



ICAO

ENVIRONMENT

Waste Management at Airports

ECO AIRPORT TOOLKIT
Case Studies



Waste Management at Airports

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Annex 1. Sample Outline for a Recycling and Waste Reduction Plan

a. Facility Description and Background

- 1) Background information about airport
- 2) Scope of existing recycling programs
- 3) Airport's current waste management program
- 4) Drivers for implementing/maintaining a recycling program
- 5) Description and inventory of recycling infrastructure (both on/off airport)
- 6) Description of the airport's current solid waste recycling, reuse, and waste reduction efforts
- 7) Description of program performance

b. Waste Audit

- 1) The annual quantity and composition of generated MSW and CDD debris
- 2) The sources and activities that generate waste
- 3) The generators (owners and facilities/areas) of various waste streams

c. Review of Recycling Feasibility

- 1) Describe the technical and economic factors that currently affect the airport's ability to recycle
- 2) Federal, state, or local guidelines or policies
- 3) Other incentives for implementing/maintaining a recycling program
- 4) Identify logistical constraints

d. Operation and Maintenance (O&M) Requirements

- 1) Describe waste handling, and the parties responsible for each area and waste stream.
- 2) Identify department/ section/organization responsible for implementation of each aspect of the airport's recycling program, and their roles and responsibilities

e. Review of Waste Management Contracts

- 1) Describe current contracting for waste management at the airport
- 2) Describe how existing contracts encourage or impede the purchase/use of environmentally-preferred products
- 3) Identify tenant leases and service contracts with corresponding expiration, extension, and/or renewal dates
- 4) Describe how waste handling and recycling is funded

f. Potential for Cost Savings or Revenue Generation

Presents recycling program recommendations developed following review of the preceding work, and compares the cost of landfilling waste with recycling, composting, or reuse. This is accomplished through financial analysis of the overall waste management program, the current airport recycling program, and potential recommendations that will enhance and broaden the program.

g. Plan to Minimize Solid Waste Generation

- 1) At a minimum, document the airport's program to recycle paper (newspaper and magazines), plastic bottles and aluminium cans, and plastic cups
- 2) Present the airport's plan for a comprehensive approach to reduce the amount of waste being disposed of in landfills. Objectives and targets should be established.
- 3) Consider updated arrangements/contracts/leases between the airport and tenants, new development specifications (to include containers and space for material collection, sorting, and recycling), and new purchasing policies/requirements
- 4) If aspects of the plan require capital improvements, these should be referenced in the plan and included in the Airport Capital Improvement Plan
- 5) Describe any plan recommendations that may conflict with existing plans and programs
- 6) Discuss how recycling will be implemented as part of new development projects; include the information and timeframe needed to meet the goals
- 7) Discuss how the airport will track and report on the recommendations, and how this will be reviewed
- 8) Description of any future program enhancements, if any are known
- 9) Earlier sections may have identified constraints to improving recycling performance that are outside of the airport's control; describe conditions that will trigger re-evaluation
- 10) Describe planned efforts for education and outreach

Annex 2. Case studies on waste management at airports (Draft)

ECO AIRPORT TOOLKIT

Auckland International Airport: Waste Management

Waste Management at the Airport site

A request for case studies

Description of Request

ICAO's Committee on Aviation Environmental Protection (CAEP) is currently developing an *ECO Airport Toolkit*, with the objective to provide supplementary information on selected topics included in the recently updated ICAO Doc 9184 *Airport Planning Manual, Part 2, Land Use and Environmental Management*. The "e-publications" are intended for use by airport operators, States and regional and local authorities that are planning or engaged in airport infrastructure projects, particularly in regions in which the aviation sector is developing strongly.

This request is for airport operators to use the below template to provide examples of eco-friendly waste management at the airport site. We are particularly interest in good waste management practices including creative approaches of reducing waste consumption and engaging different stakeholders. The selected studies are going to be included as annexes to the ICAO e-publication Waste Management at the airport site.

Step 1: Please provide your contact details in case further information is needed.

	Respondent
Name	Helen Jenkins
Organization/Company	Auckland Airport
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Email Address	Helen.jenkins@aucklandairport.co.nz CSRreporting@aucklandairport.co.nz
Telephone	+649 22 407 9820

Airport (<i>Name and 3 Letter Code</i>)	
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Step 2: Please provide the following basic information of your Project/Case Study:

Project/Case Study Title:

Timeframe (e.g., start and end month/year if applicable):

Description:

Purpose:

Step 3: Please identify which waste processing is/are used at your airport:

() Recycling

() Waste Recovery (e.g Waste to Energy)

() Incineration

() Landfill

() Other - Off site composting _____

Step 4: Please identify and prioritize the driver(s) for the waste management project. Number 1-6, where 1 is a high priority and 6 is a low priority.

(2) Economic

(1) Environmental

(5) Political

(4) Social

(3) Regulatory

() Other _____

Step 5: Please give more details on the driver(s) chosen in the previous question. For instance, was there any available incentives for the development of such programs? Can you describe it?

Two main drivers – improve diversion of waste from landfill, and the economic driver to reduce the tonnage of waste requiring sterilisation while maintaining strict biosecurity requirements.

Step 6: Could you please describe your labeling/colour coding to waste separation? Is this based on national regulation? Do you think you could benefit from international harmonization of labeling/colour codes for waste separation?

Organic waste – Green, with pictogram and description in English “Organic waste”

Mixed recyclables – Yellow, with pictogram and description in English “Comingled recyclables”

General waste – Red, with pictogram and description in English “General waste”

Colour coding is not based on national regulation. International harmonization would be helpful.

Step 7: Did you engage with internal and external stakeholders? If so, please identify which stakeholders you engaged with.

Internal stakeholders – Cabin staff, Ground handling staff, Our waste management contractor

External stakeholders – the Biosecurity regulator, known as MPI

Step 8: Which department is in charge of waste management in your organization?

Airport Operations are in charge of waste management.

Step 9: Please insert Text and Images of your project/case study below here:

Enclosed as hyperlink to Case Study:

[Green Airports Recognition 2018 Auckland Airport entry.doc](#)

Decision-Making Process:

Estimated Cost and Financial mechanisms available:

Images:

Results (Environmental Benefit/Cost Benefit):

Lessons Learned:

ECO AIRPORT TOOLKIT

Christchurch International Airport: Project Coffee Cup

Waste Management at the Airport site

A request for case studies

Description of Request

ICAO's Committee on Aviation Environmental Protection (CAEP) is currently developing an *ECO Airport Toolkit*, with the objective to provide supplementary information on selected topics included in the recently updated ICAO Doc 9184 *Airport Planning Manual, Part 2, Land Use and Environmental Management*. The "e-publications" are intended for use by airport operators, States and regional and local authorities that are planning or engaged in airport infrastructure projects, particularly in regions in which the aviation sector is developing strongly.

This request is for airport operators to use the below template to provide examples of eco-friendly waste management at the airport site. We are particularly interest in good waste management practices including creative approaches of reducing waste consumption and engaging different stakeholders. The selected studies are going to be included as annexes to the ICAO e-publication Waste Management at the airport site.

Step 1: Please provide your contact details in case further information is needed.

	Respondent
Name	Brodie Akacich
Organization/Company	Christchurch International Airport Limited
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Telephone	+64 273579737
Airport (<i>Name and 3 Letter Code</i>)	Christchurch International Airport - CHC

Step 2: Please provide the following basic information of your Project/Case Study:**Project/Case Study Title:** Project Coffee Cup**Timeframe:** May 2017 - Ongoing**Description:**

Christchurch Airport's Sustainability Strategy is centered around the Maori concept of kaitiakitanga or guardianship, placing emphasis on caring for the environment for future generations. A key pillar of our strategy focuses on Waste and sets a firm commitment to divert more than 60% of our waste away from landfill by 2025.

Key to achieving our target is reducing the contamination of recycling streams collected from public areas. The most common contaminant found are disposable coffee cups, either originating from the terminal café's or offsite.

This is a result of labelling confusion, as it is common for most disposable cups to be branded with ecolabeling. While this labelling may be correct, the coffee cups are not recyclable and enter our recyclable waste streams. This contaminates good quality recyclables, and with no viable composting options all of these cups and contaminated recyclables must go to landfill.

To address this problem, we set out to directly influence two areas we could create change in.

1. Reduce the number of disposable cups used by our staff. Estimates suggested we were using:
 - 440 cups/week, ~1m³ or ~5kgs of waste
 - 21,120 cups/year, ~40m³ or ~300kgs of waste

Staff were given a bespoke Christchurch Airport coffee cup with messaging explaining they were reducing their personal waste footprint by 3.6kgs/yr

2. We developed bespoke bins for disposable coffee cups. They look like giant coffee cups and themed and labelled to avoid confusion. Studies indicate the waste behaviors of people are driven by convenience, so our plan was to use the bins resembling a coffee cup next to recycling stations.

Within one month, terminal recycling rates increased by 7% and have remained above previous figures. Staff use of reusable cups also increased, with ~75% of staff now using reusable cups at least occasionally, up from ~52%.

Purpose:

This project had two key objectives

1. Encourage our staff (250 FTEs) to use reusable coffee cups.
2. Reduce public confusion regarding where to put used coffee cups.

Step 3: Please identify which waste processing is/are used at your airport:

- Recycling
- Waste Recovery (e.g Waste to Energy)
- Incineration
- Landfill
- Other: Offsite organic composting

Step 4: Please identify and prioritize the driver(s) for the waste management project. Number 1-6, where 1 is a high priority and 6 is a low priority.

- (3) Economic
- (1) Environmental
- (5) Political
- (2) Social
- (4) Regulatory
- () Other _____

Step 5: Please give more details on the driver(s) chosen in the previous question. For instance, was there any available incentives for the development of such programs? Can you describe it?

Waste is a key pillar of Christchurch Airport's Sustainability Strategy with Recycling (Waste Diversion) rates being linked to ambitious performance targets to increase the recycling rates from our terminal facilities.

The key drivers behind our efforts have been primarily driven by the companies desire to be a good public citizen. We understand our operation creates a waste footprint therefore we proactively strive to reduce the impact (Environmental) of that footprint. Also, the general public expect that large public facilities provide public place recycling thus there is a social driver behind our waste efforts as well.

Christchurch Airport has received grants historically from organisations such as LoveNZ and WasteMINZ which contributed to the increase of public place recycling bins throughout the terminal. More recent projects such as Project Coffee Cup and the Waste Champions initiatives have been resourced entirely by Christchurch Airport.

Step 6: Could you please describe your labeling/colour coding to waste separation? Is this based on national regulation? Do you think you could benefit from international harmonization of labeling/colour codes for waste separation?

International harmonisation of bin colours would be extremely beneficial as it would ensure consistency for the travelling passenger. Colours used at Christchurch Airport are consistent with New Zealand standards.

Red – General Waste

Yellow – Co-mingled recycling

Blue – Glass

Green – Organics (food waste)

Coffee Cups – Brown (coffee)



Step 7: Did you engage with internal and external stakeholders? If so, please identify which stakeholders you engaged with.

This project had two key objectives

1. Encourage our staff (250 FTEs) to use reusable coffee cups.
2. Reduce public confusion regarding where to put used coffee cups.

Boundaries of this project were Christchurch Airport offices and the Terminal.

Stakeholders included airport staff, café's and our cleaning contractor OCS.

Our social media efforts to promote the bins received 341 likes and 32 shares (including the Deputy Mayor) in a short period of time. Terminal cafés actively promoted their use to the public to reduce confusion over which bin to use. Furthermore, cleaning staff reported significantly lower rates of contamination in recycling bins from coffee cups, which resulted in the higher diversion rates.

Since implementing this innovative solution, we have been approached by several entities asking for advice on how to implement a similar system. To date we are aware that Brisbane Airport Corporation and Mt Ruapehu ski field have adopted similar versions of our bins.

This project also served as a catalyst for Terminal tenants becoming more involved in our waste programme. Since implementation, our team has established a Waste Champions group of representatives from all tenants. The purpose of this group is to share information and inform tenants of any new waste procedures. It also serves as a recognition forum, recognising and rewarding members for their efforts.

Step 8: Which department is in charge of waste management in your organization?

Responsibility for waste management is shared between the Terminal Management team and the Sustainability team

Step 9: Please insert Text and Images of your project/case study below here:

Decision-Making Process:

Bins: The decision-making process for this initiative was made at the senior management level (Sustainability Manager) and did not need Executive (General Manager/CEO) approval. The concept was brought to life through a collaborative approach involving the Terminal Team (Airport Services and our cleaning contractor) and our marketing design team (artwork and social media).

Coffee Cups: This initiative was lead by the Sustainability team with the support of our Marketing design team to develop bespoke artwork as part of the launch of the Sustainability Strategy. The reusable cups were selected and designed using New Zealand based companies and iconic species of plants native to the South Island of New Zealand.

Estimated Cost and Financial mechanisms available:

250 Coffee cups were purchased in bulk at a negotiated rate to reduces the total cost of the initiative. Concurrently local artists were commissioned to design bespoke artwork to go on the coffee cups to make them attractive to staff.

The Coffee Cup bins were selected based on availability and look of the bin. The aim was to select a basic bin that looked like a disposable coffee cup and then have them wrapped in a bespoke design. Three Bins were purchased for \$200 ea and wrapped in a bespoke plastic skin for and additional \$100 (total - \$900 for three bins).

Images:

Coffee Cups:



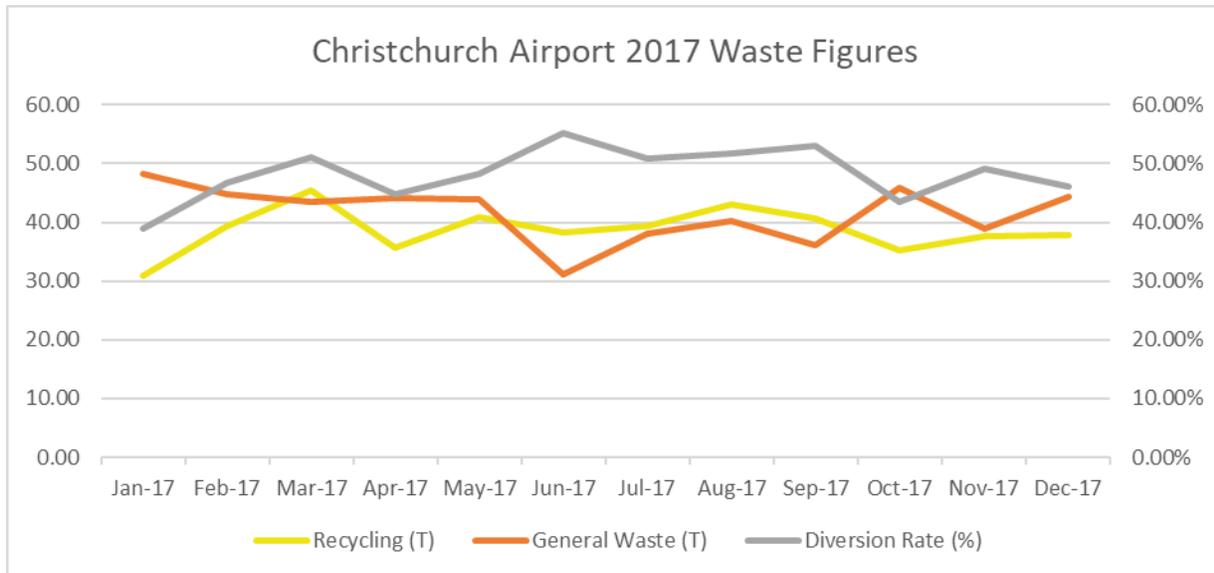
Bins:





Results (Environmental Benefit/Cost Benefit):

The main benefit tracked as part of this initiative has been Waste Diversion percentage (% of total recycling collected). Project Coffee Cup was launched at the end of May in 2017, immediately it was observed that the bins were being used for Coffee cups and that recycling bins were less contaminated. The effect of this was significant – less recycling was being rejected therefore recycling yield (tonnes) and Diversion Rates (%) increased in June to >50%.



