although clearer stickers influenced some disposal behaviour, the results demonstrated that passenger nudging alone is unlikely to deliver consistent improvements in a complex airport environment.

For airports seeking to improve waste separation, the evidence points towards a broader systems approach. Rather than relying primarily on passenger behaviour, greater impact is likely to come from preventing waste upstream, simplifying material flows, improving downstream recovery and using behavioural interventions only where they add value.

Based on the findings of the Schiphol pilot, six practical recommendations were developed for airports.



RECOMMENDATION 1

Move upstream

Look at what enters the terminal before it becomes passenger waste.

- Focus on high-volume items from Food & Beverage, takeaway, drinks and retail.
- Work with business partners to reduce unnecessary packaging and mixed-material products.
- Use concession agreements and procurement criteria to influence packaging choices.



RECOMMENDATION 2

Use procurement as a circularity lever

Use procurement to reduce waste before it is generated.

- Avoid, reduce, reuse or simplify packaging wherever possible.
- Prioritise mono-material or easily recyclable packaging where reuse is not feasible.
- Align packaging requirements with the airport's actual recycling capabilities.



RECOMMENDATION 3

Move downstream

Improve material recovery after collection where passenger sorting is inconsistent.

- Assess post-separation opportunities at material recovery facilities.
- Compare passenger source separation with bulk sorting technologies.
- Consider whether fewer front-of-house waste streams combined with stronger back-of-house sorting delivers better results.



RECOMMENDATION 4

Let technology help where passengers struggle

Use technology where it improves operational performance and material recovery.

- Apply sensors, optical sorting, AI or robotics where appropriate.
- Use data to identify the products that cause the most contamination.
- Focus technological solutions on high-volume or high-confusion waste streams.



RECOMMENDATION 5

Use nudging where it fits

Behavioural interventions remain valuable when applied selectively.

- Focus on simple, recognisable actions and products.
- Avoid relying on nudges for mixed-material items or complex sorting decisions.
- Support communication with wider system improvements rather than expecting passengers to solve the problem alone.



RECOMMENDATION 6

Run pilots to make decisions, not to prove success

Use pilots to test assumptions before investing in large-scale implementation.

- Define the hypothesis before the pilot starts.
- Measure both operational performance and behavioural outcomes.
- Be prepared to stop, adapt or redirect when evidence does not support the proposed solution.
- Share both positive and negative results so that other airports can learn.

Flight information
Vlucht informatie

06.29.09

SINGAPORE AIRLINES

Flight / Vliegtuig
SQ323

Destination / Bestemming
Singapore

Departure / Vertrek
11.00

Gate G4
Wednesday, 02 July

 **Passenger rights**

Were you denied boarding? Was your flight cancelled or delayed for at least two hours?

Ask at the check-in desk or boarding gate for information on passenger rights, which explains your entitlement to compensation and/or assistance.



PART 2

PRACTICAL

TOOLKIT FOR

AIRPORT WASTE

SEPARATION

PILOTS



The Schiphol pilot showed that passenger waste separation is only one part of a much larger waste management system. Before airports invest in communication campaigns, new bin designs or behavioural interventions, they first need to understand where the biggest opportunities for improvement lie.

The toolkit is organised into two sections.

SECTION 1 – UNDERSTAND YOUR OPERATIONAL WASTE SYSTEM

The first three tools help airports build a baseline of their passenger waste system. They identify the stakeholders involved, determine which waste streams contribute most to passenger waste and reveal the products that occur most frequently and cause the greatest contamination.

Together, these tools help airports identify which waste streams have the greatest impact, what the airport's "Big Five" products are and where the largest opportunities exist to prevent, reduce or eliminate waste before it reaches the bin. They provide the evidence needed to decide whether passenger waste separation should be a priority or whether greater benefits can be achieved through upstream measures, such as procurement, packaging or concession agreements.

