

IATA Cabin Waste Handbook

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Executive Summary

Cabin waste – making a case for action.

Cabin waste is costing airlines money, consuming valuable resources, and undermining the sector's sustainability credibility. In 2017 it is estimated that the airline industry produced up to 5.7 million tonnes of cabin waste which costs the sector US\$ 927 million (IATA). With a passenger growth rate currently at 7.6% per year these cabin waste quantities could double in the next 10 years. Passenger concerns regarding airline waste practices are mounting and the sector is being challenged to embrace the circular economy. Airlines have struggled to implement coherent cabin waste reuse and recycling programs. The challenging nature of flight operations including short turn-around times, shortage of space in the cabin, lack of clarity on waste costs and regulatory restrictions placed on catering waste from international flights by many countries, compounds this waste problem.

IATA research indicates that over 20% of cabin waste comprises untouched food and drink and with in-flight catering market of \$15 billion in 2017, this represents a significant incentive to improve planning and logistics. Food waste is emerging as a global issue with up to one third (1.3 billion tonnes) lost or

wasted each year. This has been recognised in the Sustainable Development Goals (SDGs) with a specific target to cut global food waste per capita in half by 2030. Airlines and their service providers must work collaboratively with regulators to ensure that aviation makes a positive contribution to this SDG target.

This handbook describes current cabin waste management practices and looks for examples of where best practice is already happening to deliver waste prevention and recycling solutions as well as regulatory compliant disposal. These solutions are brought together as a series of Actions that an airline and its service partners can choose to take to deliver improvements for cabin waste management. Although the adoption of individual actions will yield tangible business and environmental benefits, a structured coordinated approach will have a synergistic effect and result in long term change.

The report's aims are based on a zero waste concept in which all unwanted materials can be viewed as a potential resource and, although aspirational, this goal can be realised with the collective will of the sector, its service providers and the regulators.

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Glossary

Anaerobic Digestion is a process that breaks down organic material in the absence of oxygen. This process generates biogas (a mixture of methane and carbon dioxide) and nutrient-rich digestate.

Cabin waste is all waste generated within the aircraft cabin. Cabin waste includes cleaning and catering/galley waste and may include waste items brought on board by passengers.

Cleaning waste is all waste collected as a result of cleaning operations within the aircraft. This includes wastes collected by dedicated cleaning teams and also wastes collected by cabin crew during reset of the cabin.

Catering / Galley waste is all waste generated as a result of in-flight food and drinks service.

Circular economy is an alternative to a traditional linear economy (make, use, dispose) in which we keep resources in use for as long as possible, extract the maximum value from them whilst in use, then recover and regenerate products and materials at the end of each service life ¹.

Composting is a process that breaks down organic materials using bacteria in an oxygen-rich environment. The resulting product can be used as a soil conditioner.

Donation or redistribution is applied to packaged, safe to eat food and drink that is donated with the intention of feeding people via food banks or other charity services.

Energy from Waste (EfW) and Incineration is the thermal treatment of waste, with energy recovery. Incineration of waste is the burning of waste without energy recovery.

Food is any substance – whether processed, semi-processed or raw – that is intended for human consumption and includes drink.

Hub (or Home base) is a major base for an airline which is used to facilitate flight connections, re-catering of aircraft and full cleaning services. A 'home base' represents the airport that for a particular airline controls a significant share of flights and operations, e.g. Delta Air Lines at Hartsfield–Jackson Atlanta International Airport (ATL).

International Catering Waste (ICW) the animal (meat) derived component of food waste generated on international flights and is subject to regulation in a number of countries including Australia, Canada, European Union, New Zealand and the USA. Although some jurisdictions such as the USA extend the definition to include waste comprising fruit and vegetables.

Landfill: The disposal of waste by burying it. A landfill site is an area of land or excavated site that is specifically designed and built to receive wastes.

Long haul flight is a flight with duration of more than 6 hours

Outstation is not a major hub for the airline and may not have the same support services, e.g. cleaning contractors or recycling services, as might be available at a hub, but usually performed by third parties.

Recycling is the treatment or processing of waste materials into new products for further use.

Reduction is the decrease in the amount of waste being generated through airline operations.

¹ <http://www.wrap.org.uk/about-us/about/wrap-and-circular-economy>

Reinjection (or salvage) is the transfer of packaged, safe to eat food and drink back into in-flight service

Re-use is the act of using an item again without the necessity for treatment or processing, e.g. cups, trays and plates.

Revenue Passenger Kilometre (RPK): Measure of passenger traffic: number of paying passengers X kilometers flown ²

Short haul flight is a flight with duration of 6 hours or fewer

Uncontaminated reusable or recyclable materials have not come into contact with food containing animal products and/or substances including liquids that may compromise the quality of the reuse or recycling product.

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Waste is defined as any substance or object, which the producer or the person in possession of it discards or intends or is required to discard ³. For the purposes of this Handbook, it can be determined that if an airline passenger intends to discard cabin waste, the receiving party (airline, aircraft cleaner or catering company) may deem that there is value in this material and seek to reuse or recycle it. However, in certain countries, if the material is contaminated with animal products from airline meals and beverages or brought on-board by passengers, the material may be subject to stringent International Catering Waste controls ⁴.

Zero Waste is a concept that encourages the redesign of resource life cycles so that all products are reused with an ultimate goal for no waste to be sent to landfill or incinerated.

² <http://www.iata.org/publications/economics/Pages/developments.aspx>

³ [Council Directive 75.442 EEC as amended by Directives 91/156/EEC and 91/69/EEC]

⁴ HMSO (1994) Circular 11/94 Department of the Environment HMSO pp. 41-42

1.1 Context and rationale for this Handbook

The increasing demand for air travel for both business and pleasure is reflected in a global passenger growth rate of 7.6% in 2017 with an expectation that this growth will continue until at least 2030⁵. This expansion generates capacity and infrastructure challenges for the sector alongside those of fuel price fluctuations, geopolitical concerns, economic cycles and climate change concerns.

A growing challenge for airlines is the sustainable management of waste generated within the cabin. The airline industry has been criticised for its lack of cabin waste recycling, which threatens the sector's environmental reputation. Increasingly airlines are taking steps to address the issue and good practices are emerging within the sector. The solutions are often complex, but achievable and are based on prioritised adoption of the waste hierarchy (Section 1.2); coordination and cooperation between airlines, airports, service providers and manufacturers; and the adoption of a risk-based approach to regulation.

Limited research by IATA indicates that the airline industry generated 5.7 million tonnes of cabin waste in 2017 which cost the sector approximately US\$ 927 million. Current passenger growth rates mean that this waste volume could double in the next 10 years. IATA research also indicates that over 20% of cabin waste comprises untouched food and beverages. The in-flight catering services market is expected to reflect this growth and reach a market size of USD \$18 billion by 2021⁶.

A unique challenge for airlines (and shipping) that operate on international routes is the complex waste regulatory environment that they have to work with. International catering wastes are often subject to regulatory inspections and special handling and disposal requirements including incineration and steam sterilization which makes reuse and recycling challenging (if not impossible). Despite airline meals being prepared under strict global hygiene controls including the sourcing of ingredients, countries such as Australia, Canada, members of the European Union, New Zealand and the USA have placed restrictions on catering waste from international flights based on animal health concerns. Although international arrivals into these countries represent only a fraction of total global arrivals, tight turnaround times, lack of space in catering facilities and the adoption of a precautionary approach by service providers, means that catering wastes from domestic or non-regulated international flights are often not segregated and all cabin waste is deemed potentially biohazardous.

The IATA Cabin Waste Handbook aims to provide IATA members with practical advice on adopting sustainable solutions for managing cabin waste consistent with the principles of the waste hierarchy and in compliance with local regulatory requirements.

The Handbook sets out the strategic drivers and factors influencing increased resource efficiency. It highlights existing good practice so that this may be replicated across the industry and will identify where more data and evidence may be required prior to investment or change.

⁵ <http://www.iata.org/pressroom/pr/Pages/2018-02-01-01.aspx>

⁶ <https://www.businesswire.com/news/home/20170213006081/en/Global-18-Billion-In-Flight-Catering-Services-Market>

1.2 Assumptions

1.2.1 Cabin waste must be handled in accordance with national waste regulations for the protection of the environment and animal health

Although most countries have introduced waste legislation that ensures domestic, commercial and industrial wastes (including cabin waste) are handled, stored and disposed appropriately, a number have introduced specific regulations associated with catering waste from international flights. These generally stipulate much stricter disposal requirements for catering waste from international flights than catering waste from domestic or controlled regional areas that operate under the same levels of controls for animal disease. The actions in this handbook are based on the assumption that existing regulatory requirements are complied with and the handbook does not discuss potential for amending or changing regulations to allow different practices to happen.

1.2.2 Cabin waste must be managed in accordance with the requirements of the waste hierarchy.

The waste hierarchy ranks waste management options according to what is best for the environment which in turn will lead to business benefits. It gives top priority to preventing waste in the first place. When waste is created, it gives priority to preparing it for re-use, then recycling, then recovery, and last of all disposal (e.g. landfill).

It is important to note that if the cabin waste is classified as International Catering Waste (ICW) then recycling and reuse will not be possible, and the waste must be treated by steam sterilization or disposed of by high temperature incineration or deep landfill burial (as stipulated by local regulatory requirements).

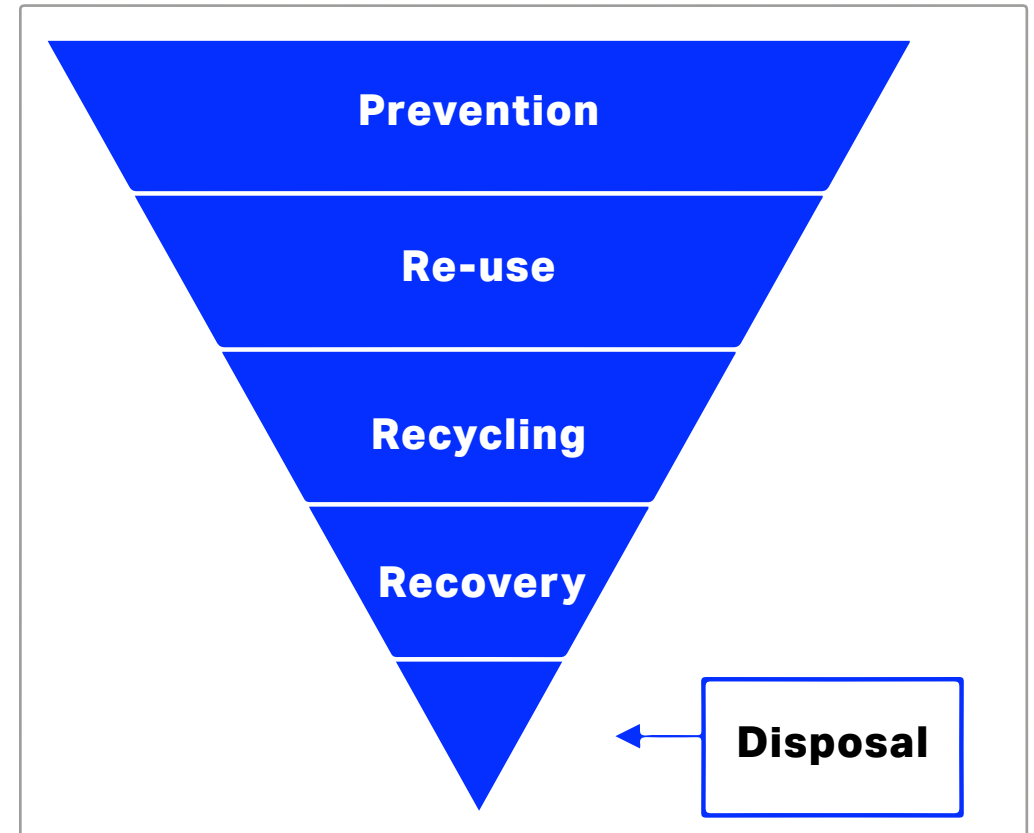


Figure 1: The food and drink material hierarchy

1.2.3 1.2.2 Definitions of terms

Terminology to describe cabin waste is not always used consistently across the industry. Where terms are differently defined measurement of those waste streams will also vary and thus it is more difficult to establish a baseline. This handbook will define airline waste-streams from the point at which the material becomes a waste and the terms are outlined in the Glossary.

2.0 | Current Practice



2.1 Cabin Waste: Overview

Aircraft cabin waste comprises two primary waste-streams: cleaning and catering (galley) waste, as shown in Figure 2.

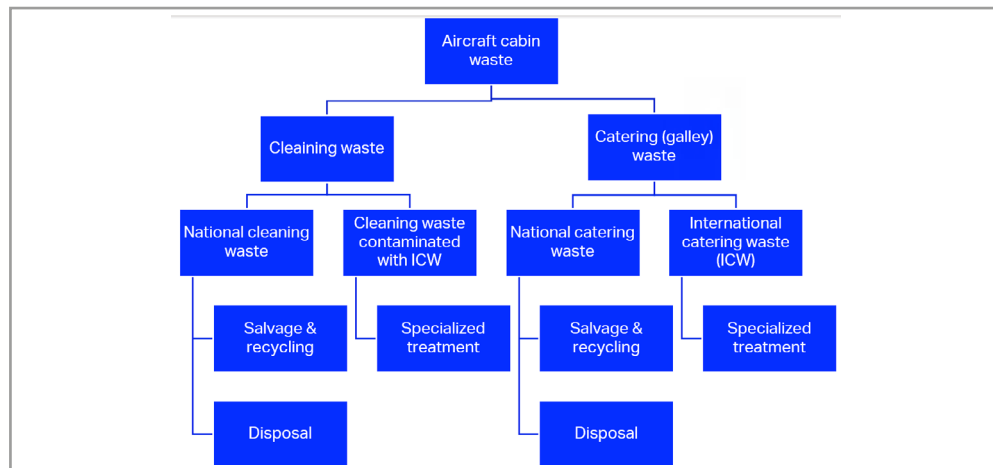


Figure 2: Aircraft Cabin Waste-streams

Cabin cleaning waste is generated by passenger service provision including newspapers, magazines, textiles (headrest protectors/blankets/pillows), amenity kits, headsets and drinks bottles (including full ones).

This waste-stream can also comprise small quantities of food dropped on the floor or placed in seat-back pockets by passengers including food carried onto the flight by the passenger. A sub-component of this waste-stream includes washroom waste which may include biohazardous waste from sharps (primarily used syringes). Cabin cleaning waste is generally collected in plastic bags and removed for disposal by the cleaning contractor through the airport waste management system. Cabin crew are tasked with collecting and storing items such as used blankets, packaging and newspaper/magazines that may restrict access in case of an emergency.

Catering (or galley) waste is generated through the provision of in-flight meals and beverages distributed by the crew. This waste stream

includes food, beverages (including part-consumed and untouched) and packaging which is returned to the galley carts (and/or to static bins and compactor boxes). This waste-stream can contain high volumes of liquid from unconsumed beverages and ice. Unused alcohol is returned to sealed carts and taken back to stores under supervision of customs authorities in bonded warehouses. Crew may additionally collect mixed or segregated recyclables including paper, aluminium cans and plastic bottles separately. The galley carts are removed and managed by the airline catering company. Catering waste may also be placed in static bins and compactor units and removed by the cleaning contractor. A number of countries have imposed restrictions on the animal (meat) derived component of food waste generated on international flights, including Australia, Canada, European Union, New Zealand and the USA. Although some jurisdictions such as the USA extend the definition to include waste fruit and vegetables, it is understood that the potential for plant disease outbreak from ingredients served in airline meals and beverages is deemed to be negligible.

2.2 Cabin Waste: Characteristics

Desk based research indicates that there are few published reports on the characteristics, management procedures, and costs of airline cabin waste. Whilst comprehensive and consolidated data does not currently exist to accurately quantify global airline waste characteristics, management and costings, a limited number of studies have been conducted providing some insight and understanding of airline cabin waste generation.

A 2012 cabin waste assessment study commissioned by IATA and conducted by WSP Environmental found that over 60% of the 44 airlines who responded to a survey conducted with IATA members did not record cabin waste volumes or weights generated on their aircraft and just 25% had carried out waste compositional analyses (WCA's)⁷.

⁷ International Air Transport Association (IATA), 2012. Airline Cabin Waste Assessment.

The WCA's results indicated a wide variability in the amount and type of cabin waste arising between short (0.52 kg per passenger) and long haul flights (between 0.63 and 1.81kg per passenger).

Following the findings and recommendations of the 2012 study, IATA commissioned a waste composition analysis (WCA) trial at London's Heathrow Airport (LHR)⁸. Composition analysis was conducted on both cleaning and catering waste from 17 international flights arriving at LHR between September 2013 and January 2014. The study found that on average 352.71kg of waste was generated per flight with 19.5% collected as cleaning waste; 23.5% as catering waste collected in compactor boxes and static waste bins; and 57% as catering waste placed back in trolley carts.