Lessons Learned:

Several lessons were learnt from this initiative:

Cups: Whilst the design and concept were embraced by staff, the cups selected were difficult to seal and usage has fluctuated as a result. Some staff have since purchased an easier sealing cup to address the issue. Our recommendation would be to approach staff with a range of cups to gauge preference prior to bulk ordering.

Bins: The disposable coffee cups collected by these bins can only be disposed of at a landfill facility as there are no commercial facilities on the South Island of New Zealand that will accept disposable coffee cups. However it has been observed that the public will use these bins as general waste bins on occasion which would cause collected cups to be rejected if they were going to a recycling facility. Our recommendation would be to ensure these bespoke bins are paired with general waste and co-mingled bins as shown in the above picture to avoid this issue.

ECO AIRPORT TOOLKIT

Brisbane International Airport: Aerosol Donation Program

Waste Management at the Airport site

A request for case studies

Description of Request

ICAO's Committee on Aviation Environmental Protection (CAEP) is currently developing an ECO Airport Toolkit, with the objective to provide supplementary information on selected topics included in the recently updated ICAO Doc 9184 Airport Planning Manual, Part 2, Land Use and Environmental Management. The "e-publications" are intended for use by airport operators, States and regional and local authorities that are planning or engaged in airport infrastructure projects, particularly in regions in which the aviation sector is developing strongly.

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Step 1: Please provide your contact details in case further information is needed.

	Respondent
Name	Wendy Weir
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Telephone	+617 734063268
Airport (<i>Name and 3 Letter Code</i>)	Brisbane Airport BNE

Step 2: Please provide the following basic information of your Project/Case Study:

Project/Case Study Title: **Aerosol donation Program**

Timeframe (e.g., start and end month/year if applicable): October 2017 onwards

Description:

A need for the installation of a Liquid, Aerosol and Gels (LAGs) waste station was identified during a passenger facilitation assessment to reduce congestion through the security check point at the Brisbane International Terminal. Any LAGs confiscated by security at the screening point have to be incinerated under Australian legislation.

Opportunities were identified to not only reduce passenger congestion but to capture LAG waste before the check point and divert it from incineration. The project identified an opportunity to allow further segregation than the usual 'general waste' and 'comingled' recycling streams.

A trial to reduce aerosol waste from Brisbane Airport started in co-operation with charity GIVIT in late 2017. This initiative has been driven by BAC staff who became dismayed by seeing aerosols, often full, going to incineration.

So far more than 180 items have been donated via the initiative. Through GIVIT these items are now reaching charities and going to needy people experiencing homelessness or those living in hostels or safe houses.

This trial is a wonderful opportunity for airport operators and local charities to work together to reduce waste and to make a difference in the lives of underprivileged members of our community.

Several organizations were involved in the project including BAC, SecureClean (BAC Cleaning Contractor), and GIVIT (Local charity).

Purpose:

This project is the first of its kind in an Australian airport. The environmental benefits are that perfectly usable aerosols can be diverted from incineration (whilst ensuring compliance with legislation) with the additional social benefit that vulnerable and disadvantaged people can use them instead. By demonstrating this process is successful, it can be improved and replicated across all Australian international airports.

Step 3: Please identify which waste processing is/are used at your airport:

Recycling/ repurposing

Waste Recovery (e.g Waste to Energy)

Incineration

() Landfill

() Other _____

Step 4: Please identify and prioritize the driver(s) for the waste management project. Number 1-6, where 1 is a high priority and 6 is a low priority.

(5) Economic

(2) Environmental

(6) Political

(1) Social

(4) Regulatory

(3) Other: Staff morale

Step 5: Please give more details on the driver(s) chosen in the previous question. For instance, was there any available incentives for the development of such programs? Can you describe it?

Operational: To reduce congestion at the security check point by encouraging passengers to dispose of LAGS prior to the check point and simultaneously reduce the amount of waste that needs to be incinerated.

Social: To support underprivileged and needy members of the community.

Environmental: To reduce the waste of aerosols and stop them going to incineration.

Staff morale: Improve morale of airport staff concerned by the waste of aerosol products.

Regulatory: This project will be used as a flagship to commence lobbying the Australian Government to enable airports to donate good quality aerosols surrendered at security check points to charity if passengers give their consent.

Step 6: Could you please describe your labeling/colour coding to waste separation? Is this based on national regulation? Do you think you could benefit from international harmonization of labeling/colour codes for waste separation?

Red: general waste (as per Queensland Government colour system)

Yellow: comingled recycling (as per Queensland Government colour system)

All other colours (green, blue and purple) were chosen to be distinct from the other colours.

International harmonization would be good although would take time to be effective.

Step 7: Did you engage with internal and external stakeholders? If so, please identify which stakeholders you engaged with.

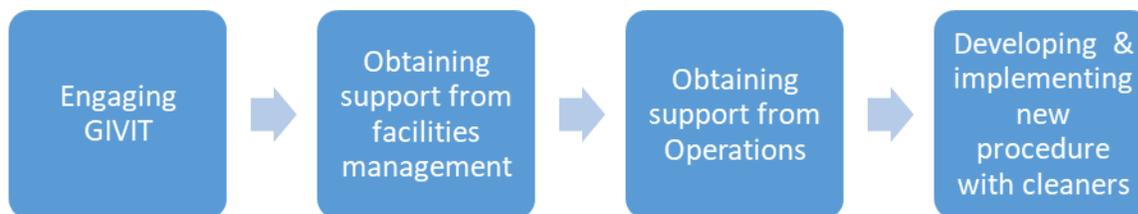
Yes to both. Firstly finding a charity that could accept the aerosols had to be found and convinced that the process could work and that health standards would be upheld. Internal stakeholders had to be satisfied that existing cleaning contractors could source separate aerosols from rubbish (if passengers do not source separate correctly) and arrange delivery of the aerosols to the charity. Passenger facilitation and security teams had to be convinced that the new LAGS waste station would be effective and not introduce delays to passenger processing.

Step 8: Which department is in charge of waste management in your organization?

Facilities Management

Step 9: Please insert Text and Images of your project/case study below here:

Decision-Making Process:



Estimated Cost and Financial mechanisms available:

The cost for separating aerosols and delivering to the GIVIT warehouse is included in the existing cleaning contract. No additional costs are incurred as a result of this project.

The new LAGS waste station cost \$26,000 AUD to design, construct and install. Half of this cost was due to connecting drainage to the sink, enabling passengers to tip out liquids prior to disposing of bottles.

Images:





People in the picture (left from right): Wendy Weir (BAC), Caet Young (GIVIT) and Tony Spencer (BAC)



Results (Environmental Benefit/Cost Benefit):

So far, more than 180 items have been donated via the new LAGS bin. Through GIVIT these items are now reaching charities and going to needy people experiencing homelessness or those living in hostels or

safe houses.

Lessons Learned:

Passengers do not source separate recyclables from waste very well, and few passengers dispose of their LAGS prior to the security screening point. As a result, this project is not making much difference to the reduction of aerosols being incinerated.

Brisbane Airport and GIVIT will commence lobbying the Australian government to allow screening contractors to ask passengers if they consent to their aerosols going to charity, rather than incineration. This will enable much greater redirection of good quality aerosols going to under privileged and needy members of the community.

ECO AIRPORT TOOLKIT

Hong Kong International Airport: Environmental Management Recognition Scheme

Waste Management at the Airport site

A request for case studies

Description of Request

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Step 1: Please provide your contact details in case further information is needed.

	Respondent
Name	Mike Kilburn
Organization/Company	Airport Authority Hong Kong
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Email Address	mike.kilburn@hkairport.com
Telephone	2188 7713
Airport (<i>Name and 3 Letter Code</i>)	Hong Kong International Airport (HKG)

Step 2: Please provide the following basic information of your Project/Case Study:

Project/Case Study Title: HKIA Environmental Management Recognition Scheme

Timeframe (e.g., start and end month/year if applicable): 2014-2015

Description & Purpose:

Airport Authority Hong Kong (AAHK)'s Hong Kong International Airport (HKIA) Environmental Management Recognition Scheme (the Scheme) was first launched in 2012. It is conducted on a bi-annual basis, targeting key themes relevant to AAHK's environmental agenda and is designed to raise tenants' and business partners' awareness on environmental management aspects. The scheme encourages participating tenants to take direct responsibility for their environmental footprint and provides a transparent way for AAHK to measure and recognise tenants' achievements.

In 2014, the theme of the Scheme was "Waste Management". It aimed to raise tenants' awareness on waste reduction and recycling. The 6-month scheme attracted 42 tenants to participate and be accredited by AAHK's independent consultant. The participating tenants were required to meet rigorous criteria on environmental management, in particular waste management, and implement a range of environmental measures depending on the nature of their business. The Scheme was designed to rate participating outlets/shops under two sectors (F&B and retail) on their achievements within six environmental categories, of which waste management carried double weighting. Other categories included energy efficiency, water efficiency, air pollution management, noise management and overall environmental management. Waste management initiatives that received favorable scoring included a) demonstrable food waste management, b) reduced usage of disposable cutlery, and (c) programmes to encourage customers to bring their own bags.

All applicants were required to submit an Environmental Management Plan which included a waste management strategy, initiatives to be implemented and at least three waste management measures with expected outcomes. Tenants were assessed on-site both under planned and surprise conditions and were accountable for consistently meeting the requirements of the schemes in order to be accredited.

Outstanding participants were invited to give a presentation to a judging panel. AAHK selected a judging panel that included AAHK's management, green NGOs and professional associations. One winner from each sector (i.e. F&B and retail) was selected to receive the grand award. An award ceremony was organized in March 2015 to recognize the accomplishments of the tenants. HKSAR Government's Secretary for the Environment attended the ceremony.

Step 3: Please identify which waste processing is/are used at your airport:

(✓) Recycling

Waste Recovery (e.g Waste to Energy)

Incineration

Landfill

Other _____

Step 4: Please identify and prioritize the driver(s) for the waste management project. Number 1-6, where 1 is a high priority and 6 is a low priority.

(4) Economic

(1) Environmental

(5) Political

(3) Social

(2) Regulatory

() Other _____

Step 5: Please give more details on the driver(s) chosen in the previous question. For instance, was there any available incentives for the development of such programs? Can you describe it?

An analysis of waste from terminals revealed that F&B and retail sectors contributed approximately 30% of HKIA's total waste. The 2014 Scheme was designed to predominantly focus on these two sectors as a way to address significant waste sources. Most importantly, the overall improvement in waste management by participants assists AAHK in meeting its' pledge to be the world's greenest airport and to achieve its long term waste target to reduce/recycle/recover 50% of all waste by 2021.

The HKSAR government is expected to introduce the Municipal Solid Waste (MSW) charging legislation by 2019. To enhance awareness of the implications of this legislation, the 2016 Scheme was designed to prepare the airport community for the upcoming charging scheme by driving the tenants to develop and consistently implement their own waste reduction/recycling measures in their daily operations.

The 2016 Scheme has also been enhanced to provide financial incentives to frontline staff by awarding HKIA coupons worth up to HK\$6,000 to accredited participants. The participating companies were required to provide evidence that the HKIA coupons were distributed directly to front-line staff.

Step 6: Could you please describe your labeling/colour coding for waste separation? Is this based on national regulation? Do you think you could benefit from international harmonization of labeling/colour codes for waste separation?

HKIA's labeling/colour coding of the recycling facilities (i.e. public recycling bins in terminal buildings and back-of-house recycling bins in refuse rooms) aligns with the HKSAR Government's current practice. Blue bins are for paper, yellow bins are for aluminum, and brown bins are for plastic.

To facilitate the airport tenants to separate waste at source, AAHK provides free recycling bags and bins for tenants. Transparent bags are used to collect dry recyclables such as paper, plastic, cans and glass bottles, and red bags are used to collect food waste. Tenants and business partners are encouraged to place separated recyclables into designated recycling bins during waste disposal.

The harmonization of labeling/colour codes for waste separation would be useful in the context of cabin waste recycling. AAHK collaborated with airlines, the Association of Asia Pacific Airlines (AAPA), Airports Council International (ACI) and the International Air Transport Association (IATA) to develop the "Cabin Waste Recycling Guidance and Recommendation Practices", which was published in 2016. There is a recommendation in the guideline about the harmonization of labeling/colour codes for waste separation. However, it is not a mandatory requirement across all airports. Currently, there is no global standard for labeling/colour coding of recyclables. At HKIA, different airlines/cleaning companies may have their own set of labeling/colour coding of recyclables across fleets. The development of a uniform system for labeling/colour codes with regard to waste separation would assist global aviation to minimize the risk of cross contamination and improve recycling rates.

Step 7: Did you engage with internal and external stakeholders? If so, please identify which stakeholders you engaged with.

The HKIA Environmental Management Recognition Scheme is a voluntary airport-wide biannual programme. In 2012, 38 tenants in the retail and F&B sectors within the terminal buildings participated. In 2014, the scheme expanded to an airport-wide programme which covered retail and F&B business partners across the airport. In 2016, the programme expanded to include the office and cleaning contractor categories, in addition to the retail and F&B sectors, and attracted 102 participants airport-wide.

As part of the Scheme, AAHK engages with the tenants regularly and provides training sessions and tools (such as recycling bags and bins) free of charge to assist business partners and tenants to achieve the best possible outcomes. Where possible, participants are invited to provide feedback via surveys to ensure enhancements can be made to facilities where necessary.