- Tool 1 - Stakeholder mapping – Identify the organisations involved in passenger waste management and clarify their roles and responsibilities.
- Tool 2 - Waste Safari – Identify the products that occur most frequently, the items causing contamination and the behaviours observed around waste bins.
- Tool 3 - Waste Baseline Assessment – Determine which operational waste streams contribute most and where the largest improvement opportunities exist.



SECTION 2 – EVALUATE PASSENGER WASTE SEPARATION

If the baseline indicates that passenger waste separation is a relevant challenge, airports can use the next three tools to design, implement and evaluate a passenger waste separation pilot.

These tools focus specifically on passenger behaviour at the bin. They are not intended to solve wider waste challenges, such as reducing single-use packaging, introducing reusable cup systems or redesigning products. Instead, they help airports assess whether passengers are able to separate waste correctly within the existing system and whether behavioural interventions lead to measurable improvements.

- Tool 4 - Pilot checklist – A practical checklist for preparing and executing a passenger waste separation pilot.
- Tool 5 - Waste composition analysis – A method for measuring the composition and contamination of each waste stream during the pilot.
- Tool 6 - Observation and interview methods – Practical methods for observing passenger behaviour and understanding why passengers choose a particular waste stream.

Together, these tools combine quantitative evidence from the waste itself with qualitative insights into passenger behaviour. The templates, checklists and worksheets for all six tools are provided in the subsections below and can be adapted to the operational context of individual airports.



1

STAKEHOLDER
MAPPING

2

WASTE SAFARI

3

BASELINE
ASSESSMENT
METHOD

4

BIN PILOT PRACTICAL
CHECKLIST

5

WASTE COMPOSITION
ANALYSIS METHOD

6

OBSERVATION &
INTERVIEW
METHOD

1

5.1 STAKEHOLDER MAPPING

2. WHY USE THIS TOOL?

Different stakeholders influence different waste streams. Food & Beverage operators may contribute cups, food packaging and organic waste, while retailers, airlines and facility operators generate other material flows.

Mapping these contributions helps airports to:

- connect stakeholders to the streams they influence;
- identify who should be involved in reducing or redesigning a specific stream;
- clarify responsibilities for collection, handling and processing;
- identify streams outside the airport's direct control;
- explore opportunities for prevention, reuse, recycling and recovery.

The tool therefore supports more targeted action. Rather than involving all stakeholders in every discussion, airports can focus on the organisations connected to the resource stream being addressed.

3. MORE INFORMATION

The Stakeholder Mapping Template ([here](#)) can be adapted to the airport's own organisational structure and used to identify and prioritise stakeholders. The Mapping Operational Resource Streams Template ([here](#)) can be used to map the resource streams accordingly.

Airports are encouraged to review and update both templates as responsibilities, concessionaires or operational partners change over time.



5.2 WASTE SAFARI



1. WHAT IS THE TOOL?

A Waste Safari is a systematic assessment of the waste generated within an airport. By collecting, analysing and documenting waste, airports gain a better understanding of the composition of their waste streams, the products they contain and the sources of contamination.

Depending on the objective and available resources, a Waste Safari can be carried out in two ways:

- Weight-based analysis, where waste bags are opened, sorted into material fractions and weighed. This provides detailed insights into the composition of the waste stream.
- Volume-based visual analysis, where transparent waste bags are assessed visually without opening them. This provides a quicker overview of the main waste streams and contamination hotspots.

Airports can also choose between manual and automated approaches. Manual Waste Safaris remain the most common option and are useful when sample sizes are small, logistics are complex or detailed product-level interpretation is needed. Automated waste scans can support more frequent or continuous monitoring where the right technology and operational set-up are available. At Schiphol, automated scanning is already being explored with Renewi, while manual scans remain useful for targeted assessments and validation.

2. WHY USE THIS TOOL?

A Waste Safari helps airports move beyond assumptions by providing evidence on what is actually discarded in terminal waste bins.