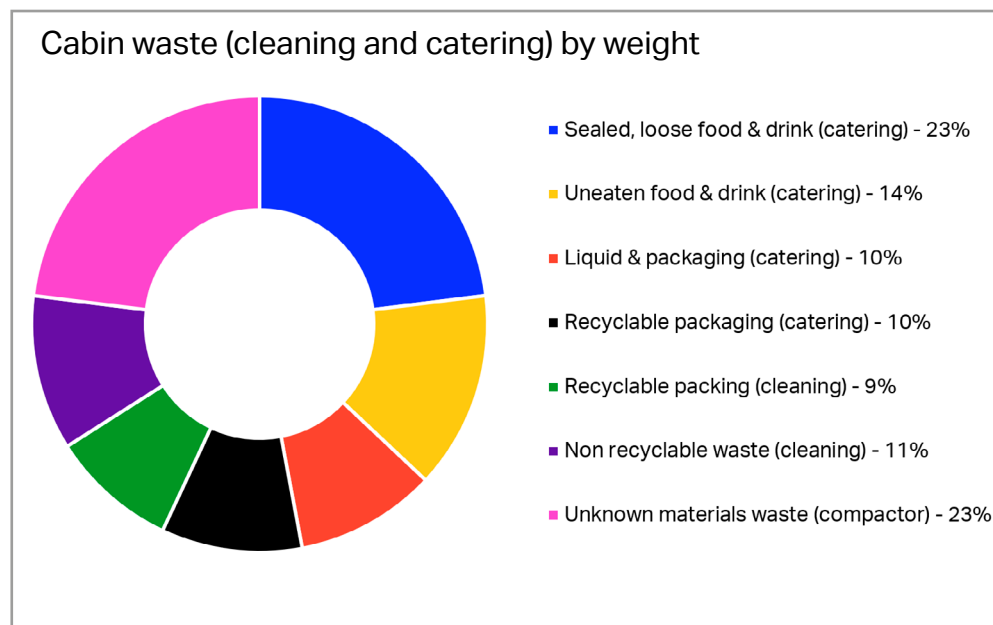


Figure 3: Combined cabin waste by weight⁹

⁸ International Air Transport Association (IATA.), 2014. Aircraft Cabin Waste Project Report

⁹ International Air Transport Association (IATA.), 2014. Aircraft Cabin Waste Project Report

From these waste-streams, the composition was:

- Sealed and loose food and beverages contributed 39.2% (by weight) of the total weight
- Liquid and packaging both represented 18% (by weight) of total weight.
- 17.3% (by weight) of the cabin waste comprised potentially recyclable materials including paper (predominantly newspapers and magazines) (8.8%), glass bottles (5%), plastic (PET) bottles (2%), beverage cartons (0.8%) and aluminium cans (0.7%).
- 23.4% of the cabin waste was unconsumed food and beverages including sealed water (4.9%), fruit juice, yoghurt, milk and untouched meals.

WRAP is aware of a number of airline cabin waste WCA studies that have been completed since 2012. Many of the findings remain unpublished, have variance in the methodologies used or the sample sizes have been too small to offer reliability for comparison and estimation of waste arisings at an industry level.

There is very little publicly available data regarding specific waste costs applied to airlines or their catering and cleaning contractors. Rather than being listed separately, waste handling, management and disposal fees are often an unspecified component of aircraft cleaning and catering contracts. Anecdotal evidence indicates that airlines can be charged over US\$600 per tonne for the handling and disposal of cabin waste. For comparison purposes, municipal waste disposal costs in the UK are up to US\$150 per tonne. It is evident, from the desk based research, that airlines do not yet know the impact that cabin waste management costs have on their business or the cost of the waste generated. The lack of financial assessment has significant limitations on understanding the true cost of airline cabin waste to the airlines and building a business case for mitigation.

2.3 Cabin Waste Regulations

Although most countries have introduced waste legislation that ensures domestic, commercial and industrial wastes (including cabin waste) are handled, stored and disposed appropriately, a number have introduced specific regulations associated with the handling and disposal of catering waste from international flights. Different jurisdictions apply different terms to the classification of waste from international flights, as well as different, but essentially similar, definitions. Countries which do not have an important agricultural sector to protect tend not to have specific legislation. The section below includes a summary of the requirements under European Union (EU), United States of America (USA), Canada and Australia, however, anecdotal evidence indicates that other countries have implemented similar legislation including Brazil, Chile, New Zealand and Chinese Taipei.

The interpretation and enforcement of ICW legislation at both the local airport and national policy level is of critical importance for the reuse and recycling of cabin waste. A number of jurisdictions have issued specific guidance that facilitates the circular economy by allowing cabin products and recyclables from international flights, uncontaminated by animal products, to be reused or recycled. In the absence of such guidance, many enforcement authorities and the corresponding waste stakeholders deem all waste generated on an international flight to be ICW.

2.3.1 European Union (EU)

The EU defines International Catering Waste (ICW) as catering waste from means of transport operating internationally. The EU categorizes ICW as a Category 1 Animal By-Product – the highest category (of 3 categories) because of its perceived high risk for animal health. Although the term “Operating internationally” is not defined in the EU legislation, it has been interpreted by several EU Member States as being only applicable to aircraft arriving from countries outside the EU. Many Member States

classify all waste material from aircraft as ICW, without any consideration of the origin of the waste, whereas others apply a more risk-based approach. A limited number of Member States have published guidance on reuse and recycling; an example is the information published by the UK Animal and Plant Health Agency (APHA) and the Department for Environment, Food and Rural Affairs (APHA and DEFRA, 2014).

2.3.2 United States of America (USA)

Cabin waste from international flights is regulated by the United States Department of Agriculture (USDA) through its Animal and Plant Health Inspection Service (APHIS). The US legislation defines Regulated Garbage as all waste material that is derived in whole or in part from fruits, vegetables, meats, or other plant or animal (including poultry) material, and other refuse of any character whatsoever that has been associated with any such material, if the garbage is on or removed from a means of conveyance, if the means of conveyance has been in any port outside the United States and Canada within the previous two-year period (unless cleared in accordance with the APHIS procedures) (Office of Management and Budget, 2006). In addition, when garbage, trash or other material that is not regulated by APHIS, has been commingled with Regulated garbage, it is also deemed to be Regulated Garbage. Regulated garbage includes but is not limited to food scraps, table refuse, galley refuse, food wrappers or packaging materials and other waste material from stores, food preparation areas, passengers’ or crews’ quarters, dining rooms or any other areas on means of conveyance. Regulated garbage also refers to meals and other foods that were available for consumption by passengers or crew on an aircraft but were not consumed. APHIS (USDA APHIS, n.d.) has published an exemption for uncontaminated waste to be reused and recycled.

2.3.3 Canada

Canadian legislation defines aircraft garbage as waste that contains, or is suspected of containing, animal products or by-products that originated either as food taken on-board or because of transportation of animals in an aircraft. This definition applies to waste from aircraft from any other country, including the U.S. International waste refers to aircraft garbage, forfeited materials, manure and ship's refuse as defined above. All international waste is handled, transported, stored, and disposed of in accordance with the Canadian International Waste Directive (CFIA, 2013). It should be noted that Canada includes waste from aircraft from the US in its definition of aircraft garbage, even though the US does not recognize waste from aircraft originating in Canada as Regulated Garbage.

The enforcement policy of the Canadian Food Inspection Agency (CFIA) is particularly robust; all material removed from an international flight is '... suspected of containing, animal products or by-products ...' and must be disposed of in accordance with the Directive. CFIA does not permit recycling of any waste from aircraft operating internationally (including flights from USA).

2.3.4 Australia

Australia has recently updated its biosecurity legislation, and in 2016, the Biosecurity Act (2015) replaced the Quarantine Act (1908). The term 'Quarantine waste' was previously used for ICW however this has been replaced by 'Biosecurity waste'. The Act prescribes that Biosecurity Waste – including all cabin, galley and hold waste on-board the aircraft must be collected, transported, stored and/or treated by a service provider that has been approved by the regulator.

Biosecurity waste may be derived from: waste, sweepings, organic galley and accommodation refuse from aircraft; refuse or sweepings from the holds of aircraft; unconsumed prepared meals and other partly consumed food; any non-washable items, other waste or materials which may have

encountered biosecurity waste; animal and plant materials (including floral arrangements and animal or plant waste); or materials used to pack and stabilise imported goods. Australian legislation (Australian Government: Department of Agriculture and Water Resource, 2016) requires "...other waste or materials which may have come into contact with biosecurity waste..." to be treated as biosecurity waste. This differs to the previous enforcement policy which stated that, since it was not possible to guarantee that contact with biosecurity waste had not taken place on-board, all waste from international flights must be treated as biosecurity waste. Following its active involvement in an audit of cabin waste, the Department of Agriculture have recognised that where waste is handled effectively and well the risk of introduction of animal and plant diseases through cabin waste is relatively low. With the right controls in place there is scope for, some relaxation of its previous interpretation and enforcement of biosecurity legislation, where formal waste handling protocols are in place and used by operators. This is an excellent example of working smarter within existing regulatory controls without the need to revise statutory instruments.

2.4 Cabin Waste Handling and Disposal

The practicalities of dealing effectively with cabin waste are limited by waste handling and treatment regulations, restricted space within the cabin and short aircraft turnaround times.

As noted in Section 2.1, cabin waste primarily comprises of cleaning and catering waste. Although in most jurisdictions the responsibility for ensuring that cabin waste materials have been disposed of correctly rests with the 'Master of the Vessel', that is, the Captain, these two streams are often handled by two separate contractors to the airline; the Cleaning Contractor and the Catering Contractor. Figure 4: indicates how these two waste streams are separately managed within the context of air-side operations.

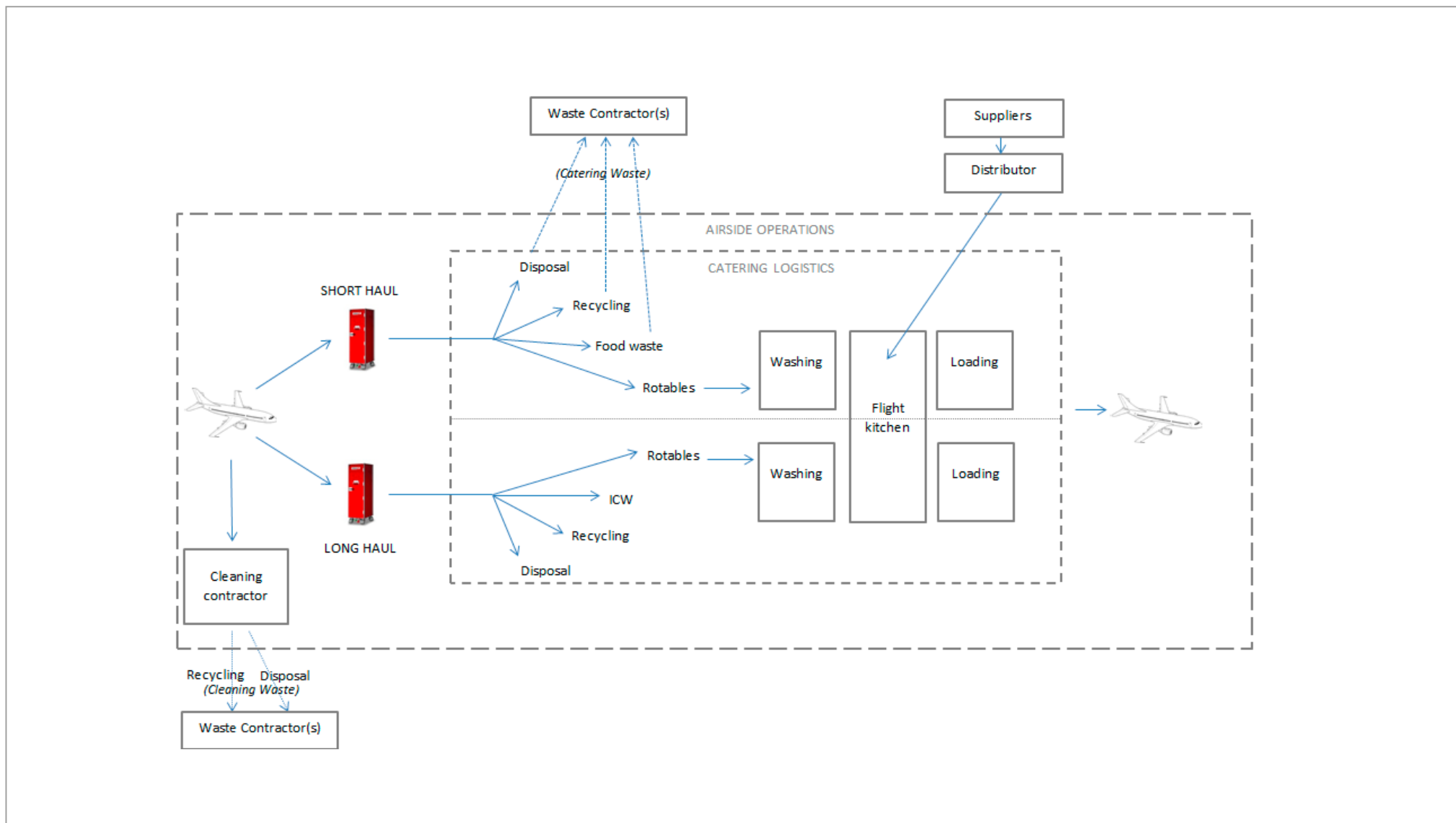


Figure 4: Management of cabin waste within airside operations

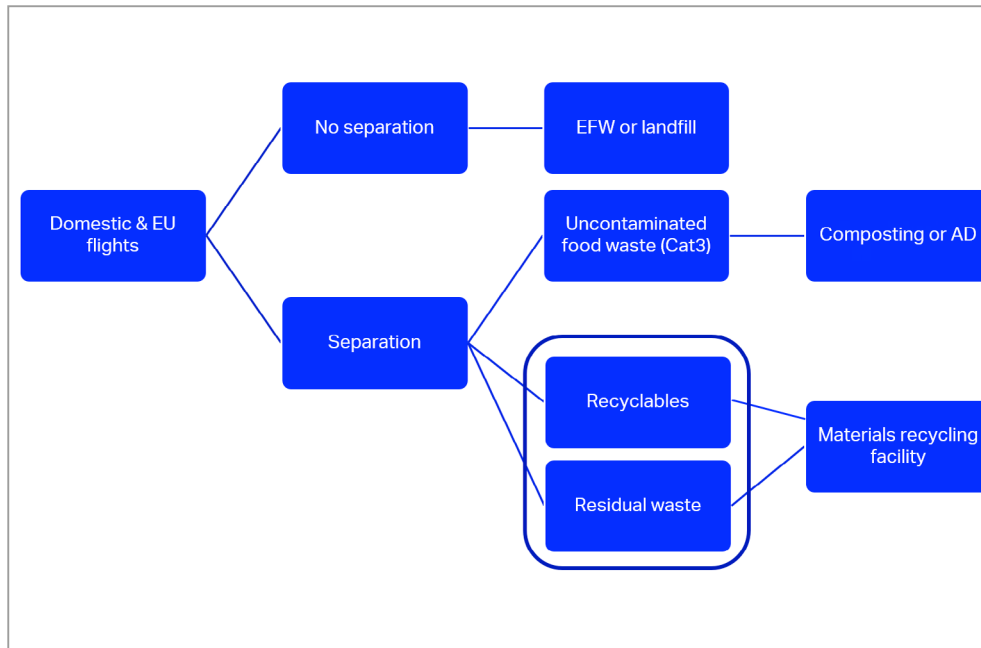


Figure 5: Management of cabin waste within airside operations

Cabin wastes generated on domestic flights and international flights between countries that have not adopted ICW legislation (or have granted exemptions) can be managed (for example, for intra-EU flights) in similar manner as domestic, commercial and industrial wastes. A schematic of the handling and treatment procedures for non-ICW is provided in Figure 5.

Countries that have adopted ICW legislation place stringent requirements on the handling and disposal of ICW. Only the following methods are generally permitted for the disposal of ICW: incineration, pressure sterilization/autoclaving, deep landfill burial and/or grinding into approved sewage system (USA). A schematic of the handling and treatment procedures for ICW is provided in Figure 6.

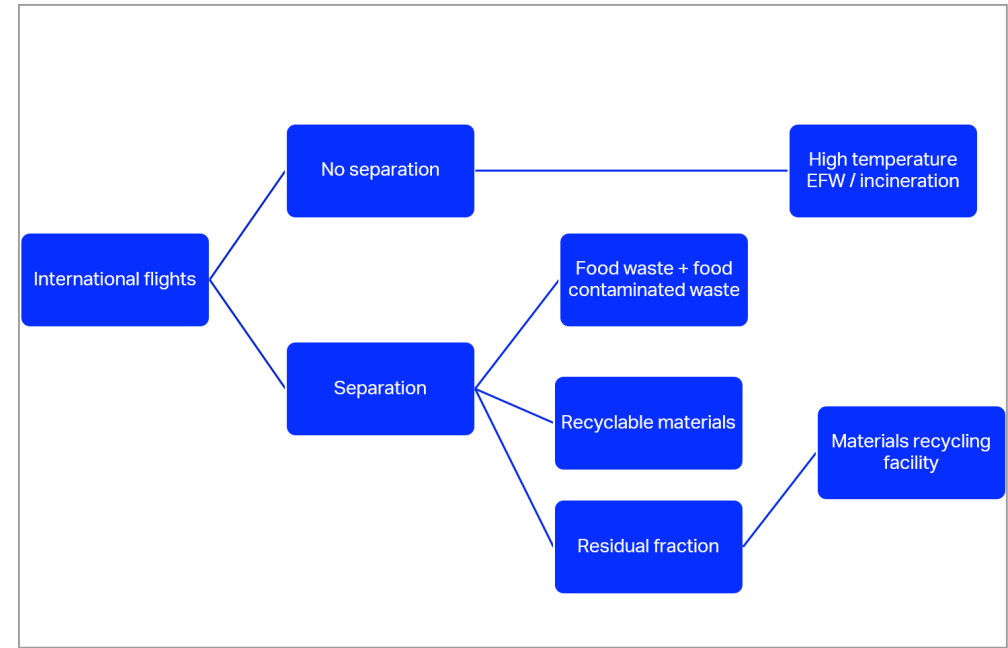


Figure 6: Management of cabin waste within airside operations

In addition to stipulations on the permitted methods of disposal, conditions are usually applied to the transport and handling of ICW, with accompanying record-keeping requirements. In the USA, operators involved in the transport and disposal of regulated waste must have compliance agreements with APHIS. These agreements require operators to have appropriate equipment, standard operating procedures (SOPs) for all aspects of their business and to keep records of incoming and out-going waste. The enforcement costs associated with compliance checks including inspections are recovered through passenger (\$3.96 per pax) and aircraft (\$225) based charges (USDA APHIS, 2017). In Canada, CFIA requires ICW haulers to be approved and to only use approved routes, landfills, incinerator plants and autoclave facilities, operated in accordance with waste legislation. The costs of handling, management and disposal of ICW vary depending on location and technology and

can range from US\$125/tonne at Amsterdam Schiphol Airport (AMS) up to US\$500/tonne at Hartsfield–Jackson Atlanta International Airport (ATL). However, as these waste costs escalate, there will be an increasing incentive to minimise the quantity of ICW that must be disposed of which will include the diversion of waste for recycling .