During the 2014 Scheme, ten organizations including government departments, industry bodies, and green NGOs were invited to be supporting organizations. In addition to ensuring that the judging was conducted by independent experts this approach also helped to spread awareness of the programme to the wider Hong Kong community, five of these organisations also participated in the final judging process for the selection of the Grand Award winners for the Scheme.

Since 2012, the Scheme has attracted the support of the Hong Kong Government's Secretary for the Environment, as well as AAHK's CEO and directors, participating tenants' senior management and NGOs, all of whom attended the opening and closing ceremonies of each biannual scheme. This recognition serves as a compelling driver for the successful and continuous implementation of the Scheme.

Step 8: Which department is in charge of waste management in your organization?

The Sustainability Department is responsible for formulating AAHK's waste management strategy and initiating "airport-wide" waste management programmes across HKIA. The Sustainability Department works closely with other operational departments to implement initiatives across AAHK's operations and embeds requirements within contract agreements to ensure measures are also enforced throughout the supply chain.

Step 9: Please insert Text and Images of your project/case study below here:

Decision-Making Process:

The Scheme was endorsed by the AAHK's Executive Director. AAHK engaged a consultant to deliver the project which included developing the scoring methodology, providing independent assessments and conducting opening or closing ceremonies.

Estimated Cost and Financial mechanisms available:

The Scheme is free-of-charge for participating tenants. AAHK chooses not to disclose the project costs.

Images:





Results (Environmental Benefit/Cost Benefit):

The 2014 Scheme resulted in the accreditation of 19 food and beverage outlets and 23 retail stores (i.e. about 15% of the total tenants at HKIA) including one Grand Award winner from each category.

The Grand Award winner for the retail sector (The Magic of Hong Kong Disneyland) reduced 15% of their packaging materials (approx. 72,600 pcs of plastics bags and paper boxes for their products) in a year. The Grand Award winner for F&B (Catalina's restaurant) developed some very innovative practices including replacing hardcopy restaurant menus with electronic menus to save paper and made an agreement with its detergent supplier to reuse containers.

Riding on the success of the 2014 programme, the scheme was launched again in 2016 and expanded to 20 months and covered four sectors, including F&B, retail, office and cleaning contractor. The scheme has attracted 102 tenants. A passenger awareness programme (PAP) was newly introduced in the 2016 scheme in order to enlighten passengers and the general public on the benefits of waste management, waste reduction and recycling through a series of promotional and educational activities that made use of the Hong Kong Government's "Big Waster" mascot.

This Scheme could be readily adopted by other airports without significant capital investment.

ECO AIRPORT TOOLKIT

Sacramento County Airport System: Food Waste Diversion Pilot Program

Waste Management at the Airport site

A request for case studies

Description of Request

ICAO's Committee on Aviation Environmental Protection (CAEP) is currently developing an *ECO Airport Toolkit*, with the objective to provide supplementary information on selected topics included in the recently updated ICAO Doc 9184 *Airport Planning Manual, Part 2, Land Use and Environmental Management*. The "e-publications" are intended for use by airport operators, States and regional and local authorities that are planning or engaged in airport infrastructure projects, particularly in regions in which the aviation sector is developing strongly.

This request is for airport operators to use the below template to provide examples of eco-friendly waste management at the airport site. We are particularly interest in good waste management practices including creative approaches of reducing waste consumption and engaging different stakeholders. The selected studies are going to be included as annexes to the ICAO e-publication Waste Management at the airport site.

Step 1: Please provide your contact details in case further information is needed.

	Respondent
Name	Tiffany Pham
Organization/Company	Sacramento County Airport System
Job Title	Environmental Specialist
Email Address	phamti@saccounty.net
Telephone	916-874-0754

Airport (<i>Name and 3 Letter Code</i>)	Sacramento International Airport (SMF)
---	--

Step 2: Please provide the following basic information of your Project/Case Study:

Project/Case Study Title: Sacramento International Airport Food Waste Diversion Pilot Program

Timeframe (e.g., start and end month/year if applicable): January 2015 to March 2016

Description: Sacramento International Airport implemented a pilot program for pre-consumer food waste collection and diversion activities at participating restaurants as part of a larger demonstration project by Sacramento Municipal Utility District (SMUD) and CleanWorld, an anaerobic digester technology company, to develop food waste collection infrastructure across the Sacramento region.

Purpose: The purpose of the project was to test and analyze food waste diversion ahead of California's Mandatory Organics Recycling regulation (AB 1826). SMF volunteered to be a participating facility to help SMUD and CleanWorld understand any logistical issues with implementing a food waste diversion program.

Step 3: Please identify which waste processing is/are used at your airport:

- Recycling
- Waste Recovery (e.g. Waste to Energy)
- Incineration
- Landfill
- Other _____

Step 4: Please identify and prioritize the driver(s) for the waste management project. Number 1-6, where 1 is a high priority and 6 is a low priority.

- (2) Economic
- (3) Environmental
- Political
- (4) Social-hidden driver. Benefit from employee engagement
- (1) Regulatory
- Other _____

Step 5: Please give more details on the driver(s) chosen in the previous question. For instance, was there any available incentives for the development of such programs? Can you describe it?

Atlas Disposal, SMF's waste hauler, approached SMF to participate in a food waste diversion pilot project in preparation for AB1826, a mandatory commercial organics recycling mandate. The purpose of the pilot program was to test food waste collection and diversion activities. Doing so would provide guidance to other facilities that would be required to comply with AB 1826.

At the time of the pilot program, Atlas endeavored to structure food waste to be more cost effective than sending waste to the landfill and result in waste management cost reductions. Involvement in the pilot program allowed Airports to purchase waste management infrastructure (i.e.: receptacles, tilt trucks) for participating Concessionaires with the use of grant funding.

Implementing a food waste diversion pilot program would also limit the amount of waste sent to the landfill and limit Airport-sourced greenhouse gas emissions. Food waste would be sent to a high-solids anaerobic digester which captures 100 percent of the greenhouse gas emissions from organic waste to produce renewable natural gas. Renewable natural gas is then used to fuel waste hauler fleets resulting in a closed loop system.

Employee engagement and the social benefit was an unexpected by-product of the pilot program. SMF's Waste Management Working Group (WaMWG) formed around the same time SMF was invited to participate in the food waste diversion pilot program. At the conception of the working group, there was a greater motivation to produce positive results. Many employees felt a greater sense of purpose and felt they were performing meaningful work as a result of the working group.

Step 6: Could you please describe your labeling/colour coding to waste separation? Is this based on national regulation? Do you think you could benefit from international harmonization of labeling/colour codes for waste separation?

Concessionaires have color-coded receptacles, tilt trucks, and compactors for waste separation and disposal. Front of the house and back of the house employees dispose of waste in receptacles. Utility workers take waste from the receptacles to the tilt trucks behind the restaurant until the tilt trucks are full. Tilt trucks are taken to the compactors at least once a day, where Atlas will pick up and haul the waste to the appropriate facility.

All receptacles, tilt trucks, and compactors are color-coded to differentiate between the three waste streams. Gray indicates receptacles for trash disposal. Blue indicates receptacles for comingled recycling. Yellow indicates receptacles for food waste diversion. Yellow was chosen as the color for food waste diversion because green receptacles symbolize yard trimming disposal in Sacramento County. Because food waste and plant trimmings are accepted at separate processing facilities, green could not be used for food waste diversion.

Given SMF's current international passenger numbers, international harmonization of labeling and color codes would not make a significant impact on waste separation results. However, as SMF expects a greater number of international flights, harmonization would be beneficial for passengers who do not speak English and must rely on colors and symbols to identify the correct receptacle to dispose of their waste.

Step 7: Did you engage with internal and external stakeholders? If so, please identify which stakeholders you engaged with.

SMF's Waste Management Working Group, made up of individuals from various airport divisions, worked to implement the food waste diversion pilot project. SMUD partnered with CleanWorld to develop food waste collection infrastructure across the Sacramento region. SMF volunteered to be one of the test facilities. Atlas Disposal provided hauling services and transport for the food waste to CleanWorld.

Step 8: Which department is in charge of waste management in your organization?

Responsibilities for waste management are shared between the airport's landscape management division and environmental division. The landscape management division manages the waste hauler contract and maintains waste management infrastructure (i.e.: compactors, towable bins). The environmental division is responsible for providing training to the Food & Beverage Concessionaires and managing the Concessionaire Recycling Program. During the food waste recycling pilot program, a person from the landscape management and environmental division performed daily waste assessments of the Concessionaires participating in the pilot program.

Step 9: Please insert Text and Images of your project/case study below here:

Decision-Making Process:

SMF's Waste Management Working Group was approached by Atlas to participate in a food waste pilot program headed by SMUD and CleanWorld. Knowing that AB 1826, a mandatory commercial organics recycling regulation, would begin enforcement in April 2016, SMF presented Atlas' offer to Airport Management. Participation in the food waste diversion pilot program was endorsed with the agreement that participation would not result in any additional costs to the airport.

Estimated Cost and Financial mechanisms available:

SMUD was awarded \$100,000 in grant funding by the California Energy Commission to promote growth of biomass-to-energy technology. Approximately \$20,000 of the grant funding was spent on color-coded receptacles, tilt carts, and recycling incentives for the six participating restaurants at SMF. In order to realize a cost-savings outcome, there were no other financial mechanisms to permit implementation of the food waste diversion program.

Images:

Figure 1: Pilot Project Process Flow



Figure 2: Food Waste and Recycling Receptacles



Figure 3: Food Waste, Trash, and Recycling Tilt Trucks



Figure 5: Food Waste, Trash, and Recycling Compactors



Figure 6: Concessionaire Recycling Training



Results (Environmental Benefit/Cost Benefit):

Nine tons of food waste was diverted to CleanWorld's anaerobic digester that would have otherwise gone to the landfill during the initial six-week phase of the pilot program. The landscape management division worked closely with Atlas Disposal to decide on frequency of hauling food waste. Factors that contributed to the decision included: how much tonnage capacity the compactor could take, cost of hauling, and minimizing pest-conducive conditions due to odor and ambient temperature. The cost per ton of disposal for trash was 35 cents higher than the cost per ton of disposal for food waste, which resulted in a minor cost savings.

Lessons Learned:

Increased Recycling: The Waste Management Working Group (WaMWG) not only trained Concessionaire employees about food waste diversion, but also comingled recyclable diversion. Many of the Concessionaire employees learned about recycling concepts for the first time during the food waste diversion pilot program. As a result of the training, there was a significant increase in recycling and a decrease in trash.

Space is Critical: Many Concessionaire spaces were designed without consideration for multi-bin placement. WaMWG noticed employees were disposing of their waste in the bin closest to their station despite recycling training and enforcement. Convenience and accessibility are important drivers for getting Concessionaire employees to recycle properly. To address the issue, WaMWG worked with supervisors and managers to strategically place certain receptacles where waste is created.

Continuous training and monitoring: The amount of training required for restaurants was underestimated due to the number of part-time employees and extremely high turnover in the food industry. It was initially expected that only a handful of trainings per restaurant were required and any new employees could be trained by seasoned employees. Instead, WaMWG had to give recurring recycling trainings as some restaurants hired new employees on a bi-weekly or monthly basis.

Recurring monitoring is required for all hours of operation. If recycling monitors had the tendency to visit one work shift more than others, the highly monitored shift would have greater compliance than the less visited work shift. Therefore, WaMWG alternated the time at which to monitor recycling practices of Concessionaires.

Odor Mitigation: During the pilot program, SMF staff received one complaint about odor around the compactor. Investigation identified the following lessons:

- Liquid may spill during the emptying of tilt trucks into the compactor and this spilled liquid is a source of odor if not properly cleaned
- The smell was not coming from the food compactor itself but from food that did not make it into the compactor

Food handling is an important aspect of odor management. Some of the concessionaires were not bagging food waste which contributed to odor in the bins and spillage in the compactor area. Continued training was provided to educate staff and managers about the use of the bags and that they are acceptable in the food waste bin (some staff thought the food waste had to be 100 percent clean).

SMF explored additional alternatives to manage odors near the compactors. Ozone generators were not compatible with SMF's waste infrastructure as they are known to deteriorate metal compactors. Instead SMF installed an odor neutralizing misting system above the food waste compactor.

ECO AIRPORT TOOLKIT

San Diego Regional Airport Authority: SAN's Food Recovery Program

Waste Management at the Airport site

A request for case studies

Description of Request

ICAO's Committee on Aviation Environmental Protection (CAEP) is currently developing an *ECO Airport Toolkit*, with the objective to provide supplementary information on selected topics included in the recently updated ICAO Doc 9184 *Airport Planning Manual, Part 2, Land Use and Environmental Management*. The "e-publications" are intended for use by airport operators, States and regional and local authorities that are planning or engaged in airport infrastructure projects, particularly in regions in which the aviation sector is developing strongly.

This request is for airport operators to use the below template to provide examples of eco-friendly waste management at the airport site. We are particularly interest in good waste management practices including creative approaches of reducing waste consumption and engaging different stakeholders. The selected studies are going to be included as annexes to the ICAO e-publication Waste Management at the airport site.

Step 1: Please provide your contact details in case further information is needed.

	Respondent
Name	Mayra I. Garcia
Organization/Company	San Diego County Regional Airport Authority
Job Title	Associate Environmental Specialist
Email Address	MiGarcia@san.org
Telephone	619-400-2795
Airport (<i>Name and 3 Letter Code</i>)	SAN

Step 2: Please provide the following basic information of your Project/Case Study:

Project/Case Study Title: SAN's Food Recovery Program

Timeframe (e.g., start and end month/year if applicable): 2014 ongoing.