The assessment enables airports to:

- identify the airport's "Big Five" products and materials;
- understand which products contribute most to contamination;
- identify opportunities to prevent, reduce or redesign problematic products;
- prioritise waste streams with the greatest improvement potential;
- establish a baseline before introducing operational or behavioural interventions.

The findings help airports determine where interventions will have the greatest impact, whether through procurement, concession agreements, product redesign or passenger waste separation.

3. MORE INFORMATION

The Waste Safari Protocol is provided [here](#) and includes guidance on selecting representative samples, choosing between weight-based and volume-based analyses, organising the assessment, documenting findings and reporting results. The protocol also includes practical information on equipment, sample selection, sorting procedures and reporting templates.

5.3 BASELINE ASSESSMENT METHOD

1. WHAT IS THE TOOL?

The Baseline Circular Airports Method (BCAM) is a structured approach for analysing operational waste streams and identifying where airports can achieve the greatest environmental impact. It combines information on waste quantities, processing pathways and environmental impacts to prioritise the waste streams that deserve the greatest attention.

Rather than focusing solely on the amount of waste generated, BCAM helps airports understand which resource streams contribute most to environmental impact and therefore offer the greatest opportunity for circular interventions. The methodology has been applied at multiple European airports and is described in detail in the accompanying scientific publication

3. MORE INFORMATION

The executive summary of the Airport Circularity Baseline Study is provided [here](#) and describes the a detailed five-step approach.

The full methodology and scientific validation of this study is described in a [Frontiers academic article](#): Transforming waste management methods to accelerate the transition towards circular airports: the Baseline Circular Airports Method (BCAM). This publication provides detailed information on the environmental assessment methodology and the prioritisation of airport waste streams.

2. WHY USE THIS TOOL?

Not every waste stream deserves the same level of attention. While some streams represent large quantities of waste, others may have a disproportionately high environmental impact due to their treatment pathway or material composition.

The baseline assessment helps airports to:

- identify the operational waste streams with the greatest environmental impact;
- prioritise where time, resources and investments will have the greatest effect;
- compare waste streams using a consistent assessment methodology;
- support evidence-based decisions on circular economy initiatives and future pilots.

The results provide a clear starting point for selecting priority streams and identifying where further investigation or interventions are most valuable



5.4 BIN PILOT PRACTICAL CHECKLIST

A practical checklist for preparing, executing and evaluating a passenger waste separation pilot in an airport terminal.

Use this checklist before changing bin communication, bin design or collection routines. It helps airport teams test one clear assumption, keep operations comparable before and after the intervention, and decide whether the pilot should be scaled, adapted or stopped.

1. WHAT IS THE TOOL?

This tool is a practical readiness checklist for airport teams planning a passenger-facing bin pilot. It translates the lessons from the Schiphol FF3 bin sticker pilot into a short set of operational decisions that should be made before implementation starts.

The checklist is deliberately simple: it does not replace a full project plan, waste composition protocol or passenger interview guide. Instead, it helps teams confirm that the scope, location, partners, security arrangements, costs, baseline measurement, data method and scale-up decision are clear before the pilot goes live.

2. WHY USE THIS TOOL?

Passenger waste separation pilots are easy to start but difficult to interpret if the set-up is not controlled. A small checklist prevents the most common problems: unclear ownership, incomparable baseline and intervention data, operational disruption, missing security approvals, and results that cannot support a scale-up decision.

- Keep the pilot focused on one testable assumption
- Make sure operational partners are ready before implementation
- Ensure baseline and intervention measurements are comparable
- Clarify costs, responsibilities and security requirements upfront
- Define in advance what evidence is needed to scale, adapt or stop

A) BIN PILOT PRACTICAL CHECKLIST

Use the checklist as a go/no-go discussion with the airport operator, cleaning partner, waste contractor, research or innovation team and any design or implementation partners. Complete it before installing the intervention.