Current cabin waste management practices generally mean that various combinations of highly mixed wastes are sent for disposal. Segregation of waste is not common or widespread through the sector and in many cases materials are being sent to incineration or landfill solutions when they could be prevented, reused or recycled. There are a number of reasons why this may be happening including:

- Time – both cabin crew and cleaning staff are time constrained with little spare capacity to undertake additional tasks that would extend their duties.
- Costs of waste handling and disposal are frequently not specified within catering and cleaning contracts so there are few incentives for airline staff procuring those services to question waste treatment costs or to put measures in place to reduce them.
- Airlines are more conscious of customer service, quality and branding than cabin waste management.
- Perception of risk and the need for regulatory compliance may mean that airlines, catering and cleaning companies take a precautionary stance when handling cabin waste.

It is possible to reuse food products and recycle paper, glass and plastic from both international and domestic flights as long as it is collected separately and does not come into contact with food that comprises animal products. This is good practice on flights that are not subject to ICW regulation as well since contamination by food can result in the

recyclable material being rejected due to quality concerns. This means that separation of the waste-streams needs to happen on the aircraft before the collected material reaches a catering or materials handling facility.

2.4.1 Other waste streams

Medical waste / sharps

Passengers with specified medical conditions are permitted to carry medical equipment on board commercial flights. These items can include: needles, syringes and lancets ('fingerstick' devices) among other items. Such items, when used, are classified as medical sharps waste and present a biohazard to cabin and cleaning crews if not disposed of carefully. Where medical sharps waste occurs on board, it is essential that provision is made to capture these in designated, puncture-proof containers.

Current practice varies between airlines, however, it is generally accepted that the responsibility for safe disposal of sharps rests with the passenger. Some airlines provide a puncture-proof container for safe disposal of sharps, particularly on long haul flights. There is often limited communication of this facility to the passenger as airlines accept that most passengers will either retain these items for safe disposal later or will know to ask a member of cabin crew if disposal facilities exist. It is common practice to train cabin crew and cleaning contractors to take care when resetting the cabin to avoid injury where sharps have been disposed of carelessly.

Electrical waste

On long haul flights airlines often offer headsets to passengers to use with the in-flight entertainment system (IFE). There is some variation in the quality and type of headset offered to passengers, with, for example, higher quality noise-cancelling headsets being offered to premium class passengers. Higher quality headsets will be collected towards the end of

the flight, sanitised and returned to service on a later flight. The cost of re-using or recycling economy headsets has been reported to outweigh the cost of replacement and, for this reason, not all airlines collect these items separately.

Textiles and toiletries

Blankets, in-flight socks and items of sleepwear are typical items offered to passengers on long haul flights depending on the class of cabin in which they are travelling. Blankets are often collected in at the end of each flight, laundered, repackaged in plastic and returned to service on a later flight. When the quality of the blanket requires it to be replaced the item should be sent for re-use or recycling.

Similarly, complimentary toiletry bags or vanity kits are issued to premium class passengers on long haul flights and are frequently discarded at the end of the flight.

2.5 Survey of IATA members and WRAP observations

2.5.1 Purpose of the survey

IATA & WRAP together with the Life Zero Waste Cabin Project¹⁰ conducted a web-survey to better understand cabin waste generation and existing management practices across IATA member airlines.

WRAP worked with IATA to gather information from airlines, through an IATA member survey, to compile a picture of their:

- Monitoring, analysis and reporting of cabin waste;
- Cabin waste handling and disposal costs;
- Cabin waste management practices (waste minimisation, prevention, recovery and recycling practices); and,
- Waste recycling promotion and awareness raising activities.

Where possible the survey aimed to capture data on waste arisings in the aircraft cabin. The data gained through the survey has been used to develop understanding around the above constructs and help identify areas which are the greatest priority.

The survey was administered as a self-completed form using an online survey platform. When completing the survey respondents were asked to focus on cabin waste managed at their home hub and national out-stations. Completing the survey required input from a number of divisions including catering, and in-flight services. The survey was created to allow respondents to save, reopen and amend up until the closing data. A PDF version was provided to allow respondents to forward to colleagues for input.

2.5.2 Analysis and reporting

Information collected through this survey is held confidentially by IATA, however, aggregated data has been shared with WRAP and used to highlight areas in which the airline industry as a whole could benefit from support and has not identified specific airlines, companies or individuals.

¹⁰ http://ec.europa.eu/environment/life/project/Projects/index.cfm?fuseaction=search.dspPage&n_proj_id=5742

3.0 | Overview of actions



3.1 Purpose

The main aim of this report is to provide airlines and their waste stakeholders with guidance on Actions that can be initiated to improve cabin waste management performance in line with the waste hierarchy. The Actions include airline and aviation case studies and, if not available, best practice guidance from other sectors.

Both waste management and aviation are dynamic fields and there is acceptance that the Actions provided in this Handbook will need to be updated and broadened as new issues, regulations, technologies and procedures emerge. Although the Actions can be initiated in isolation a focus on Reduction activities will have a significant effect on all subsequent Actions since by not generating cabin waste in the first place, the need to handle, transport, recycle, treat and dispose of cabin waste can be avoided. It is also recommended that an airline undertakes **Strategy and Corporate Engagement (S&C) Actions 1 and 5** which can provide assurance that its cabin waste activities comply with regulations and provide key information from which a business case for intervention can be based. The adoption of an airline waste resource efficiency strategy (**S&C4**) and the development of cabin waste objectives, targets and pledges (**S&C7**) can provide focus and if combined with other appropriate Actions can ultimately lead to a Zero Waste Cabin. New Actions will be added accordingly as new trends emerge, technology advances and procedures are developed.

It should be noted that all of the Actions require good communication and outreach with stakeholders. Publishing cabin waste objectives, targets and pledges as well as achievements can motivate stakeholders, encourage support from airline senior management and enhance the airline's reputation with customers and investors. Key stakeholders include: staff (air crew, in-flight services including catering and cleaning, corporate communications, procurement, finance and human resources), passengers, catering, cleaning and waste contractors, airport authorities and regulators.

3.2 Action List

Strategy and corporate (S&C)

1. Undertake a cabin waste compliance and characteristics assessment
2. Generate a shared understanding of cabin waste between airlines and regulators
3. Waste resource efficiency strategy guidance
4. Develop a waste resource efficiency strategy
5. Knowing and owning the cost of cabin waste
6. Work with catering companies to reduce over-ordering and food waste
7. Developing cabin waste objectives, targets and pledges

Monitoring and measuring (M&M)

1. Establish a baseline of cabin waste arisings and composition
2. Periodic reporting of cabin waste KPI's
3. Standard cabin waste composition analysis (WCA) methodology

Reduction

1. Pre-flight food ordering
2. Reduce on-board paper use
3. Improving the passenger experience to minimise cabin waste

Re-use and reinjection (R&R)

1. Food reinjection
2. Food donation

Recycling

1. Develop standard operating procedures for segregation of cabin waste
2. Recycling trolley carts
3. Promote the development of airport material reclamation facilities (MRFs) for cleaning waste
4. Cabin design includes cabin waste handling and management
5. Passenger participation in cabin waste solutions
6. Recyclable material colour coding to enable waste segregation

Disposal

1. Alternative cabin waste treatment and disposal options
2. Safe disposal of sharps

4.0 | Strategy and Corporate (S&C)



4.1 S&C1: Undertake a cabin waste compliance and characteristics assessment

		Owner
Action	Ensure that the airline and its service providers comply with cabin waste regulations with a focus on those countries that have adopted restrictions on waste from international flights. The airline should review all of its destinations to determine who manages cabin waste when off-loaded from its aircraft and its costs/charges.	Airline
Why	Non-compliance can result in enforcement action and reputational harm. Improved knowledge of cabin waste costings can drive waste prevention, reuse and recycling initiatives. Anecdotal evidence indicates that airlines can be charged over US\$600 per tonne for handling and disposal of cabin waste. For comparison purposes, municipal waste disposal costs in the UK are up to US\$150 per tonne.	
Output	Development and maintenance of an airline cabin waste compliance and characteristics database with agreed monitoring protocols.	
Outcome	Avoidance of regulatory enforcement action. Improve reuse and recycling of cabin waste by identifying destinations where there are no regulatory restrictions in place. Determine routes in which cabin waste is back-flown to home-stations (due to cost, regulations and/or fast turnarounds) with corresponding increases in fuel burn and CO2 generation. Costing information can be used as primary input for the business case for improved cabin waste management.	
Who do I need to talk to inside my organisation	Airline environment or sustainability managers; station managers.	

Who do I need to talk to outside my organisation	Airport authorities; Catering and aircraft cleaning companies; Environmental and animal health regulators
What impact will this action have	Avoid conflict with regulators and reputational harms. Identify reuse and recycling opportunities. Negotiate improved waste contract conditions including rates.
Timescale	Short term.
Cost	Low.
Hierarchy action level	Prevention.
Net Benefit	Systematic approach to compliance and reuse/recycling of cabin waste .
Case study/best practice example	None identified.
Steps needed to put this action into practice	Airlines could consider the following steps: <ol style="list-style-type: none"> 1. Compiling a destination list from the airline timetable and contacting airline station managers to identify the relevant aircraft cleaning contractor, cabin waste disposal route and costs/charges. 2. Station manager to consult with airport to determine the cabin waste regulatory requirements and waste disposal facilities (waste and recycling storage areas, materials reclamation facilities – MRF's, incineration and/or autoclave units) 3. Prepare a cabin waste compliance and characteristics database (at an airport level).

4.2 S&C2: Generate a shared understanding of cabin waste between airlines and regulators

		Owner
Action	Increased shared understanding of cabin waste issues between airlines and their regulators (animal health and environmental).	IATA
Why	Anecdotal evidence indicates that there is a disconnect between the views of airlines, services provider and the regulators which results in reusable and recyclable waste being treated as International Catering Waste (ICW) and disposed rather than recycled.	
Output	Shared guidance materials and regular opportunities for dialogue/questions/solution provision, leading to smarter, risk-based application of regulations.	
Outcome	Improved waste handling and disposal practices mean less waste, increased recycling and correct disposal of waste. Sharing of best practice and solutions. Better consistency of implementing the regulations within a country.	
Who do I need to talk to inside my organisation	Compliance managers; sustainability managers.	
Who do I need to talk to outside my organisation	Environmental and animal health regulators	
What impact will this action have	A clear route for dialogue will provide a forum to resolve issues with the regulations as they arise commingled	

Timescale	Short term.
Cost	Low.
Hierarchy action level	Prevention.
Net Benefit	A common understanding and interpretation of regulatory requirements will lead to a more consistent approach that can be shared between airlines.
Case study/best practice example	<ol style="list-style-type: none"> 1. Heathrow Airport (LHR): In July 2014, 13 animal health regulators visited the airport to observe the cabin waste management facilities and meet with airline and airport representatives. It was agreed that a Heathrow Animal and Plant Health Agency (APHA) working group would be established to promote an active dialogue between airlines, airports and the regulator on cabin waste issues in the UK. 2. Air New Zealand (NZ) have found that by working with animal health regulators they have been able to introduce practices such as the reuse of in-flight products from international flights that were previously deemed unacceptable¹¹. 3. IATA commissioned a study from a food safety and animal health consultancy (Food Control Consultants Ltd.). The results of the study, linked in Appendix 2: Documents available on Extranet Site, indicate that governments may not have adopted a risk-based approach to ICW regulations and the report presents a strong case for the development of smarter regulation which maintains animal health controls whilst facilitating the circular economy.

¹¹ <https://www.airnewzealand.co.nz/press-release-2017-air-new-zealand-leads-the-way-with-inflight-waste>

Steps needed to put this action into practice

A first step will always be to identify the right regulator and key responsible individuals. ICW legislation is based on protecting animal health and is often enforced by agricultural or veterinary inspectors. These inspectors often apply a precautionary approach and maybe unwilling to accept new reuse and recycling initiatives. However, given the mounting challenge of food waste, many governments have also put in place legislation and policies which aim to prevent and recover value from food waste. It is vital that the objectives of both the ICW regulations and food waste prevention measures are achieved, so it is essential that all policy areas are included in discussions and all appropriate regulators are involved.

An open dialogue between airlines and regulators will help regulators understand the complexity of the airline operation but also frequently help airlines find ways to meet compliance requirements within their existing operational and regulatory constraints.

Global regulatory dialogue and experience should be shared through an IATA run forum. This should be constructed in such a way that useful information can be disseminated to regulators across the globe so that they have access to successful global experience and best practice.

4.3 S&C3: Waste Resource Efficiency Strategy Guidance

		Owner
Action	Development of guidance and a template for a waste and resource efficiency strategy.	IATA
Why	<p>To enable a consistent approach to reducing, reusing, and recycling cabin waste across the airline industry. Viewing waste as a potential resource will assist with changing perceptions that waste always represents an environmental and financial liability. Waste avoidance, reuse and recycling can yield significant financial benefits.</p> <p>The strategy guidance should include recognition of a number of variables that will impact future cabin waste management characteristics including:</p> <ol style="list-style-type: none"> 1. Airline route plans including ultra-long haul 2. Aircraft ownership: leased aircraft offer less options for waste stowage 3. Passenger trends: bring your own device (BYOD), paperless cabins, tailored in-flight services through improved passenger profiling, passenger participation 4. Innovations: recyclable stowage in the hold, air-blade hand-dryers; 5. Environmental concerns: CO2, single use plastics (SUP), lack of recycling 6. Future waste costs and recycling revenues and how they are communicated to senior management 7. Partnership approach to waste stakeholders including catering and cleaning contractors, airports and other airlines 8. Crew involvement: training, education and rewards/recognition 9. Waste data capture and analysis 10. Regulator engagement and adoption of risk based guidance for managing ICW 11. Goals, targets and KPIs linked to corporate reporting and the SDG's 12. Development of pledges and commitments: zero waste flights, no SUPs 13. Links with initiatives to reduce food waste generated during meal production <p>The development of an industry accepted approach to resource efficiency will allow airlines to share best practice with each other and benchmark progress. The agreed strategy will provide a framework for action which will ensure that the waste hierarchy is applied correctly by those treating or disposing of waste from airlines. The strategy would be used to set appropriate cabin waste objectives, targets and key performance indicators (KPI's).</p>	

Output	Industry standard guidance on how to develop and structure a waste and resource efficiency strategy for an airline.
Outcome	The industry has an accepted understanding of the scope of resource management within the context of an individual airline and adopts a standard approach to strategy development, measuring and monitoring.
Who do I need to talk to inside my organisation	The development of an effective waste and resource efficiency strategy must be led from the top of the organisation. To ensure goals are realistic and achievable an agreed corporate resource efficiency strategy must include engagement with all internal business units. For example, the role of procurement in specifying a cabin and galley designed for waste and recycling storage and segregation and early engagement with corporate marketing to ensure waste reduction and recycling interventions do not result in a perceived reduction in service or negatively impact the customer experience. The strategy must recognise the dynamics of cabin waste management since composition, volumes, innovations, trends, public concerns and costs vary with time.
Who do I need to talk to outside my organisation	Airport authorities, animal health and waste regulators, cleaning contractors, catering contractors, waste and recycling contractors.
What impact will this action have	Airlines will have a standard template for developing their thinking and their needs for action to achieve a zero cabin waste objective. Frequently the first step in drafting a strategy is the greatest challenge. Template information will give individual airlines clear guidance on what needs to be done, who needs to be involved and what needs to be measured.
Timescale	Short to medium
Cost	Low.
Hierarchy action level	Prevention/reuse/recycling/disposal

Net Benefit	All airlines could use the template documentation and thus all airlines should be able to set up strategies with common metrics. This will make it easier to report progress and share best practice going forwards.
Case study/best practice example	<p>Cathay Pacific (CX): has developed a corporate strategy with the aim of reducing the impact of using and disposing of materials as part of its operations¹². The strategy is partly driven by customer concerns to reduce in-flight waste.</p> <p>There are four identified steps:</p> <ol style="list-style-type: none"> 1. Identify impact per operational area; 2. Identify midterm goals to meet 2020 commitments; 3. Identify solutions, trial and then full implementation; 4. Monitor progress. <p>The strategy identifies barriers to recycling of international waste, but also identifies the key materials on which they undertake to report in-flight recycling performance: glass bottles; aluminium cans; plastic cups and plastic bottles.</p>
Steps needed to put this action into practice	IATA Sustainability and Environment Advisory Council (SEAC) to agree a standard approach to developing an airline resource efficiency strategy.

¹² <http://downloads.cathaypacific.com/cx/aboutus/sd/2016/waste-management/resources-and-waste-management/index.html>

4.4 S&C4: Develop a waste resource efficiency strategy

		Owner
Action	Develop an airline waste resource efficiency strategy.	Airline
Why	A waste resource efficiency strategy will establish the airline's aims, objectives and approach to reducing the impact and cost of cabin waste. .	
Output	An agreed waste resource efficiency strategy which will be reviewed and updated regularly. The strategy development should follow IATA guidance (S and C 3).	
Outcome	<p>An agreed strategy will provide the top-down strategic approach to ensure all business units are working to an agreed plan. The agreed strategy will provide a framework for action which will ensure that the waste hierarchy is applied correctly by those treating or disposing of waste from airlines.</p> <p>In addition, the strategy will provide an important additional driver towards sustainable waste management where there may be limited incentives to change current operations. For example, where the costs of waste handling and disposal are part of a fixed service charge at each destination airport there may be no financial incentive to separate cabin waste materials for recycling. The strategy should ensure that, where possible, costs for waste treatment and disposal are clear and identifiable within airline cleaning contracts.</p> <p>Following an industry accepted approach will provide airlines with a framework within which to more accurately measure total cabin waste arisings and to quantify materials being sent for re-use, recycling and disposal. This in turn will allow setting of objectives with corresponding Key Performance Indicators (KPI's) for cabin waste. Working to an industry standard will allow airlines to better share good practice with each other and to benchmark progress.</p>	

Who do I need to talk to inside my organisation

An agreed airline waste resource efficiency strategy must include engagement with all internal business units. For example, this will include the role of procurement in specifying a cabin and galley designs for waste and recycling storage and segregation. Existing contracts with cleaning and catering contractors will also need to be considered.