Description: The San Diego International Airport serves as the gateway in and out of San Diego, providing service to over 22 million travelers in 2017. Given the volume of hungry travelers filtering into and out of the airport, there is a lot of food being purchased and consumed, which leads to opportunities for food recovery. As an alternative to food waste taking up valuable space in local landfills, in 2013, the San Diego County Regional Airport Authority (Authority) began collaboration with one food service provider to collect coffee grounds and fruits for composting through the City of San Diego's Miramar Greenery Composting Facility. In 2014, the Airport's program expanded to include 40 restaurants and coffee shops at the airport that were collecting and composting all their pre-consumer food scraps, not just coffee grounds and vegetative food waste. This marked the beginning of the Airport's Food Recovery Program – a collaboration with airport concessionaires, Flagship Airport Services (the airport's sole janitorial service provider), Bradford Airport Logistics (the airport's receiving and distribution service provider operating a fleet of refrigerated vehicles), Republic Services (the airport's sole waste hauler), and the City of San Diego. By the end of 2015, three prep kitchens, the Airport's United Service Organizations (USO) Neil Ash Airport Center, and three of the Authority's own breakrooms were participating in the program, sending 320 tons of pre-consumer food waste to the City of San Diego Miramar Greenery. New for 2016, the Food Recovery Program began a pilot project to collect the scraps of food left on plates (post-consumer food waste) in all seven wait-service restaurants at the Airport. The pilot included oversight by the Authority and the City of San Diego Environmental Services Department, and training of restaurant managers and staff on the mechanics of the food recovery program. The pilot program was a resounding success and the City approved formal implementation of post-consumer food waste collection as part of the Airport Authority's Food Recovery Program. By separating food waste from the waste stream, the Airport has reduced the volume of waste disposed as trash. In 2017, the Airport Authority diverted 368 tons of non-edible food waste to the City of San Diego Miramar Greenery for composting. At the Miramar Greenery, compost is made from yard trimmings and food scraps that have been ground, placed in windrows, turned and watered for 70 days. During this time, microorganisms digest the carbon and nitrogen rich mixture, causing the windrow to sustain temperatures of 140-165 F. This process eliminates most weed seeds and pathogens while breaking down the organic material into beneficial soil nutrients. Finished compost is screened to a particle size of one-half inch or less which also removes film plastic from the final product. Compost is used as an amendment to improve soil texture and increase nutrient and water holding capacity. In San Diego, where soil lacks many essential plant nutrients, mixing compost with the soil is good for yard and gardens. City of San Diego residents can self-load up to two cubic yards of compost or mulch for free with proof of residency.

Having made great strides in diverting food waste away from disposal and into composting, the Authority sought to minimize edible food waste at the Airport all together. In late 2016, the Airport's Food Recovery Program sought to reduce the amount of food waste being generated by initiating a program to donate edible food items before they need to be managed as waste. A team of Authority staff worked

with the Airport's six main concessionaires, Flagship Services, Bradford Airport Logistics, the San Diego Rescue Mission and other non-profits, including Feeding America, to donate food as meals to local communities (saving the community approximately \$100,000 by providing nearly 5,000 meals). In the process, the team realized there was a need to be filled that was even closer to home, right at the airport itself – the USO Neil Ash Airport Center. The USO Neil Ash Airport Center is open to active duty service members and their families and is the largest of its kind in the world, with an estimate of 11,000 visitors per month. The USO provides a resting space, entertainment, and meals for these visitors and their families. The Airport Authority's Food Recovery Program has created a closed-loop system that enables restaurants and concessionaires at the Airport to direct edible excess food to another worthy cause right here at home. The USO now has the distinction of both receiving on-site food donations and participating in our food waste collection program. The Authority has become an example to other airports and businesses that are looking to start their own Food Diversion Programs, and the team has been contacted by numerous outside organizations for information. The Airport's Food Recovery Program represents 28% of the non-construction-related waste diverted from landfill disposal by the Airport Authority in 2017. The Airport continues to collaborate with the San Diego Food System Alliance to develop and maintain a sustainable food system in San Diego County.

Purpose:

In 2013, when the Authority joined the City of San Diego's Composting Program the Authority had to comply with the City's program guidelines and requirements. One of the requirements that had to be met was to have three clean loads delivered to the Miramar Greenery. At the greenery the loads were inspected by the City of SD staff, also in attendance was the Authority and Flagship Services staff. The three loads had to be clean and could not exceed 1% contamination. In order to meet this requirement, Authority developed training materials and provided employee training including Flagship staff and concessionaires. During the inspections the Authority learned that there were large quantities of edible food being thrown away and that could be saved. The Authority started the food recovery program in an effort to divert the edible food and feed hungry people in the community. One year later, the Authority joined the EPA Food Recovery Challenge in 2015. During the same year, the White House, EPA and the U.S. Department of Agriculture announced a national goal to cut food waste in half by 2030. As part of the effort, the federal government will lead a new partnership with non-profit organizations, the private sector and local, state and tribal governments to reduce food loss and waste in order to improve food security, while conserving our nation's natural resources. After recycling and composting, food waste was the largest component of MSW discards at 21.1 percent, more than plastic or paper in 2013. According to the EPA we continue to discard more food waste to landfill compared to all of our other municipal solid waste. And yet, food waste is the least recovered material. The good news is that food recovery rates have more than doubled from 2009 to 2013.

Step 3: Please identify which waste processing is/are used at your airport:

(x) Recycling

The Authority operates a centralized waste and recycling facility which houses a covered area for the cardboard and baler, open area containing one solar-hybrid powered trash and recycling compactors, one tipper trash compactor, one custom food waste compactor, one dumpster for wood and pallets, one

container for metals, and twenty-five towable carts for use with the tipper compactors. Bradford operates a baler for plastic film that is recovered during deliveries from the concessionaires.

(x) Waste Recovery (e.g Waste to Energy)

Grease is collected from the concessions and it is turn into bio-fuel, Bradford uses the grease in their delivery trucks on campus.

() Incineration

(x) Landfill

Trash is taken to the Miramar landfill.

(x) Other – Diverting edible food from the landfill and donating to non-profit organizations (USO and the SD Rescue Mission).

Step 4: Please identify and prioritize the driver(s) for the waste management project. Number 1-6, where 1 is a high priority and 6 is a low priority.

(2) Economic

(1) Environmental

(5) Political

(3) Social

(4) Regulatory

() Other _____

Step 5: Please give more details on the driver(s) chosen in the previous question. For instance, was there any available incentives for the development of such programs? Can you describe it?

- 40% of the food produced in the US is wasted.
- 1 in 6 Americans is food insecure.
- Decrease GHG emissions methane produced in landfills.
- Authority has reduced landfill hauling fees.
- Increase SAN's overall MSW diversion rate.
- Incentives for the food and beverage concessions they receive tax deduction for the food donations.
- The Authority educates concessionaires to follow the EPA's Food Recovery Hierarchy and to prioritize their actions to prevent and divert wasted food. Each tier of the Food Recovery Hierarchy focuses on different management strategies for your wasted food.
- Recognition from the EPA in 2017 was awarded to SAN in the innovation category.
- Recognition from the San Diego Food System Alliance in 2016 SAN was recognize with an EMIES Unwasted Food Award.

Step 6: Could you please describe your labeling/colour coding to waste separation? Is this based on national regulation? Do you think you could benefit from international harmonization of labeling/colour codes for waste separation?

The Authority provides the reusable blue color totes, shown below and are labeled FOOD DONATIONS, SDCRAA, USO these are exclusive for Bradford to pick up during their scheduled deliveries and taken to the USO.

Step 7: Did you engage with internal and external stakeholders? If so, please identify which stakeholders you engaged with.

Stakeholders included the airport concessionaires, Flagship Airport Services (the airport's sole janitorial service provider), Bradford Airport Logistics (the airport's receiving and distribution service provider operating a fleet of refrigerated vehicles), Republic Services (the airport's sole waste hauler), USO, and the City of San Diego.

Step 8: Which department is in charge of waste management in your organization?

The Authority's Planning & Environmental Affairs Department and Terminals & Tenants Department oversee waste management contract and monitor the status of related activities.

Decision-Making Process: Management support has been key and collaboration with all the stakeholders.

Estimated Cost and Financial mechanisms available:

During 2017, the Authority saved \$18,170. Landfill fees are \$46 per ton; 368 tons of food scrap was delivered from the landfill saving \$16,928 and \$1,242 for diverting 27 tons of edible food donations.

Step 9: Please insert Text and Images of your project/case study below here:



Waste Management Signage



Environmental Affairs Department Will Provide Laminated Signage

Results (Environmental Benefit/Cost Benefit): During 2017, the Authority saved \$18,170. Landfill fees are \$46 per ton; 368 tons of food scrap was delivered from the landfill saving \$16,928 and \$1,242 for diverting 27 tons of edible food donations.

Lessons Learned:

The Authority continues to improve the processes and communication with all the stakeholders involved are key. The Authority started a Green Concessions program in 2017, and concessions meet with Environmental staff to find out what type of sustainability practices they currently have in place and what they can improve on. During this time staff can recommend participation in food donations program. The Authority is constantly updating the program guidelines, developing compliance guidelines, and employee training.

On-going education through monthly presentations we present on waste reduction to the concessionaires and, provide resources on the Good Samaritan Act to provide ease of donations of edible food with expired dates. We learned that there's still uncertainty on items that can be donated and the liability that the business could potentially face. The Federal Bill Emerson Good Samaritan Food Donation Act protects the donor and the recipient agency against liability. In addition, each state has passed Good Samaritan Laws that provide liability protection to good faith donors.

ECO AIRPORT TOOLKIT

San Francisco International Airport: Achieving Zero Waste by 2021: Maximizing Materials Management at SFO

Waste Management at the Airport site

A request for case studies

Description of Request

ICAO's Committee on Aviation Environmental Protection (CAEP) is currently developing an *ECO Airport Toolkit*, with the objective to provide supplementary information on selected topics included in the recently updated ICAO Doc 9184 *Airport Planning Manual, Part 2, Land Use and Environmental Management*. The "e-publications" are intended for use by airport operators, States and regional and local authorities that are planning or engaged in airport infrastructure projects, particularly in regions in which the aviation sector is developing strongly.

This request is for airport operators to use the below template to provide examples of eco-friendly waste management at the airport site. We are particularly interest in good waste management practices including creative approaches of reducing waste consumption and engaging different stakeholders. The selected studies are going to be included as annexes to the ICAO e-publication Waste Management at the airport site.

Step 1: Please provide your contact details in case further information is needed.

	Respondent
Name	Jennifer Acton
Organization/Company	San Francisco International Airport (SFO)
Job Title	Environmental Operations Manager
Email Address	Jennifer.acton@flysfo.com
Telephone	650-821-8380
Airport (<i>Name and 3 Letter Code</i>)	San Francisco International Airport (SFO)

--	--

Step 2: Please provide the following basic information of your Project/Case Study:

Project/Case Study Title: Achieving Zero Waste by 2021: Maximizing Materials Management at the San Francisco International Airport (SFO)

Timeframe (e.g., start and end month/year if applicable): Ongoing; Zero Waste goals outlined in SFO's 2016-2021 Strategic Plan, adopted and initiated in June 2016.

Description: To get to Zero, the Airport has co-designed and will soon release its first Zero Waste Plan, which contains the suite of measures required to achieve 90% diversion by 2021. In the years that follow, the Airport will work towards becoming a Closed-Loop Circular Campus. This will require the Airport's dynamic group of materials managers, located across our organization, to track new metrics, test new technologies, try new behavior-focused campaigns, and team with new stakeholders to transform our current landfill-focused system. In this way, the Airport's First Zero Waste Plan strives not just to engage, but also to enable SFO to bring positive change to some of the largest challenges of our current time – climate change, human health risks, ecosystem destruction, and beyond.

Purpose: The City of San Francisco and the San Francisco Airport Commission have a long history of and continued commitment toward environmental leadership, natural resource stewardship and climate action. Reflecting this commitment, the San Francisco International Airport (SFO or the Airport) has established the bold, Strategic Plan goal of becoming the world's first zero waste Airport by 2021. In setting this target, our Airport asks the question of "how low can we go?" within our 14 million square foot campus materials system. The first Airport Zero Waste Plan presents SFO's pathway to respond to this question and achieve our "zero" goal from a baseline of 12,200 short tons of materials generated on our campus last fiscal year.

Step 3: Please identify which waste processing is/are used at your airport:

- Recycling
- Waste Recovery (e.g Waste to Energy)
- Incineration
- Landfill
- Other Compost

Step 4: Please identify and prioritize the driver(s) for the waste management project. Number 1-6, where 1 is a high priority and 6 is a low priority.

- (3) Economic
- (1) Environmental

(4) Political

(5) Social

(2) Regulatory

() Other _____

Step 5: Please give more details on the driver(s) chosen in the previous question. For instance, was there any available incentives for the development of such programs? Can you describe it?

As described in our program purpose, SFO is first and foremost committed to environmental leadership, natural resource stewardship, and climate action. In 2016, this encouraged our Airport to establish a bold Strategic Plan of “Achieve Zero”, which includes our campus wide goal of reaching Zero Waste by 2021.

But all good goals are grounded in meeting compliance obligations first. The State of California and the City and County of San Francisco have established landfill diversion requirements through legislation. At the state level, the California Integrated Waste Management Act of 1989 mandated that each city/county/regional agency must develop a waste management plan that would produce a 50% diversion rate of all solid waste from landfill. The subsequent passage of AB 341 in 2011 set the ambitious policy goal for California that not less than 75 percent of solid waste generated be source reduced, recycled, or composted by the year 2020. At the local level, as a department of the City and County of San Francisco, SFO must comply with the Environment Code, which mandates composting and recycling by all people in San Francisco (businesses and residents alike) and requires that all Food Service Ware across the city be either recyclable or compostable. In 2003, the City also adopted a goal of Zero Waste by 2020. These mandates launched SFO's early-stage materials management efforts and provided Airport staff the opportunity to develop and implement innovative source reduction, onsite reuse, and offsite recycling services, among other programs.

The Airport's waste collection contract lists handling costs in terms of dollars per ton for each material stream. Though cost savings from more effective materials management is not our main driver, SFO receives a collection fee discount from the waste hauler for recyclable materials, specifically metals and cardboard.

Step 6: Could you please describe your labeling/colour coding to waste separation? Is this based on national regulation?

Like most Airports, SFO has done its due diligence to determine the most intuitive signage for its key end users – passengers. We continue to update this based upon the often changing materiality of the concession ecosystem. Labeling and color-coding are consistent with sorting rules determined by our waste hauler. The color-coding also matches those colors used in the City and County of San Francisco. Resources are attached that illustrate this simplified system, but for ease, the colors are coded as follows: green=compost, blue=recycling, black=landfill. Recently, SFO initiated a comprehensive project to upgrade, standardize, and improve the terminal public-facing materials bins. To inform this project, a study of passenger behavior was first conducted based upon several redesign templates of bin signage, including incorporation of new iconography relating to items most often purchased by passengers at the airport. When previewing this with passenger focus groups, the airport team identified the following keys

to sorting success: straightforward phrasing, clear and simple icons, standardized color coordination, and consistently accessible placement of trios throughout the terminals.

SFO is actively working to deploy this new signage across newly designed trios as all new capital projects come online. Deploying the full-scale implementation of these new bins is cost-constrained, so to keep the Airport on track to meeting its zero target, SFO's Facilities Operations worked to develop an interim solution. All existing bins are now being retrofit with new lids and labels that introduce the new Airport-wide standard for materials sorting and signage. This current roll-out enables SFO's passengers to improve source separation of materials into compostable, recycling, and landfilled categories at present time rather than waiting until each capital project is delivered. Current "refreshed" bins will be reused and rotated across the campus to non-terminal facilities, including parking garages.