5.4 BIN PILOT PRACTICAL CHECKLIST

READINESS ITEM	WHAT SHOULD BE AGREED BEFORE THE PILOT STARTS	MINIMUM OUTPUT
1. SCOPE CLEAR	Define the exact intervention and what is outside scope. For example: only sticker communication changes, or also bin openings, bin location, collection routines or waste streams. Formulate one testable hypothesis.	Pilot scope and hypothesis
2. LOCATION SELECTED	Choose representative bins and passenger areas. Check passenger flow, dwell time, visibility, operational feasibility and whether the same bins can be used for baseline and intervention measurements.	Location list and bin count
3. PARTNERS READY	Confirm roles for airport operator, cleaning partner, waste contractor, design partner, research team and operational contact persons. Agree who collects bags, installs materials, observes behaviour and owns the data.	Role and contact overview
4. SECURITY ARRANGED	Check access rules for staff, researchers, photographers, waste sorting teams and external partners. Arrange badges, escorts, permits, toolbox talks and any restrictions on photography or waste handling.	Security and access approval
5. COSTS AGREED	Clarify who pays for design, production, installation, waste sorting, staff time, analysis, security support and possible removal. Include small operational costs such as extra bags, labels, transport or storage.	Cost estimate and budget owner
6. BASELINE PLANNED	Plan the baseline before the intervention is visible. Use the same bins, time windows, collection routes and sorting categories as planned for the intervention measurement.	Baseline measurement plan
7. DATA METHOD READY	Agree the quantitative and qualitative methods. At minimum, define waste composition categories, contamination calculation, sample size, observation sheet, short interview questions and photo documentation.	Measurement protocol and templates
8. SCALE-UP DECISION DEFINED	Agree before launch what result would justify scaling, adapting or stopping. Include contamination targets, operational requirements, passenger feedback and cost or feasibility conditions.	Scale-up, adapt or stop criteria

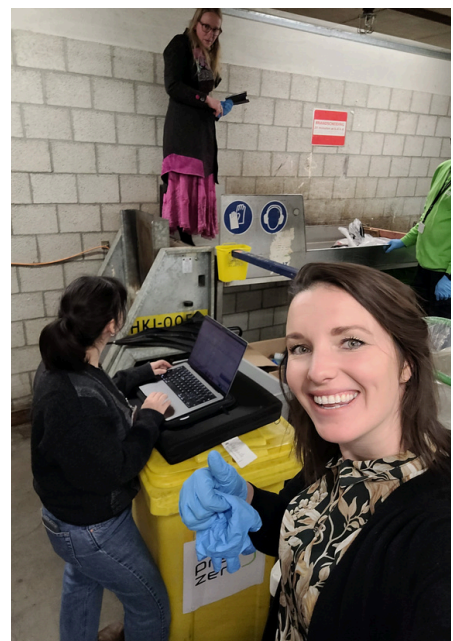
5.4 BIN PILOT PRACTICAL CHECKLIST

B) HOW TO USE THE CHECKLIST

- Before the pilot: complete all eight readiness items and store decisions in one shared project file.
- During the pilot: use the checklist as a control document when operations change, for example if bins move or cleaning rounds change.
- After the pilot: compare the results with the scale-up criteria agreed before the pilot started. Do not change success criteria after seeing the results.

C) PRACTICAL NOTES FROM SCHIPHOL

- Keep the intervention narrow if the aim is to test passenger-facing communication. At Schiphol, only the bin stickers changed; bin design, openings, collection routines and back-of-house treatment stayed the same.
- Use comparable measurement moments. The Schiphol G Pier test used the same pier, same FF3 bin type and consistent collection moments for baseline and intervention measurements.
- Treat the pilot as a decision tool, not as proof of success. If results are mixed, the pilot can still be valuable because it prevents scaling an intervention that is unlikely to deliver system-wide impact.



5.5 WASTE COMPOSITION ANALYSIS METHOD

1. WHAT IS THE TOOL?

Waste composition analysis provides a quantitative method for measuring the quality of passenger waste separation. By analysing the contents of waste bags from each collection stream, airports can determine contamination levels, identify frequently discarded products and measure whether an intervention leads to measurable improvements.