Early engagement with corporate marketing is recommended to ensure waste reduction and recycling interventions do not result in a perceived reduction in service or negatively impact the customer experience. Corporate marketing may also be able to advise how the airline brand could be used so as not to present a barrier to the distribution of surplus items for re-use. For example, redistribution or donation to local charities of branded blankets, clothing or packaged edible food.

Who do I need to talk to outside my organisation

Destination airport authorities are often directly responsible for handling and disposal of cabin waste. Facilities for recycling can vary considerably between airports and may depend on the availability of local waste recycling and disposal facilities. Availability of recycling services in turn will determine the degree of effective material separation during the in-flight service.

Local regulators will provide guidance on how waste and recycling may be handled, stored and treated. In particular regulators will be interested in cabin waste from international flights and will be able to advise on procedures to minimise contamination and maximise recycling.

Cleaning contractors are under increasing pressure to complete cabin resets as a result of airlines reducing turnaround times. Waste composition studies have identified that a significant percentage of cleaning wastes could be recycled, but contractors may require additional resources in order to meet contractual targets. A realistic strategy approach should take account of any limitations.

Catering contractors receive food service trolleys filled with a mix of materials. Trolley contents can include: untouched meals; rotatable trays, cups and cutlery; empty packaging, food and liquid wastes. A corporate strategy will consider how product and packaging design, meal planning, and in-flight cabin service procedures can be designed to allow ease of material separation for re-use and recycling.

Aircraft manufacturers are designing new aircraft to maximise airline revenue and passenger comfort and safety. Engagement with manufacturers as part of the development of a waste resource efficiency strategy will ensure that aircraft, in particular the galley and hold, are designed to support waste segregation and storage of recyclable materials.

What impact will this action have	A clear, well defined strategy that is owned by all parts of the business will enable an airline to deliver zero cabin waste. Buy in across a company is critical and a strategy must ensure that all departments can see and measure the benefits of dealing with waste properly.
Timescale	Short to medium
Cost	High
Hierarchy action level	Prevention/reuse/recycling/disposal
Net Benefit	Each airline will have a clear pathway for engaging the business in the path to zero cabin waste.
Case study/best practice example	<p>Air New Zealand (NZ) reports annually on recycling performance at Auckland ground sites and has set a target of 85% recycling by 2018 and zero waste to landfill by 2020¹³.</p> <p>British Airways (BA): has committed to improve resource efficiency through waste minimisation, increased re-use and recycling and reduced reliance on landfill for disposal¹⁴. The airline has committed to address food waste through working with its catering partners. The airline has published a target to recycle 50% of waste generated through its ground operations at London Heathrow and London Gatwick.</p>
Steps needed to put this action into practice	<ul style="list-style-type: none"> • Secure corporate leadership to develop a strategy; • Use IATA guidance and draft template documentation as a framework; • Engage across the business, including within internal business units and external partners; • Draft and pilot a strategy to get feedback on the practicalities from the business; • Ensure the strategy includes objectives backed by real and impactful metrics; • Draft strategy and set reporting intervals; • Regularly report on metrics; • Review and update strategy approach and KPIs at regular intervals.

¹³ <https://p-airnz.com/cms/assets/PDFs/sustainability-report-2017-v2.pdf>

¹⁴ https://www.britishairways.com/cms/global/microsites/ba_reports0910/pdfs/Environment.pdf

4.5 S&C5: Knowing and owning the cost of cabin waste

		Owner
Action	Clearly identify all the costs of cabin waste handling and disposal with catering and cleaning contractors and regularly collate and report them. Costs for both the handling and disposal of separate fractions should be identified where feasible.	Airlines
Why	Anecdotal evidence indicates that airlines can be charged over US\$600 per tonne for handling and disposal of cabin waste. For comparison purposes, municipal waste disposal costs in the UK are up to US\$150 per tonne ¹⁵ . These costs are not visible to airlines and vary between airports, regions and countries. This means that the true cost of generating, handling and disposing of cabin waste is hidden and as such there is little or no incentive to do more to reduce, reuse and recycle. In addition, the revenue or reduce waste costs that could be realised from clean recyclables is also hidden from the airline and may be offsetting catering and cleaning contractor costs rather than benefitting the industry. In the absence of robust economic data of this nature it is impossible to make the business case for making changes to current practices as the economic value cannot be measured or seen.	
Output	Model contracts that clearly identify cabin waste handling and disposal costs so that the airline can see the true economic cost when negotiating with contractors. Creation of a cabin waste handling and disposal costs database broken down by airport/contractor.	
Outcome	Airlines know what they are paying for waste handling and can make informed decisions on future waste handling practice as well as options to reduce, reuse and recycle based on real data.	
Who do I need to talk to inside my organisation	Those procuring both catering and cleaning services so that they understand why this information is needed and what it will tell them.	

¹⁵ <https://www.letsrecycle.com/prices/efw-landfill-rdf-2/>

Who do I need to talk to outside my organisation	Catering and cleaning companies so that they will be aware that this information will be a requirement in tendering documentation.
What impact will this action have	Having this information will enable the airline to compare between contractors when tendering in terms of their charges for waste and will give overall clarity about the cost of waste that can be used to build a business case for making more sustainable waste handling choices where appropriate.
Timescale	Short
Cost	Low.
Hierarchy action level	Prevention/recycling
Net Benefit	The cost of waste becomes visible and reportable.
Case study/best practice example	<p>WRAP: In the UK, WRAP works with the Hospitality and Food Service sector to reduce food waste. This includes working with businesses that engage contract catering services. WRAP recommends using best practice procurement guidance when developing new catering and waste management contracts and provides model guidance as part of its support. It also advises working with catering providers to jointly identify barriers to food waste prevention. WRAP has developed a "Hospitality & Food Service Agreement –Waste Management Review Guidance"¹⁶ that provides guidance on contract clauses that can promote waste prevention and improved recycling and reuse of the materials collected.</p> <p>WRAP: although not focused on air transport, WRAP has recently calculated that food waste costs the UK's healthcare sector £1,900 (US\$2,400) per tonne¹⁷. This is made up of the procurement of food (52%), labour to prepare and serve it (37%), utilities to cook/refrigerate it (7.5%) and disposal (just 3.5%).</p>

¹⁶ <http://www.wrap.org.uk/sites/files/wrap/HaFSA%20Waste%20review%20guidance.pdf>

¹⁷ <https://www.mrw.co.uk/knowledge-centre/a-diagnosis-for-reducing-food-waste-across-the-nhs/10033334.article>

Steps needed to put this action into practice

Development, piloting and trials for template contracts/contract clauses. Engagement with partners who handle and dispose of cabin waste so that the benefits of changing practices can be shared where practicable.

4.6 S&C6: Work with catering companies to reduce over-ordering and food waste

		Owner
Action	Airlines and catering companies work together to quantify and value food loss and to make it visible through agreed new systems of working or changes to catering contracts	Airline
Why	<p>The process of menu development, forecasting passenger numbers and preferences; and the purchasing, production, assembly and distribution of food is complex. The number of variables to be considered within a short time period means that precise forecasting of catering requirements can be challenging and as such most flights over-cater. Catering contracts are based on a per meal provision with additional clauses on maintaining timely delivery, quality and hygiene standards. With no reference to waste minimisation, reuse and/or recycling, catering contracts may incentivise over-supply of in-flight meals and beverages.</p> <p>This can mean that the scale and cost of waste are not visible to the airline and there is no incentive for the catering companies to put in place measures to reduce waste being generated including the monitoring of food waste. Airlines should include waste management criteria, including measurement, treatment and disposal costs in cleaning and catering contracts. This would allow an airline to regularly monitor and evaluate the performance of its waste prevention (through KPI's), minimisation and recycling services / schemes.</p>	
Output	Airlines and catering suppliers agree systems and procedures to identify and place a cost on food waste. Both parties agree mutually beneficial incentives to reduce food waste. This may be through agreed new systems of working, equipment, technology and/or through contractual changes.	
Outcome	Both airlines and catering companies develop a shared understanding of the scale and cost of food waste. This results in a joint commitment to reduce catering waste from airlines and to ensure that where possible edible food is not wasted.	

Who do I need to talk to inside my organisation	Airline operations (inflight services), Procurement, Finance and Legal
Who do I need to talk to outside my organisation	Catering companies
What impact will this action have	Research by IATA indicates that up to 25% of cabin waste comprises untouched food and drink and with the in-flight catering services market estimated to be US \$15.5 billion in 2017 , up to US \$ 3.9 billion worth is currently being landfilled or incinerated. Food waste minimisation would bring significant financial benefits to airlines.
Timescale	Medium
Cost	Low.
Hierarchy action level	Prevention/reduction.
Net Benefit	Reduction of food loss within the in-flight catering process and a reduction in the cost of handling and disposing of food waste.
Case study/best practice example	Champions 12.3: are a coalition of executives from governments, businesses, international organizations, research institutions, and civil society working to mobilize action to reduce food loss. A report ¹⁸ on behalf of Champions 12.3 provides guidance on developing a business case for reducing food loss and waste from catering. It indicates that the average benefit-cost ratio for food waste reduction was more than 6:1 over a three year time period. Key strategies for achieving food waste production was to measure the waste, engage staff, reduce overproduction and repurpose excess food (donation).

¹⁸ https://ec.europa.eu/food/sites/food/files/safety/docs/fw_lib_srp_wri-catering.pdf

Case study/best practice example

WRAP: Its Food Waste reporting guidelines for the Hospitality and Food Service sector may provide a useful resource when working with Catering contractors to monitor, and report food waste¹⁹. The aim of this fact sheet on the Food Loss and Waste Standard (FLWS) is to help the Hospitality and Food Service (HaFS) sector understand its use in delivering robust food waste measurement as part of a waste reduction strategy.

WRAP has developed standard clauses²⁰ for measurement, monitoring and reporting on food waste arisings that may provide a useful resource for airlines when procuring catering and cleaning contractors. The document provides sample contract clauses for the provision of clear, frequent and accurate collection data that can be used by businesses when seeking to procure food waste collection services. It includes contract clauses that can promote food waste prevention and improved recycling of the material collected (but can be adapted for other waste streams, should this be required).

Steps needed to put this action into practice

Engage with catering suppliers, establish a baseline for waste being generated, agree which actions from this handbook are appropriate to put in place, pilot and monitor impact

¹⁹ Source: http://www.wrap.org.uk/sites/files/wrap/Food_waste_reporting_guidelines_HaFS_1.pdf

²⁰ http://www.wrap.org.uk/sites/files/wrap/Clauses_measurement_reporting_food_waste_HaFS.pdf

4.7 S&C7: Developing cabin waste objectives, targets and pledges

		Owner
Action	Development of cabin waste objectives, targets and pledges is key to achieving a desirable outcome.	Airline
Why	<p>Waste objectives, targets and pledges assist airlines to focus on a desired outcome. An objective is what an airline wants to change or achieve, and a target is an indicator that determines successfully the airline has been in achieving an objective. A pledge is a public commitment to achieving a particular objective and/or target. Identifying and reviewing cabin waste objectives, targets and pledges is a key output from the airline's waste resource efficiency strategy (S and C 4). The objective and targets can be complemented with key performance indicators (KPIs) that is a measurable value that demonstrates how effectively an airline is achieving these objectives and targets.</p> <p>The objectives should be SMART (specific, measurable, achievable, relevant and timely). The visibility provided by objectives and targets supports better and faster budget decisions and control of processes in the airline. Waste performance improvements are difficult to achieve in the absence of objectives and targets. There are a number of factors that determine cabin waste objectives, target and pledges including:</p> <ul style="list-style-type: none"> • Demonstrate continuous environmental performance improvement – environmental management systems (ISO14001); CSR reporting • Global reporting Initiative (GRI) waste disclosure • Response to environmental concerns - zero waste to landfill, matching SDG indicator 12.3, ban on single use plastics (SUP); • Financial – saving money • Reputation – public statements may receive positive response from passengers, civil society, media and investors. <p>The airline should develop supporting KPIs and examples are provided in the table below. It should be noted that aviation's continuing growth means that the magnitude of many environmental aspects of aviation (CO₂, water consumption, waste, etc.) is also increasing. Although KPI's should be expressed in absolute terms it is also helpful to normalise the data to monitor performance improvements. Waste cabin data can be normalised by dividing the waste (tonnes) by an appropriate activity metric (passenger number, revenue tonne kilometre, etc.).</p> <p>The airline sector could agree common cabin waste objectives and goals and make a pledge to reduce waste and increase recycling and reuse as the grocery sector has done in the UK, through the Courtauld Agreement²¹.</p>	

²¹ <http://www.wrap.org.uk/node/14507>

Output	Clear set of cabin waste objectives, targets and pledges are defined and subject to periodic review, backed by KPI's.
Outcome	Airlines are realistically focussed on what can be achievable and measurable outcomes. Cabin waste volumes are reduced and recycling rates improved.
Who do I need to talk to inside my organisation	Inflight services
Who do I need to talk to outside my organisation	Catering and cleaning companies, airport authorities
What impact will this action have	High – in its absence there will be little progress on improving cabin waste management performance
Timescale	Short-term but needs to be reviewed annually
Cost	Low
Hierarchy action level	Prevention, reuse and recycling
Net Benefit	Reduced costs and enhanced reputation
Case study/best practice example	Ryanair (FR) has pledged ²² to become "plastic free" by 2023 by replacing non-recyclable plastics with environmentally friendly alternatives such a bio-degradable cups, wooden cutlery & paper packaging.

²² Source: <https://corporate.ryanair.com/plastic-free-by-2023/>

Case study/best practice example

British Airways (BA): has committed to reduce the amount of waste that has to go to landfill and has a goal to recycle 50% of waste by 2020 at its main bases in Heathrow and Gatwick²³.

Iberia (IB): is leading an EU “Life Zero Cabin Waste” project²⁴ which aims to reduce cabin waste by 5% through minimization measures, such as the redesign of menus and the use of lighter, re-usable cutlery, and, waste recovery, after this reduction, of 80% of the total cabin waste diverted from landfill (50% recoverable, 30% municipal solid waste), or approximately 4 560 tonnes per year, through the implementation of the project actions.

Gatwick Airport (LGW): In June 2018, Gatwick became the first airport to achieve a ‘Zero Waste to Landfill’ accreditation from the Carbon Trust, after taking active steps to divert its non-hazardous waste streams from landfill²⁵.

Steps needed to put this action into practice

Development of airline waste resource strategy. Monitoring of key performance indicators (KPI’s) to determine if objectives and targets are being met

Ryanair plastic free 2023:

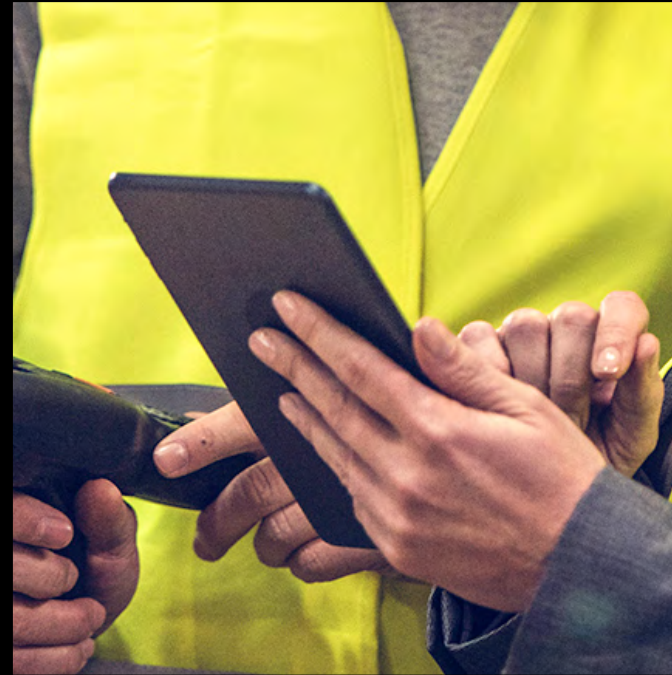


²³ Source: <https://www.britishairways.com/en-gb/information/about-ba/csr/corporate-responsibility>

²⁴ Source: http://ec.europa.eu/environment/life/project/Projects/index.cfm?fuseaction=search.dspPage&n_proj_id=5742

²⁵ Source: <https://resource.co/article/gatwick-first-airport-win-zero-waste-landfill-accreditation-12706>

5.0 | Monitoring and measuring (M&M)



5.1 M&M1: Establish a baseline of cabin waste arisings and composition

		Owner
Action	Establish a baseline of cabin waste arising that measures both weight and composition.	Airline
Why	<p>To address the challenge of reducing cabin waste the airline will need to understand what sort of items are thrown away, why, and the cost of waste generated. This information can then be used to work out where savings can be made and areas to be prioritised. Applying a cost to waste demonstrates the true value of what is wasted and the potential savings that can be made. By better understanding the amount, type and cost of cabin waste your airline would realise financial as well as environmental benefits.</p> <p>Without a baseline, airlines cannot make informed decisions regarding waste management practices, target materials or design interventions based on where the greatest benefits can be achieved.</p>	
Output purpose and audience	Establishing a baseline enables an airline to calculate costs, CO2 emissions impact, and should allow decisions to be made on where to make interventions that will have the greatest benefit to the business.	
Outcome	Once a baseline is established: realistic targets can be set, the real cost of waste and CO2 can be calculated, interventions can be designed, and progress can be measured/monitored.	
Who do I need to talk to inside my organisation	CSR, catering and cleaning contract managers, procurement, environment department.	