Another key element of designing and delivering a successful program at SFO is expanding this messaging throughout all facilities and points of collection and delivery, not just passenger-facing terminals. Specifically, central solid waste collection areas have been "rebranded" as Materials Recovery Areas (MRAs). In these areas, compactors and roll-off bins feature the same new messaging with the combination of iconography, color, and wording that is used on the public-facing bins to provide consistency of messaging throughout the materials recovery stream. This, along with numerous training events, has helped coach the Airport's materials managers, whether concession or custodial staff, to properly retain source-separated materials when placing them in the proper compactor or bin.

Do you think you could benefit from international harmonization of labeling/color codes for waste separation?

SFO would benefit from international harmonization of labeling/color codes. We are a major international gateway to the world for 55.8 Million people, and serve nearly x# of international passengers each year. We work to build amenities and services that enable an exceptional passenger experience, and consider our materials management a key aspect of this work. As we evolve our outreach and messaging to passengers, it would be beneficial to leverage internationally recognized waste disposal signage and color-coding introduced and reinforced at Airports worldwide, especially with the presence of many languages. The more we partner, the higher the likelihood we'll be able to encourage the right behaviors that allow us to reach our airport, local, and global environmental goals of minimizing materials sent to landfill.

Step 7: Did you engage with internal and external stakeholders (to do what)? If so, please identify which stakeholders you engaged with.

SFO uses an Integrated Project Delivery Model for all of its Capital Projects, and this serves as the template for the Airport to partner on all projects whether large or small. When setting its Strategic Plan goals, the Airport convened a forum of environmental experts to establish a next generation suite of performance-based "Big Hairy Audacious Goals" (BHAGS) that push us towards achieving bigger, bolder outcomes for our campus. These were institutionalized in our Strategic Plan, including an Objective under Goal Zero, of reaching Zero Waste by 2021.

Tasked with reaching ZERO the Airport worked to roadmap its path to achieving zero net energy, zero waste, and carbon neutrality via its first crowd-sourced Sustainability Plan drafted by nearly 100 Airport staff across every Division. One goal of this Plan was for the Airport to create a compendium Zero Waste

Plan that was created by key Airport implementers including Sustainability & Environmental Policy, Engineering, Facilities Operations, and Custodial Staff. This Plan identified the key measures the Airport needs to deliver in order to meet its, and the City's more global, zero waste goals.

In seeking to implement the Plan, SFO's custodial services, provided by Facilities Section personnel, are encouraged to make recommendations for improvements based on their hands-on experience, direct knowledge and challenges. SFO hosted focus group sessions with the custodial team, along with members of the Safety, Health and Wellness Unit, to provide a space for two-way communication regarding materials management and to identify opportunities for improving this system and worker experience. SFO has also coordinated program improvements with the waste hauler, based upon the feedback from the custodial team, as well as tenants. This practice has resulted in a strengthened sense of ownership from the custodial staff, who are acknowledged as the "zero waste heroes" in the SFO's Zero Waste Plan.

SFO also actively engages with its tenants on materials management issues: the Airport requires source separation of materials by concessionaires, airlines, and other tenants. SFO's Rules and Regulations state that tenants "shall maximize recycling and composting by providing separate, marked containers for recyclables, compostables, and landfilled waste". To motivate and support tenant participation in the Airport's materials management efforts, SFO launched a Green Business Program. The program is based on the State of California's Green Business Program, administered locally by the City and County of San Francisco and San Mateo County. The Green Business Program provides tenants with the necessary tools, training, and resources to increase back-of-house compostable and recyclable materials source separation, among other operational sustainability measures. To aide tenants even more, SFO has also developed maps of the Materials Recovery Areas; a "What Goes Where" guide, which describes items acceptable for recycling, composting, and landfilling; and Material Recovery Guides containing contact information and resources for what, where, and how to recycle and reuse items and properly handle and dispose of others (e.g. universal, electronic, hazardous waste) (images included). As an added incentive, the businesses that achieve Green Business certification are able to receive a trash disposal permit fee discount of up to \$2,500 per year.

Step 8: Which department is in charge of waste management in your organization?

SFO takes an interdepartmental approach to achieving strategic plan sustainability-focused goals, including advancing progress toward zero waste. Rather than dictating programs from a singular environmental department, sustainability policies, plans, and programs are owned by unique but unified divisions across SFO, based upon their scope of service delivery (i.e. Planning, Design and Construction, and Facilities Operations). SFO's Sustainability and Environmental Policy Section leads work defined by SFO's Strategic Plan, Sustainability Plan and Climate Action Plan by teaming up with staff from multiple sections to implement these Plans' defined measures, which includes material recovery, recycling, and composting. For example, contracting for materials hauling is managed by Planning, Design, and Construction; and Facilities Operations oversees the SFO's Materials Recovery Areas (MRAs), where all materials are collected by the hauler. This contract includes handling all the materials generated at SFO, including recyclables and compostables.

Step 9: Please insert Text and Images of your project/case study below here:

Decision-Making Process:

SFO has developed an Airport Zero Waste Plan as a roadmap for decision-making associated with projects, policies, and practices that may impact materials management, whether directly or indirectly. This Plan furthers the underlying policies and requirements of the Environment Code and FAA guidance on the topic. It includes all waste materials and their lifecycles; it also prioritizes circular, regenerative, and reuse strategies.

Estimated Cost and Financial mechanisms available:

SFO spends, on average, \$160,000 a month for the hauling, disposal/recycling/composting of solid waste.

Cost constraints: As mentioned above, deploying the full-scale implementation of the new bins in the terminals is constrained by cost, which will be borne by each capital project as it comes online. The estimated cost to deploy the new trios on campus is \$2.35M. The interim solution of “refreshing” bins with new lids and signage was \$60,000. Note that this cost does not include the materials to produce or install signage which was done by the Airport’s in-house Sign Shop.

Financial and Data-Tracking Mechanisms: Materials management activities are currently managed and budgeted by the Facilities department, which is also responsible for custodial staff and maintenance activities. The Sustainability and Environmental Policy team delivers the Green Business Program, and the Planning, Design and Construction department is responsible for the redesign of the sorting bins and management of the materials hauling contract. The material hauling contract lists handling costs in terms of dollars per ton for each material stream. SFO receives a collection fee discount for recyclable materials, specifically metals and cardboard. The Facilities department monitors the status of waste management activities, including the procurement of equipment.

The Sustainability and Environmental Policy Section measures and tracks the program's metrics including materials procured, diverted, landfilled, and associated greenhouse gas emissions. The waste collection contractor provides monthly data reports detailing the quantities of various waste materials generated at SFO; at one time, these reports were provided quarterly. To better understand the facility's waste streams and identify opportunities for improvement, SFO has completed waste characterization studies, passenger studies, and facility audits; an Airport Zero Waste Plan, recycling and waste management status reports, sustainability reports, and a Sustainability Strategy have also been developed for the facility.

Images: (Included as attachments)

Green Business Flyer – attach as separated document

Materials Recovery Tenant Guide

MRA pictures (1.signage and 2.compactor coloring)

Waste Station signage (1. New bins 2. Old bins relabeled with new lids)

Graphic Messaging image

“What goes Where?”

Material Recovery Area Map

Results (Environmental Benefit/Cost Benefit):

Ongoing: Results and Data Collection are continuous

- Standardized messaging throughout SFO terminals.
- SFO Waste Disposal Metrics:
 - FY 2016: SFO recycled and composted approximately 57% of all solid waste handled by the Airport - 6,960 tons were sent out for composting and recycling and 5,407 tons of material were sent to landfill. This diversion yielded an estimated GHG emission mitigation of 7,328 tons of CO₂, whereas 1,855 CO₂ tons were produced through landfilling - a net of 5,473 tons of CO₂ of GHG emission mitigation (2016 Climate Action Plan).
 - FY 2017: SFO recycled or composted about 53% of all solid waste – this resulted in a net GHG emission mitigation of 6,448 tons of CO₂ (increase from FY 2016), due to a significant increase in the amount of material recycled.
- Green Business Program Metrics:
 - 26 Green Businesses have been certified to date, while engaging over 100 businesses.
 - 60 metric tons of recyclable/compostable materials have been diverted as a result of the program.
 - 120 employees have been trained on appropriate waste practices.
- Cost Savings - Direct cost savings to the Airport are generated through reduced waste hauling fees for recycled materials which in the case of metals and glass generate a positive income for the Airport. Indirect cost savings are, also, realized by downstream users of the recycled and composted materials. In 2017, SFO source-separated about 2,800 tons of recyclables that included Old Corrugated Cardboards, Aluminums, Glass, Plastics, Mixed Paper and Wood. Sending these materials to landfill would have cost SFO \$428,400.

Lessons Learned (and Challenges Faced):

- Importance of engaging broad stakeholder network to get results – collaborative approach with Airport Commission (Environmental Operations, Sustainability & Environmental Policy, Custodial Teams), Tenants (Airlines & Concessions), Waste Hauler
 - Continuity of training and engagement with employees (noting frequent turnover of staff and/or pivoting responsibilities) – requires ongoing, consistent, and timelined outreach and education programs.
 - Custodial collaboration, feedback, training and recommendations is a fundamental element for diversion success.
 - Know what’s needed – identifying where there are gaps in the materials management chain (i.e. collection bins, front end loaders, compactors) and programing resources to ensure all stakeholders are empowered with simple solutions to support diversion (i.e. toters/carts, quarterly trainings).
 - Materials management can be an effective gateway to engaging on broader sustainability topics with tenants. Finding an easy starting point (composting/recycling) to discussing other leasehold improvements (i.e. energy and water upgrades, employee commute) is invaluable.
- The power of EP3 (Environmental Preferable Procurement Policies)
 - Developing and deploying a template policy so folks know where to start.
 - Providing support tools to ensure sure “just in time” delivery and no excess purchases.
 - Adapting to and dealing with an ever-evolving waste stream – and shaping and simplifying procurement to ensure end of life issues are navigable (addressing waste at the source).

- Making sure all stakeholders are informed of procurement requirements, embed within their own purchasing processes, and are empowered to make a change, by being given lists of alternatives.
- Simplifying messaging and graphics to fully engage and make aware an incredibly diverse and international passenger base: being sophisticated in identifying barriers to participating in materials streams, doing “proof of concept” pilots and focus groups before fully implementing a campaign, working with haulers to understand the sphere of materials handled and “what goes where” at end of life based upon their capabilities and your contract.
- \$ Talks – the Airport offers tenants participating in the Green Business Program a discount on their trash permit fee, under the premise that all certified businesses are required to have recycling and composting practices and equipment within their leased space, and so save the Airport money in hauling fees (calculated savings through Airport cost recovery model).

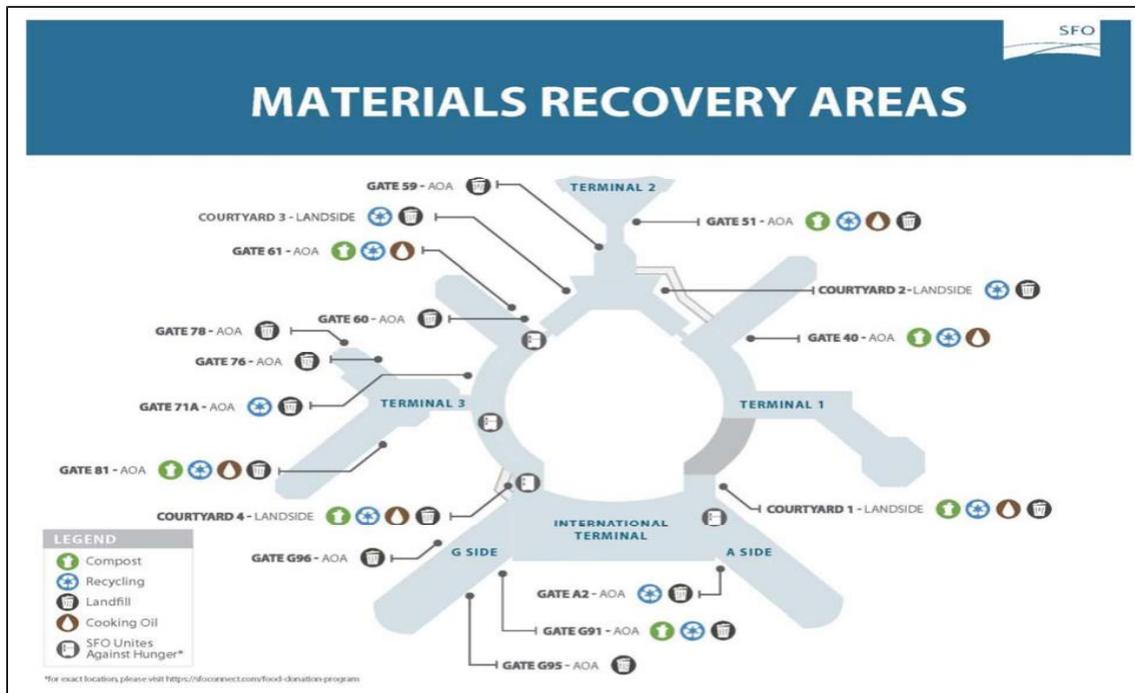


Figure 4Map of Materials Recovery Areas throughout the SFO terminal area

MATERIALS RECOVERY AREAS WHAT GOES WHERE?