The method was developed and tested during the Schiphol pilot and can be applied before and after an intervention to objectively compare results.

2. WHY USE THIS TOOL?

Visual observations alone cannot determine whether waste separation has improved. Waste composition analysis provides objective evidence by measuring what passengers actually discarded. The method helps airports to:

- measure contamination per waste stream;
- compare baseline and intervention results;
- identify the products that contribute most to contamination;
- quantify improvements or deterioration in waste quality;
- evaluate whether an intervention justifies further implementation.

By repeating the same methodology before and after an intervention, airports can make evidence-based decisions rather than relying on perception alone.



5.5 WASTE COMPOSITION ANALYSIS METHOD

3. MORE INFORMATION

The waste composition analysis consists of six consecutive steps as elaborated in Table xx

STEP	ACTION	DOCUMENT
1. SELECT LOCATIONS	Select representative waste bins (e.g. terminal, pier, arrivals or departures) and determine the measurement period. Use the same locations and time periods for both baseline and follow-up measurements.	• Measurement locations • Number of bins • Date & time
2. COLLECT WASTE	Collect the waste bags separately for each waste stream (e.g. paper/cardboard, PMD and residual waste). Record the total number of bags collected per stream. If the number of bags is too large, randomly select a representative sample.	• Number of bags per stream • Sampling method
3. SORT THE WASTE	Open each selected bag and manually sort the contents into predefined material categories. For example: paper/cardboard, plastics, PET bottles, cans and residual waste.	• Weight per material category • Photos of sorted waste
4. MEASURE CONTAMINATION	Weigh each material category using a calibrated scale and calculate contamination levels for each waste stream.	• Weight (kg) • Contamination (%)
5. IDENTIFY PROBLEM PRODUCTS	Record the products that occur most frequently and contribute most to contamination. Photograph these items to support the findings.	• Top 5 products • Photos
6. COMPARE RESULTS	Compare the results before and after the intervention to determine whether waste separation has improved.	• Baseline vs intervention • Change in contamination (%)

5.5 WASTE COMPOSITION ANALYSIS METHOD

Every waste scan should record at least the following information.

QUANTITATIVE

- Total number of bags analysed
- Weight per waste stream
- Weight per material category
- Contamination per waste stream (%)
- Number (or weight) of specific problem products (e.g. coffee cups)

QUALITATIVE

- Photos of each waste stream
- Photos of the Top 5 products
- Notes on unusual findings
- Operational observations (e.g. overflowing bins, incorrect bags, external influences)



5.6 OBSERVATION & INTERVIEW METHOD

1. WHAT IS THE TOOL?

Observation and interview methods provide qualitative insight into passenger behaviour during waste disposal. While waste composition analysis shows what ends up in each waste stream, observations and short interviews explain why passengers make particular sorting decisions.

The method combines structured observations at waste bins with short interviews immediately after passengers dispose of their waste.

2. WHY USE THIS TOOL?

Understanding passenger behaviour helps explain the results of the quantitative analysis and identifies opportunities for improving waste separation.

The method helps airports to:

observe how passengers interact with waste bins;

- identify hesitation, confusion and decision-making behaviour;
- understand which products are most difficult to classify;
- assess whether passengers notice and use visual communication;
- collect direct feedback on bin design, stickers and signage.

Together, these insights help airports understand not only whether an intervention worked, but also why it did or did not influence passenger behaviour.