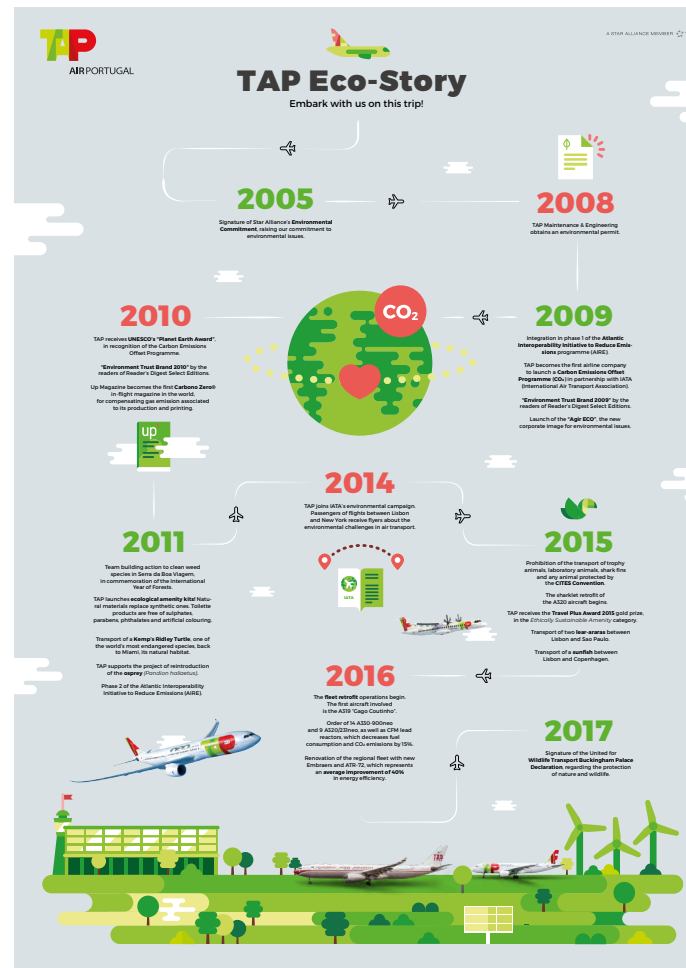
Who do I need to talk to outside my organisation	Catering and cleaning contractors, airport management, waste composition experts, waste disposal contractors.
What impact will this action have	Greater insights can then be used to identify where you can save the most money. Applying a cost to waste demonstrates the true value of what is wasted and the potential savings that can be made. By better understanding the amount, type and cost of airline cabin waste your airline could reap financial as well as environmental benefits.
Timescale	Short
Cost	Potentially high, but this exercise is essential for airlines to build a baseline and realise potential savings through improved waste management.v
Hierarchy action level	Prevention
Net Benefit	Understand what sort of items are thrown away, why, and the cost of waste generated. Reap financial as well as environmental benefits by targeting high waste areas.
Case study/best practice example	TAP Air Portugal (TP): In 2017, TAP carried out a comprehensive analysis of aircraft cleaning waste generated from 15 flights - both short and long haul. The study identified significant differences in the per passenger quantity and composition of waste generated by short and long haul. It also found that approximately 32% of short haul and approximately 55% of long haul flight cleaning waste was potentially recyclable. TAP plans to repeat this analysis and to extend it to include galley waste. It is intended to use the data to inform future waste reduction and recycling practices ²⁶ .

²⁶ <https://www.tapairportugal.com/en/responsability/environmental-commitment>
https://www.tapairportugal.com/en/-/media/Institucional/PDFs/Compromisso-ambiental/TAP_Infografia_ECO2-EN.pdf

Steps needed to put this action into practice

In the first instance define key waste terminology (such as cabin waste, galley waste, and cleaning waste). Develop an agreed standardised approach to monitoring and analysis with IATA's Cabin Waste Working to establish industry wide consistency in measurement and reporting before implementing within airline (Action: Monitoring & Measurement 4). Develop an audit team comprising airline staff and key stakeholders (catering and cleaning contractor representatives, potentially waste composition experts and/or including the regulator). Develop audit budget and time-lines.

TAP - Eco story:



5.2 M&M2: Periodic reporting of cabin waste KPI's

		Owner
Action	Report on cabin waste key performance indicators (KPIs)	IATA
Why	<p>Data can not only be used to demonstrate waste management performance improvement but also for corporate reporting purposes.</p> <p>There has been an increase in regulations that mandate organisations to publish corporate social responsibility (CSR) reports²⁷. A key reporting indicator in these reports is waste and although many airlines do publish CSR reports few disclose data specifically on cabin waste. Over 40 airlines publish annual CSR reports in accordance with the Global Reporting Initiative (GRI) Standards. However, GRI Disclosure 306-2 requires organisations to report by waste type (hazardous and non-hazardous) and disposal method (reuse, recycling, composting, recovery, incineration and landfill). Airlines generate waste from corporate activities, executive lounges, maintenance, repair and overhaul (MRO), construction and demolition activities as well as from cabin services. Cabin waste represents a minor fraction of an airlines total waste arisings and is difficult to monitor.</p> <p>Airlines may want to demonstrate progress in meeting their cabin waste goals, targets and pledges. For example, they may wish to report progress in meeting Sustainable Development Goal (SDG) Target 12.3, which aims to reduce food waste by 50% by 2030.</p> <p>Airlines should include waste monitoring as a requirement in cleaning and catering contracts. Although there is a likelihood that cleaning and catering contracts would increase to cover the costs associated with waste monitoring it is likely that payback times would be rapid.</p> <p>Detailed waste composition analyses (WCA's) can be complemented by direct weighing, counting (bags) and waste records including waste transfer documentation and invoicing, to approximate waste data over a monitoring period.</p>	

²⁷ <https://www.carrotsandsticks.net/wp-content/uploads/2016/05/Carrots-Sticks-2016.pdf>

Output	Accurate reporting of waste KPI's can be used to monitor waste management performance, support corporate reporting on change and improve CSR results.
Outcome	Accurate data available to help make informed decisions about implementing waste management activities and to meet voluntary or mandatory disclosure requirements
Who do I need to talk to inside my organisation	CSR, Procurement, Corporate Communications
Who do I need to talk to outside my organisation	Catering and cleaning companies
What impact will this action have	Drive cabin waste performance improvements. Provide information of progress towards achieving the airline's objectives, targets and pledges. Improve transparency and enhance reputation through corporate reporting disclosures.
Timescale	Short-term to medium
Cost	Low
Hierarchy action level	Prevention/reduction
Net Benefit	Monitor progress towards targets, meet compliance obligations, make informed decisions and take timely actions.
Case study/best practice example	
Steps needed to put this action into practice	Liaise with key internal and external partners to establish a mutually agreeable method of KPI reporting

5.3 M&M3: Standard cabin waste composition analysis (WCA) methodology

		Owner
Action	Industry develop and approve standardised cabin waste composition analysis (WCA) methodology.	IATA
Why	<p>There is no standard WCA methodology for cabin waste recognised by the airline sector. WCA results enable airlines to gather information on the range of materials in their cabin waste-stream as well as the amount of each of these materials and their relative proportions in their waste. This information can be used to build a business case for intervention, monitor reuse and recycling performance and identify differences in waste composition over time. A shared approach also supports benchmarking between airlines and industry-wide reporting.</p> <p>Data is gathered by physically sorting the waste by hand into a number of predetermined categories. Each category is then weighed and the results are collated to provide a breakdown of the total composition of waste that has been sampled.</p> <p>Research undertaken by IATA in 2012 indicated that few airlines had undertaken WCA's or record cabin waste weights (30% of survey respondents). The results indicated that there was no standard cabin waste monitoring protocols nor clear definitions of waste categories (e.g. 'miscellaneous', 'residual' and 'other' were commonly used but not defined). The survey results indicated that, of the airlines recording cabin waste quantities, most derived the data from their service partners and relatively few airlines reporting both catering and cleaning waste-streams.</p> <p>WCA's are a resource intensive activity and are useful in determining cabin waste characteristics at a specific location for a limited number of flights. However, approximation measures need to be applied to quantify wastes at an airline level and include direct weighing, counting (bags) and waste records including waste transfer documentation and invoicing.</p>	

Output	Facilitate and improve waste measurement, characterisation and reporting
Outcome	Measurement and monitoring results using a standardised approach can be used as evidence to set realistic targets on which periodic progress can be monitored.
Who do I need to talk to inside my organisation	
Who do I need to talk to outside my organisation	IATA member airlines Waste monitoring and measurement experts
What impact will this action have	Greater understanding of Cabin waste at an industry level through shared learning. An industry level baseline could be established and Industry level targets to be set.
Timescale	Short-term
Cost	Low
Hierarchy action level	Prevention
Net Benefit	Standard waste data can be used to develop robust performance improvement; facilitate CSR reporting and shared learning.
Case study/best practice example	IATA: The airline cabin waste analysis study conducted by Closed Loop Ltd at London's Heathrow Airport in 2012 developed a method for the collection and analysis of both cleaning and catering waste ²⁸ . The study was based on the segregation of 14 different waste material categories.

²⁸ Source: <http://iata.org/policy/environment/Pages/cabin-waste.aspx>

Case study/best practice example

Zero Waste Scotland: Guidance on the Methodology for Waste Composition Analysis was designed as a standard template for the analysis of municipal waste by local authorities in Scotland²⁹. The aim of the guidance was that there would be a greater degree of consistency and comparability between studies.

WRAP: have developed food waste measurement guidelines for the Hospitality and Food Service Sector. The aim of these guidelines is to improve data-reporting accuracy for source-separated food waste collections made from businesses in the Hospitality and Food Service (HaFS) sector³⁰. The guidelines have been written in consultation with signatories to the Courtauld Commitment 2025.

The guidelines provide good practice recommendations that enable food businesses to track the amount of source-separated food waste collected and understand how much food (and packaging) remains in the general waste stream. This could provide useful resource when speaking with catering contractors as the guidelines will be of interest to:

- **Operations managers in the HaFS sector that have responsibility for waste-contract management and waste-data reporting; and**
- **Waste Management Contractors (WMCs) that are tasked with supplying accurate waste collection data or working with new accounts.**

Food Loss & Waste Protocol (FLW Protocol) is a multi-stakeholder effort that has developed the global accounting and reporting standard (known as the FLW Standard) for quantifying food and associated inedible parts removed from the food supply chain³¹. The FLW Standard enables a wide range of entities - countries, companies and other organizations - to account for and report in a credible, practical and internationally consistent manner on how much food loss and waste is created. It also identifies where it occurs, enabling the targeting of efforts to reduce it.

Steps needed to put this action into practice

Development and endorsement of a common methodology for airline waste composition analyses by IATA's Environment Committee.

²⁹ Source: https://www.zerowastescotland.org.uk/sites/default/files/WCAMethodology_Jun15.pdf

³⁰ Source: http://www.wrap.org.uk/sites/files/wrap/Food_waste_measurement_guidelines_HaFS_0.pdf

³¹ Source: <https://www.flwprotocol.org/>

6.0 | Reduction (Red)



6.1 Red1: Pre-flight food ordering

		Owner
Action	Passengers order inflight meals through online ordering systems provided by the airline prior to the flight. Can be applied to both inflight food service and pay to eat on board services.	Airlines
Why	Pre-flight ordering reduces the number of meals over-provisioned especially for premium class passengers. Passenger experience is enhanced as they receive the meals they want, reducing the amount of leftovers generated.	
Output and purpose	Meals and snacks are not over ordered, and individual customer preferences can be met. The higher number of passengers pre-ordering means less meals need to be loaded with the resulting reduction in weight assisting fuel efficiency and CO ₂ production.	
Outcome	In flight food waste losses are minimised, catering volumes reduced and fuel savings realised and CO ₂ emissions reduced	
Who do I need to talk to inside my organisation	Customer services - digital communications, catering services	
Who do I need to talk to outside my organisation	Catering suppliers	
What impact will this action have	Food losses are minimised as over ordering of meals is reduced. Similarly, once meals are served passengers are more likely to eat the food that they have ordered thus minimizing waste. The case studies below demonstrate how pre-ordering food offers a personalised customer flight experience. If the customer is able to order the food that they want on a flight they may be more likely to eat it.	

Timescale	Short to medium – the airline would need to amend its check-in process and catering companies develop new meal offerings.
Cost	Unknown for airlines. However the introduction of pre-ordering of meals in the UK NHS has led to demonstrable economic savings and significant decreases in waste.
Hierarchy action level	Prevention/recycling
Net Benefit	<p>A reduction in over catering for inflight meals;</p> <ul style="list-style-type: none"> • Passenger dietary requirements are addressed • Minimum amount of food is taken on flight • Passenger has tailored food for their needs (enhanced experience) • Less food and waste to handle and dispose of
Case study/best practice example	<ol style="list-style-type: none"> 1. Singapore Airlines (SQ) has introduced 'Book the Cook' allowing premium class passengers to select meals from sixty menus on outbound routes from Singapore. SQ has also extended the system for returning flights but with a more limited menu choice³². 2. Qantas (QF) has launched 'Select on Q-Eat'³³ a pre-order service is also available in economy on international flights departing Australia. Passengers can pre-order their choice of meal between 7 days and 12 hours prior to departure online or using the Qantas app³⁴. 3. Ryanair (FR) passengers can pre-order food on flights on short haul flights from Dublin³⁵. The IT solution that enables passengers to order the breakfast ahead of their flight was developed for Ryanair by Retail inMotion, a subsidiary of LSG Group. It can be integrated into any airline's booking system, although it is understood that FR is the only airline using the solution at the moment. 4. Air Baltic (BT) allows passengers to submit their in-flight meal selections up to 1 hour before departure at the airlines hub in Riga (RIX)^{36,37}.

³² <http://www.airlinetrends.com/2016/01/15/choice-convenience-food-beverages-pre-ordering-airlines-airports/>

³³ <https://www.ausbt.com.au/review-qantas-select-on-q-eat-economy-pre-flight-meal-ordering>

³⁵ <https://runwaygirlnetwork.com/2017/04/03/passengers-wake-up-smell-the-bacon-with-ryanair-pre-order-breakfast>

³⁶ <https://skift.com/2018/11/05/airlines-hope-algorithms-can-finally-fix-their-drink-carts/>

³⁷ <https://www.travelcodex.com/pre-selecting-my-meal-on-airbaltic-this-is-how-airlines-should-sell-merchandise/>

6.2 Red2: Reduce on-board paper use

		Owner
Action	Identify opportunities to reduce the use of paper on-board.	Airlines
Why	Airlines traditionally provided paper-based literature for passengers including newspapers, magazines and promotional materials, however, the widespread adoption of in-flight entertainment systems (IFE) provides an opportunity to reduce these paper-based materials and improve fuel efficiency and reduce CO2 emissions through weight savings whilst enhancing the passenger experience. It is estimated that waste paper represents 46.8% ³⁸ of cabin cleaning waste and on many routes this paper is not recycled.	
Output	Use of in-flight entertainment (IFE) systems, personal device downloads and digital services to provide the information currently delivered by in-flight magazines and duty free shopping brochures.	
Outcome	Significant reduction in cabin cleaning waste, reduction in fuel consumption and an overall reduction in emissions	
Who do I need to talk to inside my organisation	Aircraft procurement, customer services, digital communications	
Who do I need to talk to outside my organisation	Aircraft suppliers, shopping suppliers, advertisers	
What impact will this action have	A paperless cabin that still offers customers the same information currently available in magazines and shopping brochures. This action could also enable an airline to provide a more customised communication line and personalised service with more opportunities to understand customer behaviour through data collection on digital choices.	

³⁸ IATA, Aircraft Cabin Waste Analysis Project report, June 2014

Timescale	Short/medium
Cost	\$\$\$
Hierarchy action level	Prevention
Net Benefit	A significant reduction in cabin cleaning waste leading to a quicker cabin cleaning turnarounds and potential for reduced waste disposal costs. IFE e-newspaper and magazine subscription charges maybe lower than paper-based options.
Case study/best practice example	<ol style="list-style-type: none"> Swiss (LX) passengers have access to more than 250 digital newspapers and magazines with the digital content, regardless of travel class³⁹. LX's new eJournal range will gradually replace the selection of print newspapers and magazines that are currently carried on board. LX estimates that the reduction in weight will reduce its annual CO₂ emissions by 450 tonnes. KLM (KL) no longer provides complementary newspapers to economy passengers and instead they are directed to the KLM news app which has been developed for smart-phones and tablets⁴⁰. This small change has resulted in an annual CO₂ reduction of 750 tonnes. between 30 and 40 tonnes each month.