Compost




Food Scraps


Tableware, Packaging


Soiled Paper & Cardboard
Coffee Grounds & Filters


Other Paper

Recycle




Bottles, Cans


Plastics


Plastic Lids

Landfill




Juice Boxes, Condiments,
Tetra Paks


Soiled Foil,
Foil Wrappers


Plastic Bags, Diapers,
Plastic Wrap


Rubber & Latex
Gloves

Figure 2: “What Goes Where” guide

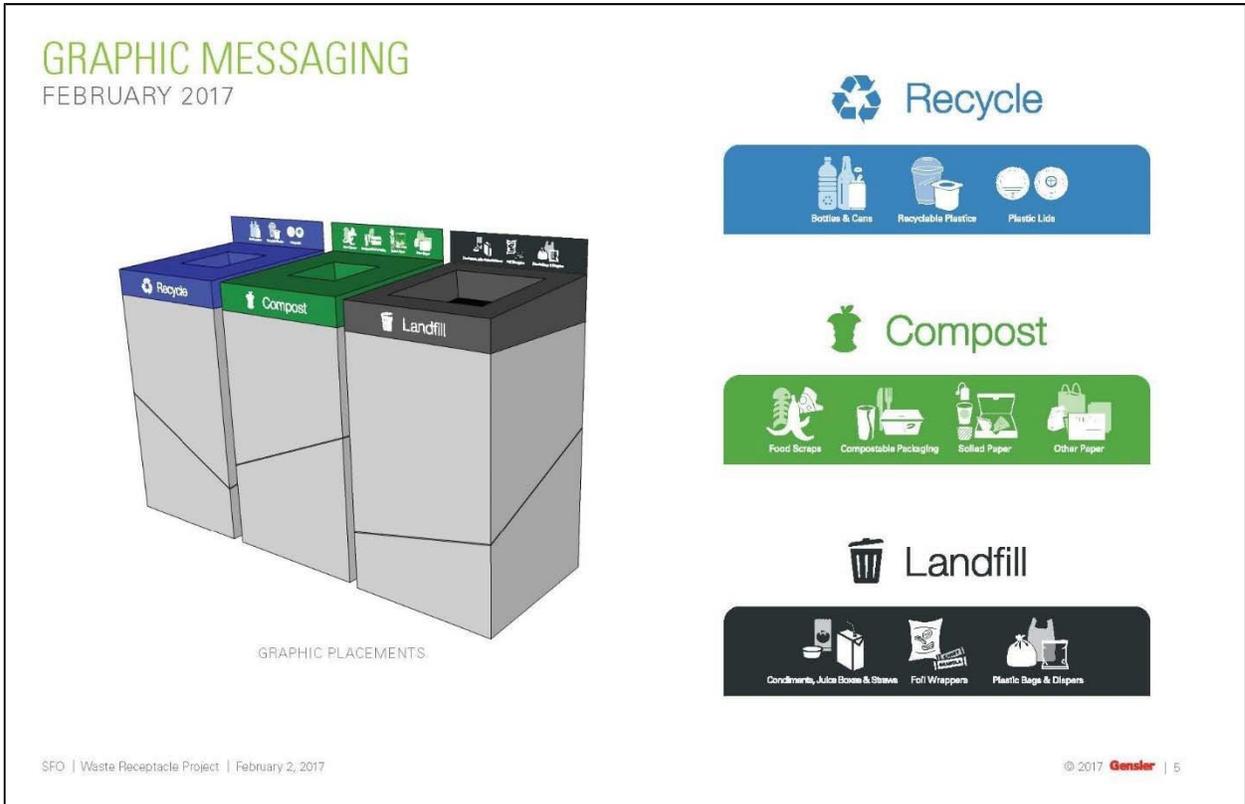


Figure 4: Standard signage integrated on new Materials Sorting Bins



Figure 5: Standard signage integrated on existing “refreshed” bins

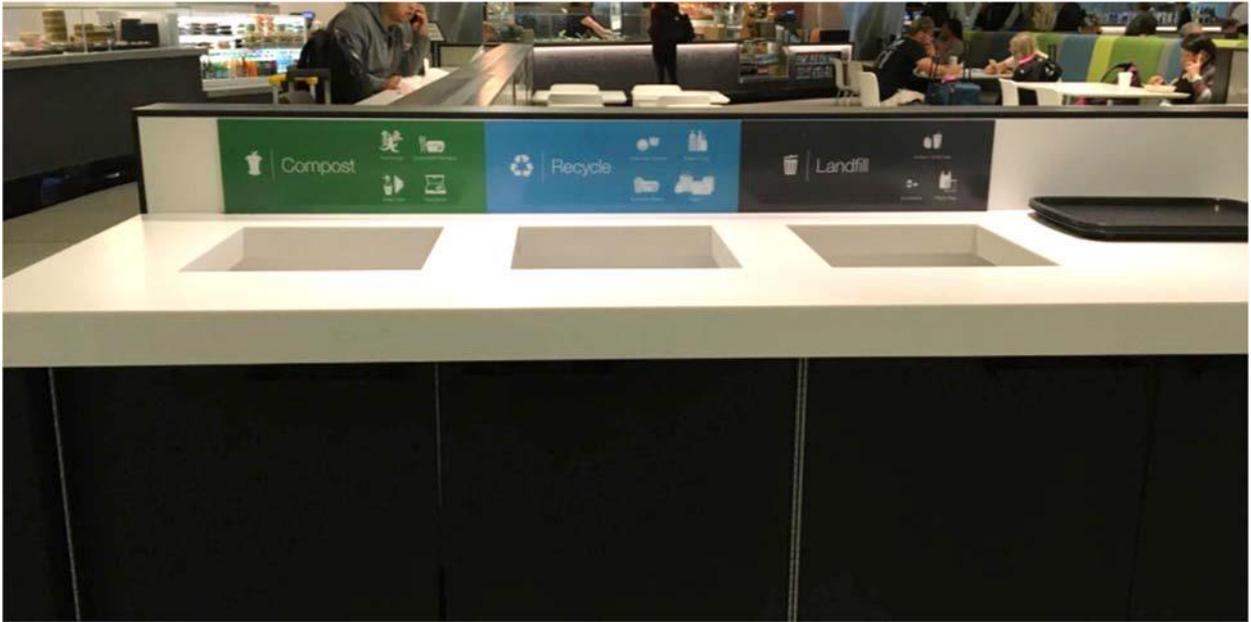


Figure 6: Standard signage on built-in Materials Sorting Bin Stations within food pier areas



Figure 7: Standard signage in Materials Recovery Area



Figure 8: Standard signage on Materials Recovery Area compactors

MATERIALS RECOVERY

TENANT GUIDE

Have an item and not sure how to reuse, reclaim, recycle or dispose of it? Read on, visit www.recyclestuff.org or www.earth911.com or email: greenbusiness@flysfo.com

Material Type	Airport Service Provider	Contact Information	Additional Resource
Compost, Recycling, Landfill Materials		Jennifer Acton x1-8380 Airport Duty Managers x1-5222 Revenue Development x1-4500	Materials Recovery Areas Map https://sfoconnect.com/sfo-green-business-program
Edible Food – DONATE IT!	Unite Against Hunger	SFOConcessions@flysfo.com	greenbusiness@flysfo.com
Electronic Waste Recycling		For a list of service providers visit the following resource websites:	www.recyclestuff.org www.earth911.com
Universal Waste Recycling <i>(batteries, pesticides, mercury-containing equipment)</i>	San Mateo County Health	www.smchealth.org/environ/toxic	www.recyclestuff.org www.earth911.com www.recyclewhere.org
Hazardous Waste <i>(motor oil, chemical waste, paint)</i>	San Mateo County Health	www.smchealth.org/environ/toxic For a list of SMC haulers visit link below: www.smchealth.org/sites/main/files/file-attachments/hazwaste_hauler_list.pdf	Very Small Quantity Generator (VSQG) Program: (650) 655-6217 www.smchealth.org/vsqq
Liquid Waste <i>(fats, oils, grease)</i>	Darling International	Revenue Development x1-4500 Airport Duty Managers x1-5222	
Surplus Items <i>(furniture, electronics, office supplies)</i>		*Tenants are responsible for disposing of their own milk crates and pallets	www.recyclestuff.org www.recyclewhere.org
Construction & Demolition Materials		Requirements for project Construction & Demolition Waste Please contact: Jennifer.Acton@flysfo.com	
Integrated Pest Management		Deana Noonan x1-5533	https://sfenvironment.org/download/2017-reduced-risk-pesticide-list

Interested in applying these resource recovery actions @ home? Visit to learn where household items go: www.recyclestuff.org (scroll to bottom of the page) or www.recyclewhere.org. For household toxic waste collection (batteries, light bulbs, paint, motor oil, etc.) visit: www.flowstobay.org/toxic

DISCLAIMER - This partial list serves as a reference only. The mention of a company does not constitute an endorsement by the Airport. For more resources visit websites listed above or www.smchealth.org/environ/toxic.

ECO AIRPORT TOOLKIT

Munich Airport: Process for the disposal of solid waste (in terminals) included analysis of mixed recyclables

Waste Management at the Airport site

A request for case studies

Description of Request

ICAO's Committee on Aviation Environmental Protection (CAEP) is currently developing an *ECO Airport Toolkit*, with the objective to provide supplementary information on selected topics included in the recently updated ICAO Doc 9184 *Airport Planning Manual, Part 2, Land Use and Environmental Management*. The "e-publications" are intended for use by airport operators, States and regional and local authorities that are planning or engaged in airport infrastructure projects, particularly in regions in which the aviation sector is developing strongly.

This request is for airport operators to use the below template to provide examples of eco-friendly waste management at the airport site. We are particularly interest in good waste management practices including creative approaches of reducing waste consumption and engaging different stakeholders. The selected studies are going to be included as annexes to the ICAO e-publication Waste Management at the airport site.

Step 1: Please provide your contact details in case further information is needed.

	Respondent
Name	Martin Heiss
Organization/Company	Flughafen München GmbH
Job Title	Environmental Protection Officer
Email Address	Martin.heiss@munich-airport.de
Telephone	+49 89 975-51 710
Airport (<i>Name and 3 Letter Code</i>)	Munich Airport, MUC

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Step 2: Please provide the following basic information of your Project/Case Study:

Project/Case Study Title: Process for the disposal of solid waste (in terminals) included analysis of mixed recyclables

Timeframe (e.g., start and end month/year if applicable): (Analysis: June July 2015)

Description:

Procedure

The objective of the procedure is to ensure that any solid waste from the **Terminals** is being disposed correctly and furthermore to provide the most economic waste disposal offer to the clients.

The following points listed below are the most important ones - for example:

- Meet all rules and regulations by (local) authorities
- Ensure that all waste is separated according to pre-defined categories
- Have a documented disposal-chain, so that it is ensured that the waste is handled correctly (recycled)
- Guarantee that disposal is billed according to the customers points
- Requirements for this process: IT-systems/equipment; PC operated weigher unit in the central waste rooms

All waste is being collected in different containers (waste press) at central collection points. It is important that the waste has already been separated before it is brought there. A Container takes the waste of more than one client. In the next step the waste has to be weighted and the weight and type of waste has to be documented. This is crucial in order to make sure that disposal is billed according to the causative principle.

Waste volume 2016:

- In 2016, altogether 11.321 Mg (=tons) waste (treated only by the FMG waste management department) were disposed of.
- Proportion of collection area Terminal 1: 1.493 Mg (=tons)
- Proportion of collection area Terminal 2(*): 2.421 Mg (=tons)

(*) Opening of satellite building in April 2016

Types of waste (Terminals)

Solid Waste means waste like paper, cardboard, xPackaging foils, bulky waste, residual waste, plastic and organic waste. It does not include liquid waste and dangerous substances.

Step 3: Please identify which waste processing is/are used at your airport:

(see diagram)

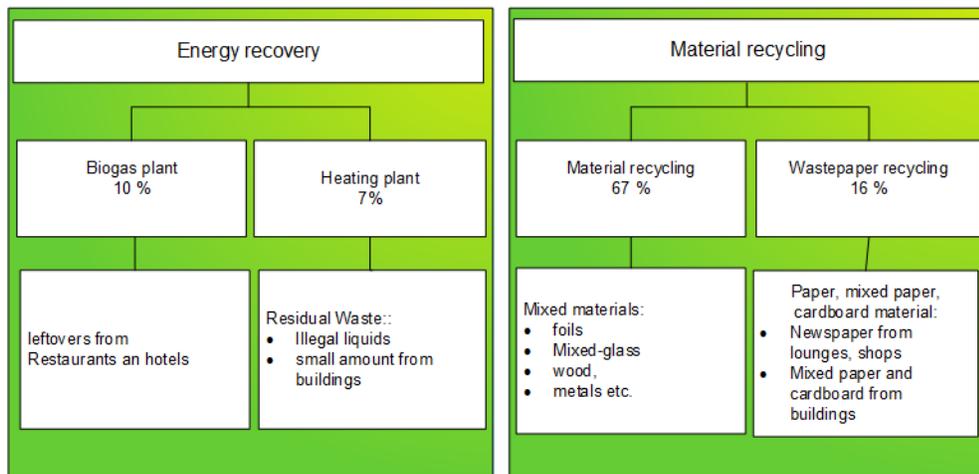
Recycling

Waste Recovery (e.g Waste to Energy)

Incineration

Landfill

Other _____



Step 4: Please identify and prioritize the driver(s) for the waste management project. Number 1-6, where 1 is a high priority and 6 is a low priority.

(3) Economic

(2) Environmental

(5) Political

(4) Social

(1) Regulatory

Other _____

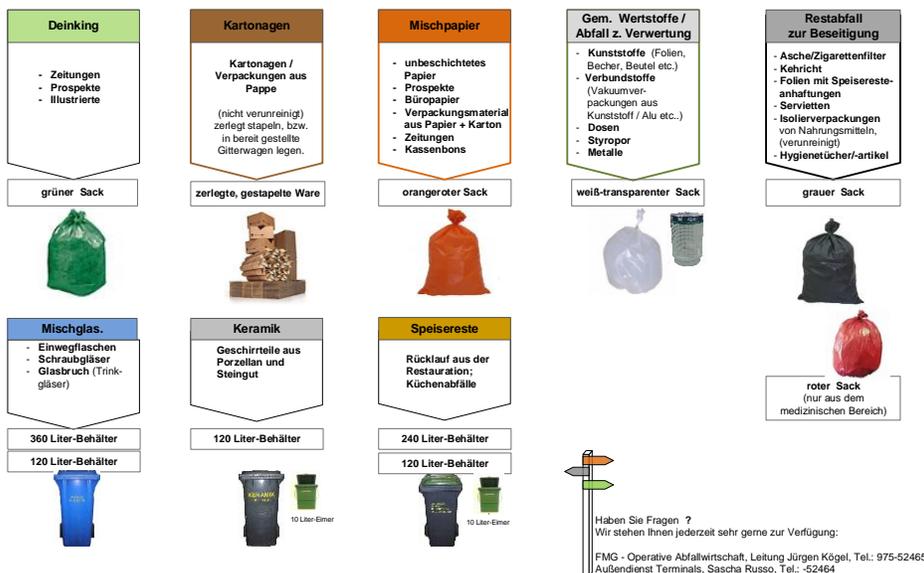
Step 5: Please give more details on the driver(s) chosen in the previous question. For instance, was there any available incentives for the development of such programs? Can you describe it?

The accounting process is to be based on different waste fractions, depending on the collected volume and using different prices. In this way, the customer can influence his own waste disposal costs in future by avoiding ad sorting waste.

Step 6: Could you please describe your labeling/colour coding to waste separation? Is this based on national regulation? Do you think you could benefit from international harmonization of labeling/colour codes for waste separation?

Wegweiser „Abfallentsorgung am Flughafen München“

Sortierschema **TERMINAL 1**



Abfallwirtschaft / Stand September 2016

Step 7: Did you engage with internal and external stakeholders? If so, please identify which stakeholders you engaged with.

A certified company for the disposal of solid waste and a Disposal Company who empties Waste containers when requested. As raw materials are becoming increasingly rare and more valuable, a reliable and sustainable Disposal Company should be chosen as contracting partner.

Step 8: Which department is in charge of waste management in your organization?