5.6 OBSERVATION & INTERVIEW METHOD

3. MORE INFORMATION

The observation and interview method consists of five consecutive steps as elaborated in Table xx

STEP	ACTION	OUTPUT
1. SELECT OBSERVATION LOCATIONS	Select representative waste bins and observation periods. Include different passenger flows, locations and times of day where possible.	Observation plan
2. OBSERVE PASSENGER BEHAVIOUR	Observe passengers while they dispose of waste without interacting with them. Record behaviour immediately after each disposal event.	Observation sheets*
3. CONDUCT SHORT INTERVIEWS	Approach passengers immediately after disposal and ask a small number of standardised questions. Keep interviews short (approximately 1–2 minutes).	Interview ** responses
4. ANALYSE BEHAVIOURAL PATTERNS	Combine observations and interviews to identify recurring behaviours, confusing products and opportunities for improvement.	Behavioural insights
5. COMPARE WITH QUANTITATIVE RESULTS	Compare the qualitative findings with the waste composition analysis to explain the measured contamination levels and intervention results.	Combined conclusions

5.6 OBSERVATION & INTERVIEW METHOD

*OBSERVATION SHEETS

Passenger profile

- Child
- Adult
- Senior

Group type

- Individual
- Group (two or more people)

Waste item

-Describe the item being disposed of.

Record whether the passenger:

- looked at the sticker
 - Yes / No
- showed signs of hesitation or confusion
 - Yes / No
- spent a short or long time at the bin
 - Short (<3 seconds)
 - Long (>3 seconds)

Record:

- selected waste stream
 - Paper & cardboard
 - Plastics / drink cartons / cans
 - Residual waste
- correct sorting
 - Yes / No

**INTERVIEW QUESTIONS

- Question 1: Was it clear where your waste belonged?
- Question 2: What made you choose that waste stream?
- Question 3: Would you recommend this sticker or communication?

Quantitative observations

- Number of observations
- Number of interviews
- Number of individuals versus groups
- Number of children, adults and seniors
- Percentage of passengers looking at the sticker
- Percentage showing hesitation
- Percentage of correct sorting
- Time spent at the bin

Qualitative findings

- Frequently misclassified products
- Common reasons for incorrect sorting
- Passenger comments and suggestions
- Behavioural patterns
- Differences between passenger groups
- Any unexpected findings

GLOSSARY

BCAM (Baseline Circular Airports Method): A methodology for prioritising airport waste streams based on waste quantities, treatment pathways and environmental impact to identify where circular interventions have the greatest effect.

Big Five: The five products most frequently found in passenger waste bins that contribute significantly to waste volumes and contamination.

Circular economy: An economic system that aims to keep products and materials in use for as long as possible by preventing waste and maximising reuse, repair and recycling.

Contamination: The presence of materials in a waste stream that do not belong there, reducing recycling quality and recovery potential.

FF3 bin: Schiphol's standard passenger bin consisting of three separate waste streams: paper & cardboard, PMD and residual waste.

Intervention: The change or measure introduced during a pilot to evaluate its effect. In this study, the intervention consisted of redesigned waste-bin stickers.

Mixed-method approach: An evaluation approach combining quantitative and qualitative research methods to understand both outcomes and underlying behaviour.

Nudge / Nudging: A behavioural intervention that encourages people to make a particular choice without restricting their options or significantly changing incentives.

Operational waste: Waste generated through airport operations, including passenger, commercial and operational activities within the airport.

Pilot: A small-scale, controlled test carried out to evaluate an intervention before deciding whether it should be implemented more widely.

PMD: Waste stream consisting of plastics, metal packaging (cans) and drink cartons.

Residual waste: Waste that cannot be separated into one of the designated recycling streams and is typically sent for energy recovery or disposal.

Stakeholder: Any organisation or group involved in, influencing or affected by passenger waste management, such as airport operators, airlines, retailers and waste contractors.

System-level intervention: An intervention that improves the waste management system itself, for example through procurement, packaging, infrastructure or downstream processing, rather than relying solely on passenger behaviour.

Waste composition analysis: A method for manually sorting and weighing waste to determine its composition and contamination levels.

Waste Safari: A structured assessment of airport waste used to identify the products, materials and behaviours contributing to waste generation and contamination.

FOR MORE INFORMATION, PLEASE REACH
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