³⁹ <https://flightchic.com/2018/02/08/finnair-introduces-digital-newspapers/>

⁴⁰ <https://news.klm.com/klm-media-app-replaces-newspapers-on-board/>

Steps needed to put this action into practice

1. Undertake an IFE review of current fleet and proposed cabin interior upgrades (including new seats and IFE systems).
 2. Investigate e-based literature options, carry out cost benefit analysis taking into account paper based literature procurement, weight/fuel savings, handling and waste disposal costs. The provision of e-based literature also represents a marketing opportunity with associated sponsorship revenues.
 3. Ensure all new aircraft include IFE systems compatible with the provision of e-based literature
-

Practical examples of onboard magazines:

6.3 Improving the passenger experience to minimise cabin waste

		Owner
Action	Improving the passenger experience will result in passengers receiving the in-flight meals, beverages and products they want resulting in less wastage and reduced costs.	IATA
Why	<p>Improved passenger profiling and in-flight product and meal selection methods can result in bespoke offerings to passengers which results in less wastage.</p> <p>Airlines can use surveys or previous meal selections for frequent flyers to provide more bespoke service offerings, thus reducing waste. Airlines are also beginning to introduce algorithms to optimise both food and drink victualling which results in weight optimisation and less wastage. The shift to buy-on-board (BOB) for short-haul flights has significantly reduced cabin waste with passengers only purchasing the food and drink they want.</p> <p>Non-food related in-flight products such as amenity kits , pyjamas, blankets, pillows, headphones, flight socks, earplugs represent a significant proportion of cabin cleaning waste (IATA research indicates 9.7% by weight). Airlines can reduce wastage, collection and cleaning costs by offering these products, on demand and ensuring that they are recycled at end of life. Although high quality headphones in premium cabins are collected, sanitised and reused, both used and unused disposable headphones in economy class are often discarded and end up in the cleaning waste-stream. The 2017 IATA Global Passenger Survey (GPS) indicated that 42% of passengers, would prefer to use their own smart devices- Bring Your Own Device (BYOD) - to access in-flight entertainment options. However, aircraft typically have a dual prong jack sockets whereas smart devices have a single plug. Airlines that facilitate and promote BYOD will have lower demand for headphones.</p> <p>Aircraft inflight entertainment (IFE) systems can be fitted with menu and drinks selection options that can ensure passengers get what they want and, thus lower wastage. The data can be used to determine customer preferences for later flights. A number of airlines including Virgin America, Air New Zealand, Norwegian, Azul and Finnair allow passengers to order meals, snacks and drinks via the IFE system in between regular meal services.</p>	

Output	Service level is tailored to passenger needs as some in-flight items are not handed out routinely. This service change will need to be communicated clearly so that passengers are aware that items can be requested.
Outcome	Fewer items are ordered per flight which reduces service costs. At the end of a flight less items require collecting and handling either for reuse or for disposal. Where contracts permit, procurement and waste management costs are reduced.
Who do I need to talk to inside my organisation	Customer services Cabin crew Corporate communications / marketing
Who do I need to talk to outside my organisation	Inflight product suppliers cabin interior designers/manufacturers
What impact will this action have	Volumes of these items that are procured reduce and less end up in the cabin cleaning waste at the end of a flight
Timescale	Short
Cost	Low
Hierarchy action level	Reduction
Net Benefit	Fewer items distributed to customers however customer experience is not undermined or eroded as the offer is tailored to individual needs.
Case study/best practice example	Jetblue (B6): has recently expanded its fresh food sales to 70 routes and records everything it sells so it can predict future provisioning, reduce waste and ensure they "have enough food to "satisfy the majority of what our customers want" ⁴¹ .

⁴¹ Source: <https://skift.com/2018/11/05/airlines-hope-algorithms-can-finally-fix-their-drink-carts/amp/>

Case study/best practice example

Easyjet (U2): has estimated that over 800,000 fresh food items, worth \$2 million, are being wasted each year and has introduced algorithms to anticipate the food needs of passengers⁴². This not only reduces food waste but leaves stowage space for food products that are “sure sellers”.

United Airlines (UA) collects the contents of part used amenity kits and repackages them for charity⁴³.
(Photo Credit: United)



Aer Lingus (EI): introduced a new ‘Saver’ fare on its Dublin to North America routes in 2017 with passengers receiving a reduced fare but having to pay for extras such as a blanket or headset⁴⁴.

Finnair (AY) allows on-demand ordering of alcoholic drinks and snacks in economy on long-haul flights via the IFE screen and pay with the cabin crew who receive the orders on their tablet devices⁴⁵.

⁴² <https://www.wingsjournal.com/airlines-address-problem-food-waste>

⁴³ <https://www.paddleyourownkanoo.com/2018/08/18/airline-amenity-kits-are-they-a-wasteful-and-unnecessary-luxury-which-are-ripe-for-disruption>

⁴⁴ <https://www.paddleyourownkanoo.com/2018/08/18/airline-amenity-kits-are-they-a-wasteful-and-unnecessary-luxury-which-are-ripe-for-disruption>

⁴⁵ <http://www.airlinetrends.com/2017/11/11/8-innovative-touches-onboard-finnairs-new-a350/>

Case study/best practice example

Emirates (EK) has rolled out its **Meal Ordering Device (MOD)** whereby business class cabin crew are issued with smart phones that can take food orders. Each order is then prepared immediately in the galley, making the service more efficient and personalized. The phones are synced with Passenger Number Records (PNR) before take-off and the app can tell crew about their meal preferences⁴⁶.

Air France (AF): Based on specific flight profiles, meals on board are adjusted to better fit real demand by passengers. For example, for late departures from the US, premium class passengers are offered dinner in the executive lounge, facilitating 40% less business meals being loaded.

Steps needed to put this action into practice

Identify which commonly used items could be replaced or reused in the short medium and long term.
Identify a plan to introduce changes to the way in which in flight items are used and collected on board.
Develop an internal and a customer facing communications plan so that staff and passengers understand why changes are made to existing service provision.

⁴⁶ <https://www.ausbt.com.au/emirates-rolls-out-smartphone-based-meal-ordering>

7.0 | Reuse and Reinjection (R&R)



7.1 R&R1: Food reinjection

		Owner
Action	Reinjection of edible food for subsequent flights	Airline
Why	<p>Cabin waste contains significant quantities (up to 25%) uneaten food and beverages. Some of these could be reinjected back into the supply chain for use on subsequent flights if fit for human consumption.</p> <p>These wastes include products that have a long shelf-life such as confectionery, crisps, nuts and drinks not containing milk. A number of governments, with restrictive ICW legislation in place, have issued guidance supporting the reuse of food products including the UK⁴⁷ and US⁴⁸. Although the US guidance list of products is comprehensive covering types of drinks, condiments, pre-packaged and processed foods, the products must remain on-board which presents challenges to catering contractors when re-stocking the galley.</p>	
Output and purpose	Agreed SOPs that clearly set out protocols for safe and legal reinjection of edible food	
Outcome	Larger proportion of food is legally reused and waste volumes are reduced.	
Who do I need to talk to inside my organisation	Cabin crew, on-board services, corporate communications, food safety experts	
Who do I need to talk to outside my organisation	Regulators, catering companies	

⁴⁷<https://www.gov.uk/guidance/handling-and-disposing-of-international-catering-waste>

⁴⁸<https://www.gov.uk/guidance/handling-and-disposing-of-international-catering-waste>

What impact will this action have Reinjection of useable food fractions will ensure that more edible food is used rather than discarded.

Timescale Short to medium

Cost Additional costs include human resources required to segregate, store and re-pack the unused products but should be offset by reduced procurement demand.

Hierarchy action level Reuse

Net Benefit Reinjecting edible food for subsequent flights reduces costs (procurement and waste disposal) but should be carried out under the existing legal framework by working with individual regulators.

Case study/best practice example

New Zealand Air (NZ): In October 2017, Air New Zealand, launched "Project Green" with its catering partner LSG Sky Chefs and the Ministry for Primary Industries (MPI). The partners have teamed up to reduce cabin waste from the airline's international services arriving in Auckland. MPI has allowed the airline to reuse 40 of its Made in New Zealand products including cookies, sugar, water bottles and soft drink cans. Cabin crew and the caterers take extra handling measures to separate used and unused sealed products to avoid contamination and biosecurity risk⁴⁹.

Air New Zealand Head of Operational Delivery Alan Gaskin said "Project Green is an outstanding example how airlines can work with border regulators to develop solutions to reduce cabin waste without compromising quarantine controls."

Early data provided by Air New Zealand suggests that the project has diverted 13 tonnes of waste including 3.5 tonnes of bottled water, 266,000 plastic cups and 480kg of sugar⁵⁰.

Watch this video to see how Air New Zealand 'revolutionised the approach to cabin waste⁵¹.

⁴⁹ <https://www.stuff.co.nz/business/97539393/air-new-zealand-reusing-untouched-snacks-plugging-in-grounded-planes>

⁵⁰ <https://www.gov.uk/guidance/handling-and-disposing-of-international-catering-waste>

⁵¹ https://www.nzherald.co.nz/business/news/article.cfm?c_id=3&objectid=11929540

Steps needed to put this action into practice

Airline establishes edible food waste arisings through waste composition analysis (WCA's). Airline identifies food that is safe to reinject into catering provision in agreement with catering provider and food safety experts. The catering contract should recognise and incentivise the role of food reinjection.

7.2 R&R2:Food donation

		Owner
Action	Redistribution of unconsumed and edible food and drink through donation	Airline
Why	<p>Cabin waste contains significant quantities (up to 25%) uneaten food and beverages. Airlines should attempt to reduce this wastage through the implementation of the Reduction Actions including better customer profiling, “feed before you fly”, pre-flight meal ordering, and salvage procedures for restocking on subsequent flights (Action R&R 2).</p> <p>For the remaining surplus, the best option is to redistribute this food and drink for human consumption, where safe to do so.</p> <p>A number of countries including USA⁵², New Zealand⁵³ and Italy⁵⁴ have introduced regulations that promote donation including protection of the donor from civil and criminal litigation if the product, given in good faith later causes harm to the recipient. However, in many countries, food donation is not straightforward with legal and operational obstacles to both donors and recipients that stand in the way of redistributing safe and edible food. The food needs to be clearly labelled, with ingredients and consumption dates, and comply with hygiene regulations including the temperature linked controls. In some countries donors are subject to taxation (VAT) on donated products.</p>	
Output and purpose	Agreements to redistribute safe food that would otherwise would be landfilled or incinerated.	
Outcome	Larger proportion of food is consumed by individuals experiencing food poverty that would otherwise be wasted	

⁵² Bill Emerson Good Samaritan Food Donation Act (Public Law 104-210: 1996)

⁵³ <https://www.parliament.nz/en/pb/bills-and-laws/bills-digests/document/50PLLaw20541/food-bill-2010-2010-no-160-2-bills-digest-no-2054>

⁵⁴ <https://www.bancoalimentare.it/en/node/4222>

Who do I need to talk to inside my organisation	Cabin crew, corporate communications, food safety experts. legal
Who do I need to talk to outside my organisation	Regulators, catering providers, redistribution charity partners, airports
What impact will this action have	Re-using edible food through donation comes before recycling or recovery within the waste hierarchy. If successful, redistribution of some uneaten edible food will reduce the overall quantity of waste that need to be treated or disposed of.
Timescale	Short to medium
Cost	Logistical costs associated with segregating and safeguarding (cold chain maintenance) of uneaten meals and unconsumed drinks from cabin waste; storage or transport costs for delivery to the redistribution organisation ("food bank"). Donation may also result in additional tax (VAT) charges.
Hierarchy action level	Reuse
Net Benefit	Food donation must be seen as the right thing to do and should be carried out under the existing legal framework by working with individual regulators and recognised redistribution organisations.
Case study/best practice example	Cathay Pacific (CX): In 2015, the airline began to donate surplus food and beverages from inbound flights to a local food bank, Feeding Hong Kong, and in 2016, 234 tonnes of food were collected and donated ⁵⁵ .

⁵⁵ <http://downloads.cathaypacific.com/cx/aboutus/sd/2016/waste-management/food-waste/index.html>

Case study/best practice example**Cathay pacific food donation:**

Qantas (QF): Qantas started a partnership with the food donation organization OzHarvest. Volunteers from Qantas and catering centers in Sydney, Brisbane and Melbourne collect untouched food including packaged meals, fruit and cereals from domestic flights. The food is picked up by OzHarvest vans and delivered to charity organizations. The food is collected from all of the airline's domestic flights and taken to over 1,000 school children a week. At the Brisbane airport, 200 to 400 kilos of food are collected from domestic flights every day⁵⁶.

European Union (EU): In 2017 the EU Platform on Food Losses and Food Waste (FLW) published guidance on food donation which assists both donors and recipients of surplus food ensure they respect relevant requirements such as food hygiene and food information to consumers⁵⁷.

WRAP: have developed templates in the UK to facilitate redistributing food⁵⁸.

⁵⁶ <http://justmeans.com/blogs/how-airlines-are-reducing-food-waste>

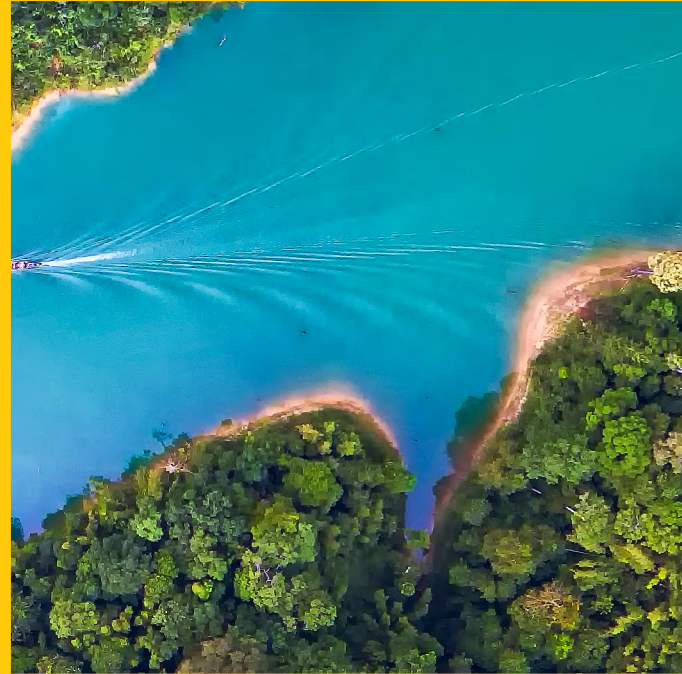
⁵⁷ https://ec.europa.eu/food/sites/food/files/safety/docs/fw_eu-actions_food-donation_eu-guidelines_en.pdf

⁵⁸ <http://www.wrap.org.uk/content/framework-effective-redistribution-partnerships>

Steps needed to put this action into practice

Airline should determine the nature and scale of the unconsumed food and drink generated on its flights through waste compositional analysis (WCA). Airlines should seek to reuse (salvage) these materials for subsequent flights (Action: R&R1). For any residual food that is fit for human consumption the airline should assess the national regulatory and legal framework regarding food donation and engage reputable food redistribution organisations (food banks). The airline should consider the WRAP Framework for Redistribution to understand the implications of establishing a food donation programme. Airline introduces programme of staff engagement to highlight the programme and encourage volunteers to benefit local communities

8.0 | Recycling (Rc)



8.1 Rc1: Develop standard operating procedures for segregation of cabin waste

		Owner
Action	Develop standard operating procedures (SOP) for segregation of waste within the cabin.	Airlines
Why	Separation of waste materials is critical to ensuring uncontaminated materials can be sent for reuse or recycling. It is thus an important step to consider how waste can be effectively separated during a flight. Separation of waste in the cabin is the key to ensuring correct handling, recycling and disposal of all materials.	
Output	<p>Clear, written guidance for staff on the separation and storage of waste and recycling during and after cabin service. The SOP will:</p> <ul style="list-style-type: none"> • List the target materials and how they should be handled and stowed per aircraft type/cabin layout basis; and, • Identify the responsible individual(s). 	
Outcome	An increase in the quality and quantity of uncontaminated materials which can be sent for recycling.	
Who do I need to talk to inside my organisation	<p>Cabin staff, catering contractor, customer relations, corporate communications.</p> <p>The role of cabin crew in delivering any level of waste separation is key and it is essential that the right staff communications and training materials are used so that there is a shared understanding of why new waste separation procedures are being implemented.</p>	
Who do I need to talk to outside my organisation	<p>Waste and recycling materials are offloaded from the aircraft by either the:</p> <ol style="list-style-type: none"> 1. Airline catering contractor; or, 2. Airline or airport cleaning contractor. <p>Early engagement with service partners will ensure that separated materials can be handled, stored and sent for re-use and recycling. Engagement will also help inform target materials, trolley / galley storage requirements and the role of cabin crew during the in-flight service.</p> <p>Regulators – regulations may dictate protocols for segregation of cabin waste</p>	

What impact will this action have

Crew have standard procedures to deliver recycling on board that are tailored to airline operating practices.

Effective separation may require some changes to existing on-board equipment, for example, trolley carts fitted with separate compartments for collecting different waste fractions from customers at the end of a food service, or the use of colour coding or icons on bins and waste bags so that staff are clear about what should be put where.

Timescale

Medium

Cost

Low.

Hierarchy action level

Reuse

Net Benefit

Waste generated in the cabin is more likely to be reused or recycled.

Case study/best practice example

IATA: has developed a guidance document for recycling on international flights. The guidance is intended to assist airlines with developing their own SOPs for the collection, storage, and handling of recyclable materials on-board aircraft during international flights. The objective of the document is to provide a framework which: ensures airlines are able to meet the requirements of the most stringent regulatory regimes found globally; is flexible enough to accommodate a wide variety of airline operating models; and incorporates best waste management practices from within the aviation industry⁵⁹.

⁵⁹ www.iata.org/cabin-waste

Case study/best practice example

KLM: has managed to reduce the amount of cabin waste produced per passenger by 32% since 2011 by segregating 14 different waste flows and it hopes halve its 2011 figures by 2011⁶⁰.



Iberia (IB): is leading an EU “Life Zero Cabin Waste” project which aims to recover at least 80% of cabin waste through recycling and innovation such as composting and energy recovery processes. Trials are underway of compartmentalised trolley carts. Although recycling efforts are currently limited to domestic flights Iberia plans to expand the scheme across short-haul European flights in the near future⁶¹.



⁶⁰ <https://runwaygirlnetwork.com/2018/03/13/klm-outlines-challenges-of-reducing-inflight-catering-waste>

⁶¹ <https://www.paddleyourownkanoo.com/2018/11/21/iberia-steps-up-on-board-recycling-efforts-but-are-international-aviation-rules-the-real-problem/>

Case study/best practice example

Delta Air Lines (DL): Cabin crew are provided with information before a flight departs to let them know if they are travelling to an airport which has recycling facilities. This informs the degree of useful material segregation possible on board. On domestic routes, mixed recyclables are collected and, although, this is an optional crew activity, the revenue from the sale of aluminium cans is used for raising funds for charity⁶².