Waste Management Group at Munich Airport

The task of the Waste Management Group at Munich Airport is to assure that waste produced on the airport premises is properly disposed of or recycled according to the statutory regulations.

The waste management serves as a connecting link between the Clients and the Disposal Company. Amongst other things the aim of this cooperation is to offer an economic waste disposal to the Clients, but also to ensure that everything runs out environment-friendly and for the best to the airport's reputation.

Step 9: Please insert Text and Images of your project/case study below here:

Decision-Making Process:

According to the hierarchy of the German Closed Substance Cycle and Waste Management Act

Estimated Cost and Financial mechanisms available:

Compared to disposal, the recovery of waste gains cost reduction. This becomes even clearer when having a closer look at the fact that the disposal costs differ greatly depending on the type of waste.

For example, proceeds of 80 €/Mg are generated by newspapers. Disposal costs of 219 €/Mg have to be paid for residual waste.

Images:



Waste collection room – Terminal 1

Results (Environmental Benefit/Cost Benefit):

By performing an analysis of recyclable material, referring to mixed recyclables, the potential for recycling can be increased and in consequence costs for disposal can be reduced.

In addition to that: Short distances to the disposal companies means low energy consumption for transport and help to reduce CO₂-emission.

Lessons Learned:

With this waste management process it is possible on increasing the recycling ratio of waste and on the other hand to reduce costs for waste disposal. It is therefore mandatory to sort the waste in the best way possible. In addition to sorting waste it is necessary to bill the customer/producer of waste for his personal waste amount and sorting quality.

Waste, which is sorted in high quality, can reach high prices in negotiation on the recycling market. Economic and ecological targets are not necessarily in contradiction: with the waste management process at Munich Airport it is possible to save money AND resources.

ECO AIRPORT TOOLKIT

Schiphol Airport: Light as a Service

Waste Management at the Airport site

A request for case studies

Description of Request

ICAO's Committee on Aviation Environmental Protection (CAEP) is currently developing an *ECO Airport Toolkit*, with the objective to provide supplementary information on selected topics included in the recently updated ICAO Doc 9184 *Airport Planning Manual, Part 2, Land Use and Environmental Management*. The "e-publications" are intended for use by airport operators, States and regional and local authorities that are planning or engaged in airport infrastructure projects, particularly in regions in which the aviation sector is developing strongly.

This request is for airport operators to use the below template to provide examples of eco-friendly waste management at the airport site. We are particularly interest in good waste management practices including creative approaches of reducing waste consumption and engaging different stakeholders. The selected studies are going to be included as annexes to the ICAO e-publication Waste Management at the airport site.

Step 1: Please provide your contact details in case further information is needed.

	Respondent
Name	Denise Pronk
Organization/Company	Royal Schiphol Group
Job Title	Programme Manager Corporate Responsibility
Email Address	Pronk_d@schiphol.nl
Telephone	0031 6 538 27742
Airport (<i>Name and 3 Letter Code</i>)	Schiphol Airport / AMS

Step 2: Please provide the following basic information of your Project/Case Study:

Project/Case Study Title: Light as a service

Timeframe (e.g., start and end month/year if applicable):

Description:

Philips (supplier), Engie (maintenance partner) and Schiphol joined forces on this exciting programme. All were inspired by a shared vision and ambition. Philips and Engie adapted fittings in consultation with Schiphol, making it possible to replace separate components with ease, which extends the service life of the lighting. When lamps have reached the end of their service life, Philips will collect and recycle them.

Purpose:

Schiphol believes in a circular economy and wants to play an active role in making it happen. Schiphol entered into a partnership with Engie and Philips to replace the lighting fixtures in its terminal. Schiphol will pay for light performance while Philips remains the owner of the fittings and installations. Philips and Engie are responsible for the system's performance and service life. By applying various circular economy principles, Schiphol, Engie and Philips are setting a new standard for the worldwide transition to a circular economy.

Step 3: Please identify which waste processing is/are used at your airport:

- Recycling
- Waste Recovery (e.g Waste to Energy)
- Incineration
- Landfill
- Other: Circular Economy; maintenance _____

Step 4: Please identify and prioritize the driver(s) for the waste management project. Number 1-6, where 1 is a high priority and 6 is a low priority.

- (1) Economic
- (2) Environmental
- Political
- Social
- Regulatory

() Other _____

Step 5: Please give more details on the driver(s) chosen in the previous question. For instance, was there any available incentives for the development of such programs? Can you describe it?

Our traditional business models are based on the linear model of take-make-waste. To create a circular future, the models had to be adapted according to the principles of the circular economy. As a result, the contracts and partnerships with our suppliers changed, too. A challenge that cost time and perseverance to get everyone on the same page.

In this case, Engie performs the maintenance whilst Philips is responsible for taking back the lamps. The 'light as a service' concept entails that Schiphol pays for the light produced, while Philips and Cofely remain the owners of the lamps and fittings (pay per use).

Step 6: Could you please describe your labeling/colour coding to waste separation? Is this based on national regulation? Do you think you could benefit from international harmonization of labeling/colour codes for waste separation?

Not applicable

Step 7: Did you engage with internal and external stakeholders? If so, please identify which stakeholders you engaged with.

Philips – supplier; Engie – maincontractor maintenance terminal. Together, Philips and Engie ensure real-time lighting management for optimum effect and sustainability, with Cofely's on-site, round-the-clock support. At the same time, they monitor intensity and reliability by applying a KPI model.

Step 8: Which department is in charge of waste management in your organization?

Asset management

Step 9: Please insert Text and Images of your project/case study below here:

Decision-Making Process: Investment decision, proved by Management Board.

Estimated Cost and Financial mechanisms available:

Images:



Results (Environmental Benefit/Cost Benefit):

- Unique lighting plan for significantly improved sustainability, feel and flow 50% reduction in energy consumption thanks to energy-efficient LED lighting.
- 75% longer service life of the fittings.
- Decline in maintenance costs – components of fittings can be replaced separately. Adapted fitting rates 19% higher on circular economic score card and service life is extended by 75%.
- Maximum reduction of raw material consumption – complete fittings can be reused.
- New business model for putting circular economic principles into practice. KPI model is included in a contract for performance monitoring.

Lessons Learned:

- Dare to try something different.
- Opt for a large-scale project to have an immediate impact and truly learn something.
- Ensure you have a very clear, shared vision and goal that consistently provides direction and a point of reference.
- Ensure your business partners have a shared vision about the end state. The way how to get there is difficult, so a clear joint ambition is crucial.
- Build mutual trust and dare to go beyond the traditional supplier-purchaser relationship.
- Put together a team of people who are interested in innovation.
- Invest a great deal of time and energy in stakeholder management.
- Excellent management support is key to success.
- Strike the right balance between the sustainable and business cases.
- Persistence pays.

ECO AIRPORT TOOLKIT

Vancouver International Airport: Waste Management at YVR

Waste Management at the Airport site

A request for case studies

Description of Request

ICAO's Committee on Aviation Environmental Protection (CAEP) is currently developing an *ECO Airport Toolkit*, with the objective to provide supplementary information on selected topics included in the recently updated ICAO Doc 9184 *Airport Planning Manual, Part 2, Land Use and Environmental Management*. The "e-publications" are intended for use by airport operators, States and regional and local authorities that are planning or engaged in airport infrastructure projects, particularly in regions in which the aviation sector is developing strongly.

This request is for airport operators to use the below template to provide examples of eco-friendly waste management at the airport site. We are particularly interest in good waste management practices including creative approaches of reducing waste consumption and engaging different stakeholders. The selected studies are going to be included as annexes to the ICAO e-publication Waste Management at the airport site.

Step 1: Please provide your contact details in case further information is needed.

	Respondent
Name	Shaye Folk-Blagbrough
Organization/Company	Vancouver Airport Authority
Job Title	Environmental Specialist
Email Address	Shaye_Folk-Blagbrough@yvr.ca
Telephone	604-276-6710
Airport (<i>Name and 3 Letter Code</i>)	Vancouver International Airport (YVR)

Step 2: Please provide the following basic information of your Project/Case Study:

Project/Case Study Title: Waste Management at YVR

Timeframe (e.g., start and end month/year if applicable): January 1, 2015 – ongoing.

Description:

Vancouver Airport Authority (Airport Authority) is a community-based, not-for-profit organization, which manages Vancouver International Airport (YVR) under the provisions of a long-term ground lease with the Government of Canada. YVR is located in the City of Richmond within the region of Metro Vancouver, in British Columbia (BC) Canada. YVR is the second busiest airport in Canada and in 2017 hosted over 24.1 million visitors. YVR's operations includes two terminals, specifically the main terminal comprising a domestic terminal building (DTB), and the international terminal building (ITB), a small satellite terminal, as well as several off-site administrative offices, plus multiple businesses and retailers.

The Airport Authority's mandate is to manage and operate YVR in the best interests of the region, expand the contribution that YVR makes to local economic development, and ensure that the airport can respond to the demands of the community and aviation industry in a safe, efficient, and environmentally responsible manner. As part of the Airport Authority's 2015-2019 Environmental Management Plan, one of the four key strategic priorities is to divert 50 per cent of total waste generated at YVR (from the DTB and ITB) from going to landfill by 2020. From 1992 to 2014, YVR's waste diversion rate ranged from a low of 9 per cent to 36 per cent with difficulty in moving past the latter value.

- YVR has a multi-stream waste and recycling system enabling staff and visitors to recycle a variety of materials. However, the corporate goal of 50 per cent waste diversion rate includes the airport's four primary recycling streams collected from the DTB and ITB. These include:
 - Mixed containers (glass, metal, plastic);
 - Paper and cardboard (including coffee cups);
 - Pallets and clean wood; and
 - Organics (food scraps, paper towel, and food soiled paper)

Additional areas that are not reflected in the 50 per cent diversion rate, but are still readily recycled include:

- Construction waste (YVR achieves a 97-98% recycling rate);
- Extended Producer Responsibility (EPR) program materials including lightbulbs, batteries, and electronics;
- Kitchen grease;
- Latex gloves;
- Wooden chopsticks;
- Landscape materials; and
- Food donations.

Purpose:

Step 3: Please identify which waste processing is/are used at your airport:

Recycling

Reuse – reuse of chopsticks collected at food courts. See explanation below.

Waste Recovery

Incineration – YVR does not have any waste sent for incineration. For airlines all non-domestic flights and the operations associated with them (and pre-customs areas within the Terminal) are currently required to incinerate all waste as per the Canadian Food Inspection Agency International Waste Directive. Airline waste at YVR is not under the purview of the Airport Authority and is the responsibility of the airlines to manage.

Landfill

Other On Site Composter (treating organic waste)

Step 4: Please identify and prioritize the driver(s) for the waste management project. Number 1-6, where 1 is a high priority and 6 is a low priority.

(4) Economic

(1) Environmental

(1) Political

(1) Social

(1) Regulatory

Other _____

Step 5: Please give more details on the driver(s) chosen in the previous question. For instance, were there any available incentives for the development of such programs? Can you describe it?

There were no financial incentives for YVR to further develop its waste management program. However, there were a number of key drivers that included:

- Regulatory environment
- Corporate goals
- Business case
- Corporate value: innovation

REGULATORY ENVIRONMENT

Metro Vancouver, the region's solid waste regulator, introduced a disposal ban regulation on compostable organic material to help achieve the provincial waste diversion target. The regulations stipulated that waste transfer stations would not accept waste loads going to landfill with organic material greater than 25 per cent and the originator of these loads would be subject to a financial penalty. In response and to comply with this organic waste ban, institutions and businesses operating in the region have been required to source-separate organic material (i.e., food scraps, food soiled paper and clean wood) from the garbage stream.

CORPORATE GOALS

In 2014, the Airport Authority approved a five-year Environmental Management Plan (2015-2019). The Environmental Management Plan was aligned with the Airport Authority's new Strategic Plan's objective to be a leader in sustainability. With corporate leadership stating change, a number of new environmental targets were publically set to reduce the airport's environmental footprint, including the adoption of a goal to cut waste going to landfill to 50 per cent within the plan's time frame.

BUSINESS CASE

To address stated waste (environmental) goals, the Airport Authority expanded its business case to ensure that sustainability pillars — environment, social, financial and governance — were embedded into all airport projects. The shift in business at the corporate level has trickled down to all airport departments ensuring that waste targets are no longer the sole responsibility of the Environment Department. The Environment Department remains the office of primary responsibility for the airport's waste target. However, all Airport Authority departments are accountable with the consideration of waste as a priority for all airport projects.

CORPORATE VALUE: INNOVATION

Prior to the adoption of the 2015–2019 Environmental Management Plan, waste diversion was not top-of-mind for most of the Airport Authority's departments. This level of ownership had been sufficient for the waste goals of the past, but to improve performance and meet the new corporate goal of 50 per cent waste diversion by 2020, the Airport Authority embedded innovation as one of four core values. Interdisciplinary teams have worked on identifying barriers to change and brainstormed potential and innovative new instruments to drive improved waste diversion.

Step 6: Could you please describe your labeling/colour coding to waste separation? Is this based on national regulation? Do you think you could benefit from international harmonization of labeling/colour codes for waste separation?

The Airport Authority is required to adhere to the Government of Canada's requirement to provide all signage in both English and French, Canada's two official languages and with a large international passenger complement, the use of pictograms rather than words provides greater clarity and simplicity in the development of waste bin signage. YVR follows the regional government, Metro Vancouver's, recommended colour scheme for waste separation (see below). Though most businesses and cities are using a similar colour scheme, there are no national regulations or standards on colours and labels that should be used in regards to waste diversion.

Waste Stream	Colour
Garbage (Landfill)	Black
Compost	Green
Containers	Blue
Paper	Yellow

In addition to the colour scheme, the Airport Authority has included symbols of accepted products at the front of each bin so that it can be easily identified. All bins located throughout YVR are placed in a consistent bin order; paper, containers (plastics, metals and glass), compost/organics and landfill.

The standardization of waste reduction communication efforts, such as signage and branding, ensures that the messaging is understood and recognized by passengers. YVR chose the colour scheme as it reflects the regional colour scheme adopted by Metro Vancouver. This is meant to provide consistency for most users of the airports, as the majority of passengers at YVR are domestic.

While the international harmonization of labeling/colour codes for waste separation would have its benefit, it would need to be well-researched to ensure YVR could target all passengers effectively.

Step 7: Did you engage with internal and external stakeholders? If so, please identify which stakeholders you engaged with.

YVR's waste management program's success can be attributed to a strong stakeholder engagement program. To achieve YVR's waste diversion target, required a collaborative effort of internal staff, as well as external stakeholders including third-party waste contractors, airport business partners, food and beverage tenants and housekeeping staff who have a role in how waste is managed at YVR. Improved recycling is behaviour focused and requires education, interaction and ongoing reinforcement.