Steps needed to put this action into practice

Identify best practice, engage with cabin crew, pilot different approaches (including customer perception of changes to on board waste management), roll out SOP

⁶² <http://news.delta.com/delta-celebrates-10th-anniversary-industry-first-board-recycling-program>

8.2 Rc2: Recycling trolley carts

		Owner
Action	Provision of recycling trolley carts that allow for in-flight separation of recyclables and waste	Airlines
Why	<p>Standard trolley cart design does not facilitate the separation of cabin wastes, so materials are often co-collected by default or separated using bags.</p> <p>Following meal service, trays containing part-consumed food, packaging, crockery and utensils are placed back in the trolley carts. This means that unopened food, other wastes (e.g. plastic and card) and food waste go back to the catering facility mixed together. As many of the items are contaminated with food waste the options to reuse and recycle are limited (especially on international flights). Changing trolley cart design to enable segregation of wastes will allow airlines to separate out fractions and will offer greater opportunity for reuse and recycling.</p> <p>Separation of waste materials is key to achieving waste treatment options that are higher up the waste hierarchy than incineration or land-filling of mixed waste fractions. It is an important step to consider how waste can be effectively separated during a flight. The role of cabin crews, and potentially passengers, in delivering any level of waste separation is key and it is essential that the right staff communications materials are used so that there is a shared understanding and responsibility about new waste separation procedures being implemented.</p>	
Output	Waste and recyclables are separated during in-flight services by cabin crew without the need for additional trips through the cabin or changes to existing working practices.	
Outcome	Waste is separated and can be treated or recycled in accordance with the waste hierarchy.	

Who do I need to talk to inside my organisation

Inflight Services

A review should be undertaken to determine if there is sufficient stowage space on board to facilitate one or more dedicated recycling carts.

Procurement

The purchase of new trolley carts that facilitate segregation of recyclables requires additional expenditure that can be offset against recyclable revenues and reduced waste costs.

Cabin crew

A significant barrier to recycling is the mixing and contamination of material streams, in particular where International Catering Waste (ICW) is mixed with non-ICW recyclable materials. A clear methodology and sharing of good practice will enable airlines to implement segregation within operational services. Engagement with cabin crew is essential to ensure that segregation does not create additional burdens on staff and crew time.

Investments in new trolley carts (and possible redesign of galley space) should be supported with the development of standard operating procedures which include recycling and crew training, as described in Action Recycling 1.

Who do I need to talk to outside my organisation

Airport authorities and regulators

Investment in new equipment or procedures to separate materials is only of value if the destination airport can accept and manage these materials for re-use and recycling. Amendments to waste disposal contracts and, for mixed material streams, investment in material sorting technology may be required.

Trolley cart manufacturers, aircraft manufacturers

Although trolley cart selection is an airline choice, aircraft manufacturers can support cart manufacturers or develop and market their own recycling equipment. Current innovations include the design of a service trolley with compartments for the separation of waste streams, galley waste compaction units and liquid disposal units.

Catering companies

Changes to trolley design or how existing trolleys are used will need to be discussed and agreed with catering companies. It is important that changes make the unloading of trolleys easier and the separation of materials for re-use and recycling more effective.

What impact will this action have	Mixed cabin wastes from aircraft will be separated as part of the in-flight service. More items will be re-used, redistributed or recycled. The costs of waste handling and disposal will fall where existing contracts allow.
Timescale	Medium to long
Cost	High
Hierarchy action level	Recycling
Net Benefit	Recycling can happen for waste fractions that are kept free of contamination.

Case study/best practice example

Airbus: The Retrolley is an innovative half size waste trolley, which allows pre-sorting and manual compaction of waste. The Retrolley can be installed in a galley compartment like a typical existing waste trolley without any additional means or galley adaptations. It consists of two main compartments, which can be used for recyclables and non-recyclables. It has 3 modules that are exchangeable for the stacking of cups, collecting residual liquid and compacting/storing aluminium cans⁶³.



⁶³ <https://www.airbus-bizlab.com/project/retrolley/info>

Case study/best practice example

KLM (KL): Cabin crew are trained to put back used items in their original place. These items can then be separated into different streams when the trolleys are returned to KCS (KLM catering service provider). Waste bins are only to be used for items that are for disposal.

On European flights there is a 'waste trolley' which has three compartments:

- **General rubbish**
- **Paper cup stacking**
- **Plastic cup stacking**

For all other items the cabin crew follow the 'put it back where you found it' maxim. Limiting the task of separating materials means the crew need to change the waste bag less often and this is preferable. The system of utilising existing trolley space also overcomes the challenges of storing separate material streams in the galley. KLM/KCS operate on the principle of, "Separation of materials must feel easier than not separating materials⁶⁴".

Steps needed to put this action into practice

Take the learning from an ongoing EU funded Zero Cabin Waste Project being implemented by Iberia (IB). The research will assist with defining procedures for engaging staff, working with catering companies to procure newly designed galley trolleys that will allow for the separation of waste fractions, developing SOP for on board recycling (Action Recycling: 1), piloting and refining operating procedures and roll out⁶⁵.

⁶⁴ <https://klmtakescare.com/en/content/afval-aan-boord-wat-doen-we-ermee->

⁶⁵ <http://www.cabinwaste.eu/en/home>

8.3 Rc3: Promote the development of airport material reclamation facilities (MRFs) for cleaning

		Owner
Action	Maximise the amount of cabin cleaning waste recycled through the development of airport material reclamation facilities (MRFs)	Airlines
Why	Cleaners collect waste dropped on the floor of the cabin and placed in seatback pockets including newspapers, plastic water bottles, menu cards, napkins, food, toiletries and headrest covers. Cabin cleaning waste is generally managed by the airport. IATA research indicates that 50% of cleaning waste could be reused or recycled. Airports should be encouraged to construct MRFs to segregate and recycle cabin cleaning waste. Cleaning staff should ensure that waste does not contain food or liquids, which could result in the recyclables being deemed international catering waste (ICW) and/or rejected because of quality concerns. An additional visual check on the presence of contaminants can be undertaken at the MRF. Although a number of countries have introduced ICW legislation, IATA statistics ⁶⁶ indicates that 36% of global air traffic in 2017 was on domestic routes and 14% was on intra-European flights, with no restrictions on recycling and disposal of cabin waste.).	
Output	Increased recyclable volumes and lower waste disposal costs.	
Outcome	Waste and recycling is seen as an element of business with the recyclable fractions of cleaning waste increasing and the residues being subject to appropriate treatment and disposal.	
Who do I need to talk to inside my organisation	Procurement, cabin crew	
Who do I need to talk to outside my organisation	Cleaning companies, airport owners, waste treatment and disposal companies	

⁶⁶ <https://www.iata.org/statistics/>

What impact will this action have	Separation and recycling of some fractions of cleaning waste become business as usual. More waste is recycled and less is sent for disposal
Timescale	Long: Airports need to be encouraged to construct and operate MRFs for cabin cleaning waste within a partnership approach. Airlines will need to implement appropriate SOPs (Action Recycling 1) aimed at crew and cleaning contractors to ensure recyclable quality.
Cost	High: Revenue from the sale of recyclables and lower waste disposal costs could be shared between airport, cleaning contractors and the airline, but the cost of building and operating a facility is most likely the responsibility of waste management contractors or airport facilities.
Hierarchy action level	Recycling
Net Benefit	Increased recycling rates and reduced waste volumes.

Case study/best practice example

Auckland Airport (AKL): in June 2015 a recycling initiative was initiated at Auckland Airport that has halved the amount of aircraft cabin cleaning waste from international flights being sent to landfill. The initiative is a joint venture between the airport, facility management company OCS and the Ministry of Primary Industries (MPI), and working in collaboration with Air New Zealand has recycled an average of 695kg of waste per day. Prior to the facility opening, 40 tonnes of cabin waste was compacted, steam sterilized and buried in landfill each month to meet MPI's biosecurity risk requirements. MPI allows non risk items to be segregated in the transitional waste facility for reuse and recycling including disposable polypropylene head covers, paper, cardboard, plastic wrapping, cans and uncollected headphones⁶⁷.



⁶⁷ <https://corporate.aucklandairport.co.nz/-/media/Files/Corporate/Social-Responsibility/Waste-reduction-case-study.ashx>

Case study/best practice example

Heathrow Airport (LHR): working with their waste contractor, they have established a means of separating cabin cleaning waste from international flights that ensures that some waste fractions are recycled and the whole waste handling process remains compliant with UK animal health regulations. The waste contractor has worked with the cleaning companies operating on the airport to provide clear colour coding for cabin waste collections. They have then provided clearly labelled central collection bins for cleaning staff to take waste fractions to. Once brought back to an air-side MRF, the staff ensure that ICW is disposed of correctly, and that clearly separated fractions that are visibly free from contamination with food waste can be recycled⁶⁸.

Steps needed to put this action into practice

Airline, cleaning contractor and airport management should meet to discuss the potential for partnering to develop airport MRF's.

⁶⁸ <https://corporate.aucklandairport.co.nz/-/media/Files/Corporate/Social-Responsibility/Waste-reduction-case-study.ashx>

8.4 RC4: Cabin design includes cabin waste handling and management

		Owner
Action	Aircraft cabin design should incorporate the need to handle and manage cabin waste correctly	Airlines
Why	<p>Aircraft cabin layouts are designed to maximise revenue whilst optimising the passenger experience. This significantly impacts available space for the storage of cabin waste and recyclables. Recent aviation trends such as ultra-long haul flights and reduced galley size on short haul aircraft is further constraining available space. When trolley carts, static waste bins and compactor boxes are full, crew often have to place bagged cabin waste and recyclables in wash-rooms at time of descent or in overhead compartments. Crew also face challenges with the handling of waste liquids and often resort to disposal in wash-room toilets.</p> <p>Aircraft and cabin interior manufacturers are market-led, however, it would appear that cabin waste management is rarely a consideration when procuring new aircraft or refitting cabin layouts in older ones. On board solutions are needed to minimise waste generation in the first place and then make waste separation, storage and recycling easier. Airline environmental managers and crew representatives should be involved in the cabin interior layout design process.</p> <p>Looking forwards to the delivery of a zero cabin waste solution, there are a number of design additions or alterations that could increase waste separation and recycling without diminishing customer experience during a flight. Current innovations include the design of a trolley carts with compartments for the separation of waste streams, galley waste compaction units and improved liquid disposal units.</p>	
Output	Aircraft cabin interior design options include cabin waste solutions such as dedicated waste trolley carts, vacuum powered waste compactor units, air-blade hand dryers in washrooms, enhanced liquid disposal and galley chutes for recyclable storage in the cargo hold.	

Outcome	Separation of materials for re-use and recycling is easier because on-board infrastructure supports handling and storage. Additional materials are diverted from disposal to landfill or incineration.
Who do I need to talk to inside my organisation	Procurement Engineering Cabin crews Customer services
Who do I need to talk to outside my organisation	Aircraft manufacturers Cabin interior equipment design and manufacturers Airport authorities Regulators Catering and cleaning contractors
What impact will this action have	Good, well informed redesign could result in reductions in materials carried on flights (e.g. hand towels) and transform how cabin waste is sorted and stored on-board.
Timescale	Discussion needs to begin in the short term in order to achieve longer term objectives
Cost	Variable but lower if waste options are included during initial procurement phase
Hierarchy action level	Reduction, Recycling
Net Benefit	Separation and recycling of waste on board is easy for both customers and staff, saving time and having no impact on customer experience.
Case study/best practice example	Airbus: has been developed the 'Retrolley' concept which is an innovative half size waste trolley, which allows pre-sorting and manual compaction of waste. Pre-sorting is a prerequisite for recycling of cabin waste. The Retrolley can be installed in a galley compartment like a typical existing waste trolley without any additional means or galley adaptations. The Retrolley consists of two main compartments, which can be used for recyclables and non-recyclables. These two main compartments can be manually compacted using the handle of the Retrolley ⁶⁹ .

⁶⁹ <https://www.airbus-bizlab.com/project/retrolley/info>

Case study/best practice example

The unit consists of three modules, which are easily exchangeable according to customer needs. These modules can be used to stack cups, collect residual liquid and compact and store aluminium cans.

Airbus: has also supported the development of a mobile vacuum trash compactor which provides significant weight reduction, better space utilisation and less system complexity by using the on-board vacuum toilet system or waste water system as pressure source for a compaction mechanism. Conventional waste compactor technologies are based on electromechanical compactors which are heavy (80 kg – 113 kg) and bulky, as the compaction mechanism takes almost two third of the available space of a unit. The new device weighs only 24kg⁷⁰.



Iberia (IB): is leading an EU “Life Zero Cabin Waste” project which aims to recover at least 80% of cabin waste through recycling and innovation such as composting and energy recovery processes. In October 2018, Iberia undertook trials on 7 international flights using dedicated recycling compactor boxes that minimise the risk of ICW contamination⁷¹.



⁷⁰ <https://www.airbus.com/newsroom/press-releases/en/2015/04/airbus-supported-university-project-mobile-vacuum-trash-compactor-wins-crystal-cabin-award-at-aircraft-interiors-expo-in-hamburg.html>

⁷¹ <https://www.cabinwaste.eu/en/2018/10/19/first-international-flights-with-selective-collection/>⁶⁹ <https://www.airbus-bizlab.com/project/retrolley/info>

Steps needed to put this action into practice

Gain airline commitment to integrate waste and recycling systems into the design of new cabin layouts
Work with internal business units to ensure new designs are compatible with operational procedures.
Work with airport authorities, cleaning and catering contractors to ensure new designs are compatible with operational procedures.

8.5 Rc5: Passenger participation in cabin waste solutions

		Owner
Action	Integrate passenger involvement into cabin waste prevention, reuse and recycling solutions.	Airlines
Why	<p>While the airline sector looks to improve its cabin waste management performance, the passenger is not currently viewed as part of the solution, despite waste reuse and recycling activities increasingly being part of everyday life in the home and at work.</p> <p>Although airline marketing and branding representatives may view passenger participation in cabin waste recycling activities as inappropriate, many airlines have seen the benefits of passenger engagement. Not only can the airline demonstrate its commitment to reducing the environmental impact of its operations but many passengers are willing to contribute.</p> <p>Airlines also have the opportunity to develop passenger-facing waste communications. There are two types of passenger message:</p> <ul style="list-style-type: none"> • Informational: Raise awareness of the issue of cabin waste and the industry or airline's efforts to reduce its impact. • Instructional: This could include advice on how the passenger can assist the cabin crew with recycling as part of the in-flight service. <p>The industry has an opportunity to work together to develop and deliver a shared, positive message on cabin waste reduction and recycling. Joint communications can serve to motivate passengers to engage with airlines to deliver more sustainable services. Areas for industry-wide coordination could include:</p> <ul style="list-style-type: none"> • Clear and consistent labelling of waste and recycling containers, on-board literature and advertising can help to reinforce the message on-board and in airports. • Communicating internal waste reduction and recycling achievements. Linking to waste prevention campaigns such as Love Food Hate Waste could help passengers to understand the benefits of pre-flight ordering of meals or why cabin crew take time to ask passengers how many sachets of milk or sugar they require 	

Output	Introduction of sustainable practices that involve the passenger that are aligned with the messages that they see at home e.g. Recycle Now, Love Food Hate Waste. Passengers receive clear messages about what to do with cabin waste on aircraft and understand why they are asked to separate materials.
Outcome	Passengers will share the airline's environmental values and take action to separate materials for re-use or recycling. There will be a corresponding decrease in the quantity of cabin waste sent for disposal to landfill or incineration. Increased visibility and recognition of efforts to reduce cabin waste will enhance the airline's brand and public reputation.
Who do I need to talk to inside my organisation	Corporate communications / Marketing, Customer services, Cabin crew
Who do I need to talk to outside my organisation	Catering companies, Inflight product suppliers, Airports authorities, Passengers (via representatives sampling)
What impact will this action have	Prevention and reduction in cabin waste sent for disposal and a corresponding increase in cabin items sent for re-use or recycling.
Timescale	Short
Cost	Low
Hierarchy action level	Prevention/reduction/recycle
Net Benefit	By using familiar communications messaging, airlines have an opportunity to engage with customers to help deliver a zero cabin waste service.

Case study/best practice example

Qantas (QF): introduced an in-flight recycling scheme in 2009 on its domestic routes. Communications include an on-board announcement asking passengers to separate particular items of cabin waste for recycling and providing a clearly labelled 'recycling bag' for this purpose. Qantas worked with recycling consultants Closed Loop to identify opportunities to recycle cabin waste. Commenting on how recycling might influence the passenger experience Courtney McGregor from Closed Loop said, "Qantas had always been concerned about asking too much of their passengers in this space, so I do hope they feel the positive effect of having an environmental program that the flying public can be involved with too⁷²."

Between 2009 and 2015 Qantas diverted over 22,000 tonnes of recyclables and reduced waste to landfill by 28%⁷³.

Steps needed to put this action into practice

Undertake a customer survey to establish their interest in recycling. Focus on the main, most frequently recycled cabin items, and develop communications materials. Work with customer services to ensure customer experience is enhanced; pilot and monitor customer reaction via online survey and share the results. Link to corporate resource efficiency strategy.

⁷² <http://www.airlinetrends.com/tag/inflight-recycling>

⁷³ <http://wastemanagementreview.com.au/qantas-sky-high-ambitions-for-airline-recycling/>

8.6 RC6: Recyclable material colour coding to enable waste segregation

		Owner
Action	Agree and promote a clear and consistent sectoral colour coding and labelling system for cabin waste and recycling bags, containers and trolley compartments.	Airlines
Why	<p>There is no agreed international convention on the colour coding and labelling of waste and recyclable streams. In addition, national schemes are not consistently applied. For an international industrial sector, the lack of clear cabin waste coding scheme causes confusion with crew, passengers and contractors resulting sub-optimal recycling performance.</p> <p>Agreeing and promoting a set of clearly recognisable colour codes will help all those involved in ensuring that waste is handled and treated in the right way. The agreed labelling scheme can then be integrated into cabin interior design layouts.</p> <p>In addition, airlines could adopt a sectoral colour and labelling scheme to identify hazardous wastes such as ICW.</p>	
Output	Agreed colour code system for cabin waste segregation and recycling	
Outcome	Increased recyclable volumes and lower waste disposal costs.	
Who do I need to talk to inside my organisation	Procurement, cabin staff	
Who do I need to talk to outside my organisation	Airport owners, manufacturers, catering and cleaning contractors	

What impact will this action have	Consistent systems should make recycling easier. If the same colour coding is used on all flights or even across multiple companies, all those who handle waste will be familiar with what needs to be placed in which colour coded receptacle.
Timescale	Medium
Cost	Low - A relatively simple and low cost measure that will raise the profile of collection and recycling within the airline industry and generate larger volumes of segregated waste for correct treatment.
Hierarchy action level	Recycling
Net Benefit	A uniform approach that is replicable across businesses.
Case study/best practice example	<p>IATA: A review undertaken by IATA indicates that the 2 most widely recognised waste and recyclable colour coding systems have been developed by the UK⁷⁴ and US⁷⁵. IATA will seek airline member views on the adoption of one of these as the global aviation standard⁷⁶.</p> <p>Easy jet (U2): has established a colour coded waste collection system for use in the cabin, with recyclable material such as newspapers, plastic bottles and metal cans being collected in green plastic bags and general waste in orange⁷⁷.</p> <p>There are many examples where colour coding has been used successfully to aid segregation of waste in other sectors e.g. the hospitality and food sectors (WRAP reports), (WRAP case study) municipal collections (collections) and even in the construction industry (construction case study).</p>

⁷⁴ <https://partners.wrap.org.uk/assets/3647/>

⁷⁵ <http://wastemanagementreview.com.au/qantas-sky-high-ambitions-for-airline-recycling/>

⁷⁶ www.iata.org/cabin-waste

⁷⁷ <http://corporate.easyjet.com/corporate-responsibility/environment/waste-management>

**Steps needed to
put this action into
practice**

IATA and airline members to promote a model for colour coding for recycling.

9.0 | Disposal (D)



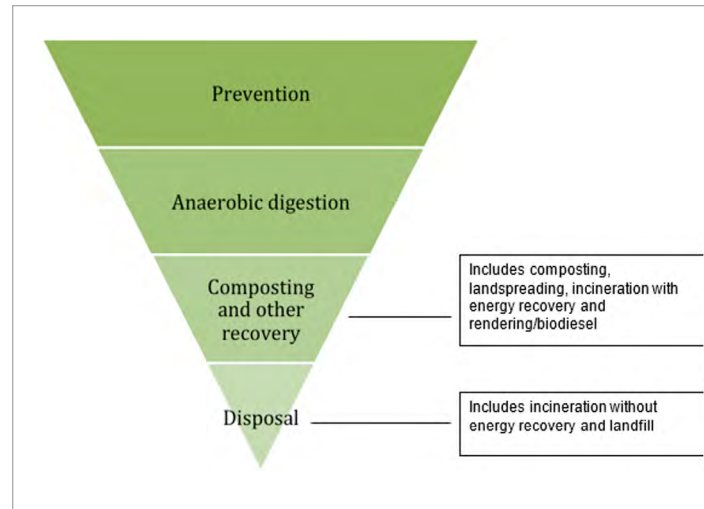
9.1 D1: Alternative Cabin Waste Treatment and Disposal Options

		Owner
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Action	Support more sustainable cabin waste treatment and disposal options	Airlines
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Why The majority of cabin waste is either disposed to landfill or incinerated due to the perceived risk from contamination by ICW. Although a number of countries have introduced ICW legislation, IATA statistics⁷⁸ indicates that 36% of global air traffic in 2017 was on domestic routes and 14% was on intra-European flights, with no restrictions on the disposal of cabin waste.

Where local regulations allow, airlines can support alternative treatment and disposal options including biological treatment such as anaerobic digestion and composting. Working with local regulators, airlines could also consider cabin waste as a feedstock for sustainable alternative fuels (SAF) by hydro-processing or pyrolysis. Incineration with energy recovery should be considered if biological treatment or SAF options are not feasible. Airlines should adopt a hierarchical approach to the selection of alternative cabin waste treatment, as described below⁷⁹.



Where feasible and within regulatory requirements, low risk food waste fractions can be treated with waste arising at airport facilities. To deliver economies of scale.

⁷⁸ <https://www.iata.org/statistics/>

⁷⁹ http://randd.defra.gov.uk/Document.aspx?Document=11314_Annex1.docx

Output	Alternative cabin waste treatment can yield cost effective products such as compost for horticultural purposes, biogas for electricity generation and alternative jet fuels, as well as avoiding or significantly reducing the need to resort to landfill
Outcome	Lower waste disposal costs and revenues from the sale of bio-products
Who do I need to talk to inside my organisation	Environment, corporate communications, commercial fuel, procurement
Who do I need to talk to outside my organisation	Airport authorities, catering companies, bio-waste experts, regulators
What impact will this action have	Reduced waste disposal costs, increase revenues and lower of reliance on landfill as the primary disposal option
Timescale	Long term
Cost	High initial costs
Hierarchy action level	Disposal
Net Benefit	Sustainable use of resources

Case study/best practice example

Alaska Airlines (AS): collects used coffee grounds and filters using compostable “bio-bags” on more than 500 flights a day for composting and with 30% of cabin waste compostable they are looking to expand this initiative⁸⁰.



Sun Country Airlines (SY): In December 2016 the airline launched a comprehensive in-flight organics recycling program on its domestic routes. In addition to collecting recyclable, the crew segregates leftover food, napkins and discarded coffee cups and grounds for composting⁸¹.



Gatwick Airport (LGW): In 2017, Gatwick opened a new, £3.8 million combined heat and power plant designed to treat up to 10 tonnes of ICW per day from international flights. The plant provides heating for the North Terminal and has an integrated MRF that will boost the airport's recycling rate to around 85% by 2020⁸².



⁸⁰ <https://blog.alaskaair.com/alaska-airlines/green/inflight-composting/>

⁸¹ <http://www.startribune.com/sun-country-organics-program-aims-to-make-flights-greener/408894805/>

⁸² <https://resource.co/article/gatwick-airport-unveils-facility-treat-problem-plane-waste-11763>

Steps needed to put this action into practice

Development of partnership approach with airport authority, catering and waste management companies.

9.2 D2: Safe disposal of sharps

		Owner
Action	Ensure that aircraft have the correct facilities for the disposal of used hypodermic syringes (sharps) and that instructions on where and how to use them are displayed for passengers' information.	Airline
Why	Airlines are reporting increasing numbers of puncture injuries to cabin crew and cleaning staff due to inappropriate disposal of used sharps. Not all washrooms are fitted with integrated sharps disposal boxes and passengers are disposing of used sharps inappropriately.	
Output	Clear guidance on the safe disposal of sharps on board aircraft, e.g. where and how sharps bins should be provided and used in the cabin; accessible passenger safety information to ensure that used sharps are not left in seat backs or in general cabin waste where they may cause harm; use of medical waste bags where sharps boxes are not available and procurement guidance to ensure sharp box provision on new aircraft or as part of cabin refits.	
Outcome	Sharps disposed of correctly and injury reporting decreases.	
Who do I need to talk to inside my organisation	Procurement, Health & Safety, cabin crew, customer communications	
Who do I need to talk to outside my organisation	Cleaning contractors, aircraft suppliers, specialist waste disposal companies.	

What impact will this action have Safer working practices for cabin crew and cleaning staff

Timescale Short term

Cost Low

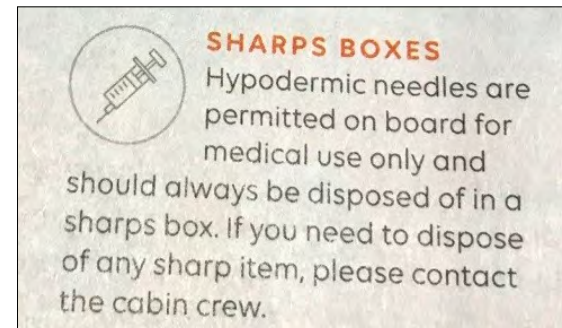
Hierarchy action level Disposal

Net Benefit Correct disposal of a small scale but potentially high risk element of the cabin waste stream

Case study/best practice example

It is considered that passengers travelling with personal medical kits have an individual responsibility to dispose carefully of syringes, lancets or needles. Airlines will often provide safe disposal facilities, particularly on longer flights.

Easyjet provides a safe disposal facility and promotes this as part of its passenger information in the in-flight magazine



Steps needed to put this action into practice

IATA to develop and circulate standard guidance for the disposal of sharps on board flights for adoption by airlines.

Appendix 1 | Waste Composition Analysis



Appendix 1: Catering waste hierarchy

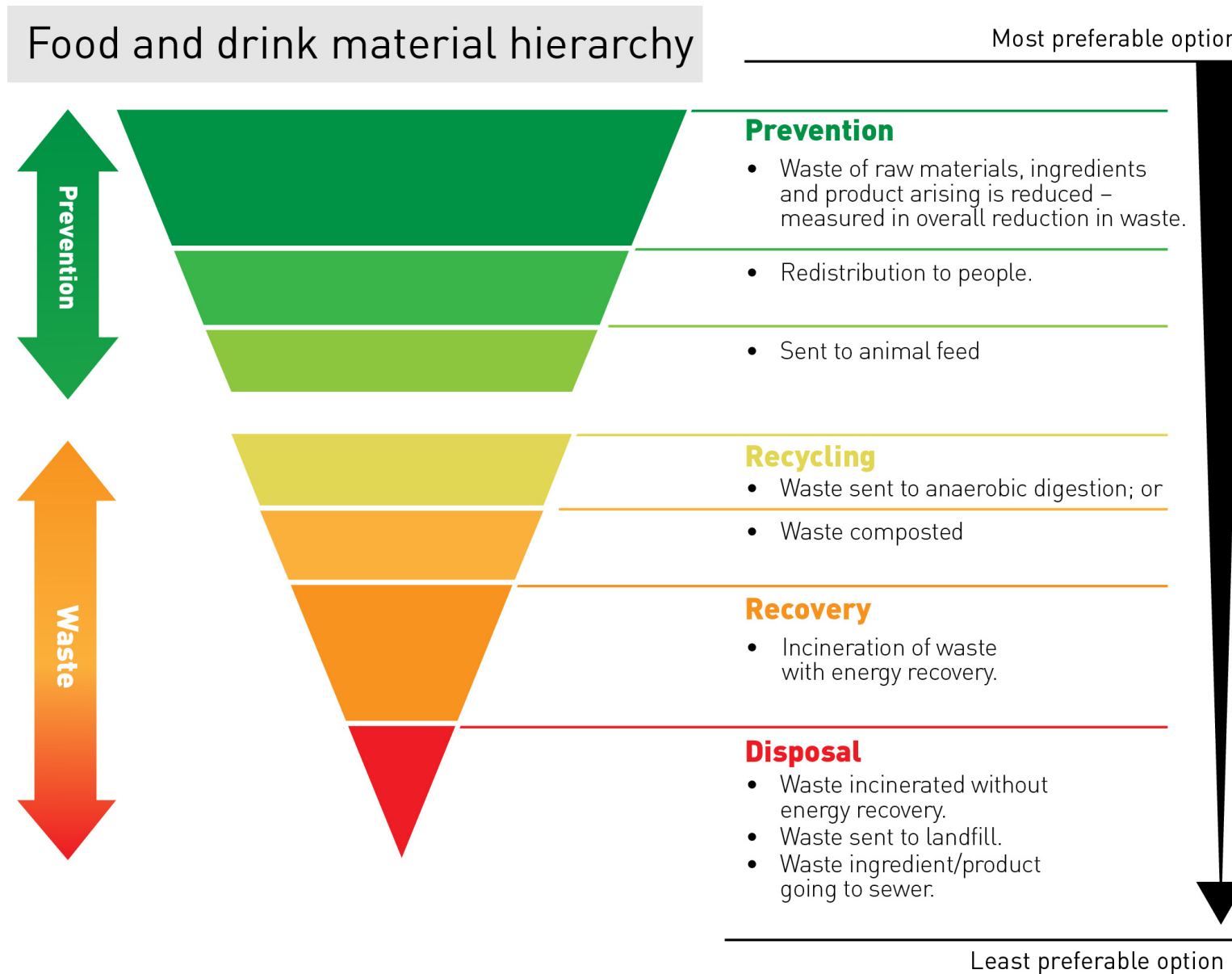


Figure 7: Catering waste hierarchy⁸⁰

⁸⁰ http://www.wrap.org.uk/sites/files/wrap/image/Food_and_Drink_hierarchy.jpg/

Waste Composition Analysis (WCA)

Knowing the composition of the catering waste and cabin cleaning waste streams can only be established by means of a compositional analysis. There are a range of possible reasons to conduct a WCA and a number of different design options and key questions to be answered of which identifying areas to target for waste reduction, and recycling or to evaluate actions taken to reduce cabin cleaning waste.

WRAP recommends that a professional company with appropriate experience, insurance and health and safety policies is employed for this task. Although anyone can learn how to carry out a waste analysis given suitable training, this is not the purpose of this document.

What is the general idea?

The general approach involves determining the average composition of cabin waste collected and comparing the waste collected through each collection route for catering waste and cleaning waste.

Can I have a step by step guide?

Following these steps will allow you to calculate the composition of cabin waste (cleaning waste + catering waste)

Step one: Commission a WCA of cabin waste.

Step two: Ensure that flights are selected for WCA that are representative of the type of flight for which you are interested. There are a variety of areas that may be of interest. This could be a representative sample of all of your airlines flights or a sub section such as long haul or short haul flights. There are many factors to consider when selecting a representative sample, examples include:

- Flight duration
- Flight times – day vs night

- Departure location
- Arrival destination
- Passenger composition – percentage of standard vs enhanced ticket options

If you commission a professional organisation to carry out the composition work, it will advise on the most appropriate sample. The bottom line is that there are no hard and fast rules on this. Theoretical sampling requirements must be balanced against the operational realities of waste management and budgetary constraints. The aim is to come up with a strategy that is sufficiently robust for the purposes to which the information will be put; waste composition analysis is very far from being a clinical trial. Waste composition analysis is not an exact science as it deals with the outputs of (relatively) unpredictable human beings.

Step three: Define waste category lists. There is a range of possible categories that could be defined, however, they should be selected to answer the key questions posed by your airline. Below is an example category list defined by and used in a study commissioned by IATA. Step Four: Communicate with the companies contracted to remove waste from your airline. This is essential to ensure that they are aware of the research as this will reduce the risk of misplacing waste for analysis. Step Five: Carry out the waste composition analysis. This will tell you the proportion of the waste made up of each material for each waste stream.

How do I decide when and how often to sample waste?

When working out waste composition it is important to consider seasonality. For example, summer time may result in higher load factors producing larger quantities of waste or different type of waste. Ideally, a separate waste analysis study would be required for each season but, as a minimum, should be conducted in spring and autumn to allow for seasonal differences

How do I get hold of the waste to be analysed?

First you must decide where you are going to collect the waste and how to ensure that it is representative. Once you have decided which flights you are going to select the waste from, you need to decide which method you are going to use for collecting and sorting the waste. This will likely depend on the cleaning and catering contracts in place and the availability of WCA sort sites at which to conduct the analysis..

How do I Commission WCA?

Waste composition analysis is a specialised activity and, unless you have trained and experienced staff, WRAP recommends that a professional company be engaged. The following gives more in-depth advice, covering the specifics of outsourcing this kind of monitoring.

A full tendering exercise should be run by anyone wishing to commission waste composition analysis and references requested.

When assessing the tenders, look for the following key characteristics in an organisation:

- strong track record of similar work – contact previous clients for references;
- experienced and trained staff, especially the team that will be sorting the waste and the team supervisor;
- detailed health and safety procedures covering waste collection, lifting, manual handling, waste sorting and infection precautions;
- proof of compliance with any in country laws or regulations;
- public liability insurance and professional indemnity insurance if appropriate

What should I look out for when assessing bids?

- How do the contractors intend to ensure that the sample is representative?
- Cutting back on samples can reduce the price of a waste analysis, but it can also reduce the reliability of the data. In this field, the cheapest is not necessarily the best and you should make sure that the method being proposed is robust, particularly if the price is considerably cheaper than the other bids. It may be that the bidder has misunderstood your needs and it is best to clear that up sooner rather than later; and
- The price of waste analysis is not usually very sensitive to the number of categories the waste will be sorted into, but you should check what each bidder is proposing. Organisations that provide these services are usually quite flexible on the categories that can be used, so don't reject a bidder just because you don't like the categories they are proposing to use.

If I am using WCA to evaluate a project or change how should I go about this?

A WCA should be conducted before any activity is taken. This will provide a baseline on which post intervention analysis can be compared. When undertaking repeat waste audits, of key importance is to account for seasonal variation. If only annual audits are undertaken, they should be carried out at the same time of year for comparability. The same method should be deployed for analysis of both pre and post intervention WCA.

Appendix 2: Documents available on Extranet Site

IATA hosts several airline resources on an Extranet site which is available to all Member airlines. If you do not already have access, please contact Sophie Bellin (bellins@iata.org).

Below is a list of resources mentioned in this handbook that are available on the Extranet site:

- IATA Airline Waste Audit Protocol
- International Catering Waste – A case for smarter regulation
- Guidance on recycling for international flights