Step 8: Which department is in charge of waste management in your organization?

The Environment Department is the office of primary responsibility for the waste diversion target at YVR. However, all departments are accountable to the program and must consider waste in projects.

Step 9: Please insert Text and Images of your project/case study below here:

Estimated Cost and Financial mechanisms available: minimal

Communication and engagement programming

- Talkin' Trash Articles

Talkin' Trash is series of electronic articles posted on the Airport Authority's internal web portal to educate and inspire employees on all things waste-related. Topics have ranged from waste sorting and the circular economy to interesting waste facts and how to reduce waste generation at home and in the office.

- Recycling Spot Checks

The Airport Authority conducts regular informal “spot” recycling back-of-house inspections at all food and beverage establishments at the airport. This is an ongoing and routine initiative that ensures the Airport Authority continues to educate and reinforce the airport’s waste diversion goals.

- Green Bins

To assist restaurants in setting up their own organic waste systems within their kitchens, the Airport Authority distributed compost “green bins” and provided educational materials on what was allowed and not allowed in the compost bins. The Airport Authority provides continuous support to restaurants in helping them overcome their organic waste challenges through bin replacements, education and signage to improve organics recycling.



- Waste Wars

To support acceptance among tenants and to reduce cross-contamination of all food and beverage in the waste streams, the Airport Authority developed an educational engagement program, called ‘Waste Wars’. Waste Wars was designed as a friendly and voluntary competition encouraging food and beverage tenants to sort their waste properly and avoid contamination of recyclable materials in garbage and vice versa. The objective of the competition was to engage tenants while improving their waste separation skills. Waste Wars rules are simple: organic waste belongs in the green bin; plastics, paper and metals in the recycle bins; and the remaining waste in the garbage. Every week, during Waste Wars, each food and beverage tenants’ bins are inspected and the tenant is allocated points based on the level of appropriate separation. Along with the inspections, staff is quizzed on their recycling awareness for extra points. At the conclusion, the tenant with the highest point allocation is announced as the winner and is profiled in various media in recognition of their efforts.

WASTE WARS

May the best bin win!

- Presentations on Waste Diversion

The Environment Department discusses waste with stakeholders at any opportunity. The team conducts several waste reduction presentations for both internal and external audiences, including the following:

- YVR Environmental Advisory Committee
- All Concessionaires Meetings
- YVR All-Employee Meeting Presentations

- Waste Reduction Week

Airport Authority observes Waste Reduction Week, an annual event held during the third week of October to raise awareness of waste reduction across Canada. To celebrate this annual event and raise awareness of waste reduction, the Airport Authority has organized a household object and clothing donation drive; held a film screening of “The Clean Bin Project” - a zero-waste documentary; providing daily information articles on how to engage in a reduced waste lifestyle; and hosting a zero-waste lunch contest to name a few.

- Chopstick Recycling

Due to the high number of restaurants using chopsticks at YVR, the Airport Authority partnered with ChopValue Manufacturing, a Vancouver-based engineering and design company that creates innovative material repurposing used chopsticks. Chopsticks once used as cutlery at YVR are given a new life and repurposed into trophies for YVR’s Waste Wars.



Estimated Cost and Financial mechanisms available: n/a

- Composter

The Airport Authority is constantly seeking other new and innovative ways to improve waste management at YVR. The Airport Authority installed its first in-house composter in the International Food Court in the Main Terminal Building. The composter:

- Reduces the amount of organic waste to be collected and removed from International Food Court by up to 80%.
- Reduces the amount of organic waste material needing to be trucked offsite. This reduces truck traffic resulting in fewer GHG from transportation of the material off-site.



The in-house composter in the International Food Court

- Centralized Food Court Sorting Station

To improve the sorting of waste in food courts at YVR, the Airport Authority took the action of sorting out of the passenger's hands. The Airport Authority installed a centralized sorting station at one of the airport's busiest food courts. With this new station, patrons leave their trays on the counter for trained airport staff to sort into the different waste streams. This prevents any confusion and ensures that waste is being diverted into the proper stream while improving customer service. The sorting station has resulted in improved diversion rates and a reduction in garbage.



Centralized food court sorting station

Results (Environmental Benefit/Cost Benefit):

Infrastructure changes – the composter and centralized food court station - have been the largest cost to the overall program; however operational cost savings were identified. The community engagement component of the program costs have been small with staffing being the largest resource and critical to its success. With the combined efforts of the Airport Authority, its business partners and tenants coupled with the various supporting waste reduction programs, engagement initiatives and technologies, YVR achieved a waste diversion rate of 51 per cent in 2016, three years ahead of stated goal.

Lessons Learned:

YVR's waste program has worked on improving culture, introduced programming and installed innovative new designs to advance our waste management goals. Community engagement is the primary focus of the program and is very cost affordable and has been proven to be successful in terms of achieving our waste diversion goal of 50 per cent by 2020, three years earlier than targeted. It is also through engagement that new and positive relationships are being built between the Airport Authority and airport tenants. Educating and supporting tenants are where immediate gains can be observed. Minimal capital costs have been incurred for the waste program at YVR because it is felt that waste is behavioural (and with slight alterations in infrastructure) and supporting desired behaviours is paramount to success. Going forward, the Airport Authority is excited to continue to be innovative and strategic in advancing new waste diversion initiatives, working in collaboration with its partners into the future.

ECO AIRPORT TOOLKIT

Gatwick Airport Limited: Circular Economy Waste Management Strategy

Waste Management at the Airport Site

A request for case studies

Description of Request

ICAO's Committee on Aviation Environmental Protection (CAEP) is currently developing an *ECO Airport Toolkit*, with the objective to provide supplementary information on selected topics included in the recently updated ICAO Doc 9184 *Airport Planning Manual, Part 2, Land Use and Environmental Management*. The "e-publications" are intended for use by airport operators, States and regional and local authorities that are planning or engaged in airport infrastructure projects, particularly in regions in which the aviation sector is developing strongly.

This request is for airport operators to use the below template to provide examples of eco- friendly waste management at the airport site. We are particularly interest in good waste management practices including creative approaches of reducing waste consumption and engaging different stakeholders. The selected studies are going to be included as annexes to the ICAO e-publication Waste Management at the airport site.

Step 1: Please provide your contact details in case further information is needed.

	Respondent
Name	
Organization/Company	Gatwick Airport Limited
Job Title	
Email Address	
Telephone	
Airport (<i>Name and 3 Letter Code</i>)	LGW

Step 2: Please provide the following basic information of your Project/Case Study:

Project/Case Study Title:

Timeframe (e.g., start and end month/year if applicable): May 2016 – March 2018 – Contract start to project completion / close out

Description:

Gatwick encompasses over 120 airport operational and commercial businesses which use and provide - to other businesses or to passengers - a wide range and large volume of materials every day. The Airport is

also undergoing a major development and refurbishment transformation. All of these activities generate leftover materials that can – some easily, others only with systemic innovation – be reduced, reused or recycled. Our Decade of Change goals, set in 2010, are to achieve zero untreated waste to landfill and 70 percent reuse and recycling for operational and commercial waste by 2020. We achieved zero to landfill which has been maintained continuously since May 2015. Progress on the second goal has been more incremental, with reuse and recycling increasing from 40% at the start of the decade to 49% in 2015 and 52% in 2016. This is above average performance in the UK but we wanted to do much better. In 2015 therefore we set out to change the way ‘waste’ is regarded and processed at Gatwick.

Our aim was to redesign and implement a waste management strategy focussing on a “Circular economy” ethos of utilising as many recovered resources as possible within the Airport campus. The project included redeveloping the collection facilities, a new approach to waste logistics and an on-site organic energy from waste system to deal with highly regulated international catering waste

Areas of focus and investment included;

- Gatwick upgrading the waste away areas
- Gatwick investing in a MRF recycling facility
- Gatwick investing in a biomass boiler Purpose:

The project encompassed a “root and branch” review of waste management and handling practices across the Airport, in addition to identifying opportunities to utilise resources more effectively across the campus. The resultant project has delivered an immediate uplift in conventional recycling, whilst allowing valuable resources such as energy and water to be harvested and put to use within the Airport.

A key focus throughout this was waste minimisation (following the waste hierarchy) and having futureproof processes in place to ensure no waste goes directly to landfill and Gatwick Airport maximises the opportunity to recycle and re-use all of its commercial and airline cabin waste.

Step 3: Please identify which waste processing is/are used at your airport:

Recycling

Waste Recovery (e.g Waste to Energy) Incineration

Landfill

Other _____

Step 4: Please identify and prioritize the driver(s) for the waste management project. Number 1-6, where 1 is a high priority and 6 is a low priority.

Economic

Environmental Political

Social

Regulatory

Other _____

Step 5: Please give more details on the driver(s) chosen in the previous question. For instance, were there any available incentives for the development of such programs? Can you describe it?

A key commitment was for the Airport to achieve an overall recycling rate of 70% by 2020. Conventional recycling best practice had already achieved a recycling performance of 42% by 2014 however to achieve 70% the Airport Management realised that a step-change would be needed. In November 2015 Gatwick's Capital Executive Committee (CEC) approved a £4m capital investment over 2 years for a new waste management facility. In May 2016 Gatwick awarded DHL the waste management contract and to implement the changes required following a competitive OJEU tender which had innovation at the heart of its requirement.

The deliverables from the investment would be seen in:

- Providing better areas and equipment to segregate waste at source
- Reducing the vehicle movements and handling of waste
- Further segregation of waste on site at the recycling centre
- Recycling / re-use of CAT 1 & CAT 3 airline cabin waste and food waste

Step 6: Could you please describe your labeling/colour coding to waste separation? Is this based on national regulation? Do you think you could benefit from international harmonization of labeling/colour codes for waste separation?

Mixed recycling facility:

The Facility includes a manual waste sorting conveyor which began operating in September 2016. Together with reclassification of waste streams into 'Dry' and 'Wet', onsite sorting is lifting the Airport's reuse and recycling rate to 60% in 2017 and above 75% by the end of 2018. In addition, by using small balers at our Terminals and large 'mill size' bales to compress waste, there are 200 fewer industrial-size waste bin collections per day at the Airport, reducing lorry vehicle journeys to external waste plants

Bio Mass boiler:

The Facility is the first at any airport in the world to process Category 1 airline waste onsite and convert it to low-carbon energy. Category 1 waste comprises food waste and anything mixed with it from non-EU flights. Its disposal is governed by strict rules that require specialist processing (until now, offsite) to protect against potential spread of disease and infectious material. Around 20% of the Airport's operational and commercial waste is Category 1. To treat this waste, and other wet waste that cannot be recycled, the new Facility incorporates an onsite dryer and biomass boiler. The waste is dehydrated and turned into solid biomass fuel which is used to generate heat for the dryer and for the Facility buildings. Water recovered from the waste-drying stage is also used to clean waste bins, helping to reduce Airport water consumption by 2 million litres per annum. The biomass boiler has been designed to operate to emission standards that are stricter than required by EU regulation. The Facility is set to save £1,000 in energy and waste management costs for every day it operates.

EU and CAT 1 Waste Labelling:

Since summer 2015 Gatwick has been working closely with the airlines cleaning contractors and DEFRA (Animal Health) to implement a working process so Gatwick Airport can identify waste coming from the

EU or if it's Category 1 waste. As mentioned above there are strict regulations around the disposal of CAT 1 waste (or unclassified waste off an aircraft). It's great that CAT 1 waste can now be processed on site but by working through a process to identify EU bags (which aren't considered a risk), Gatwick can process these down the mixed recycling facility line and extract the valuable recyclables from these bags.

Step 7: Did you engage with internal and external stakeholders? If so, please identify which stakeholders you engaged with.

Legislative:

- There was a requirement to address and speak with the local environment agencies, local council and DEFRA early on in the process as there were complex regulatory environmental guidelines covering the operation and there was no single regulatory point of contact

Operations & Airport Campus:

- There were challenges at the airport which we were trying to address and therefore the involvement with other departments (EHS, Terminals, Airfield Op's, Fire etc) were key to making sure all of their requirements were included.
- Gatwick airport has over 30,000 working staff members from various organisations who operate on site and would be using the waste facilities so it's important they were made aware and process changes were communicated.

Step 8: Which department is in charge of waste management in your organization?

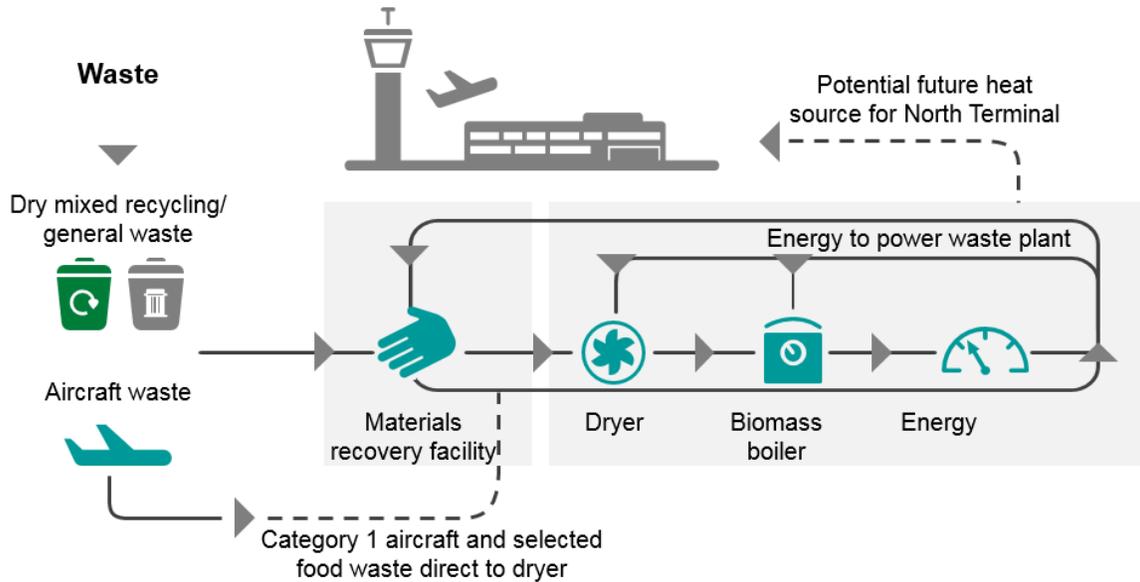
At Gatwick Airport, Waste Management is managed in our Stable Operations department by our Senior Logistics Manager. They oversee the day to day operation and are responsible for maintaining compliance. The EHS department and our Sustainability Manager will have close links into the operation supporting and managing duty of care audits, external audits and driving our decade of change target.

Step 9: Please insert Text and Images of your project/case study below here:

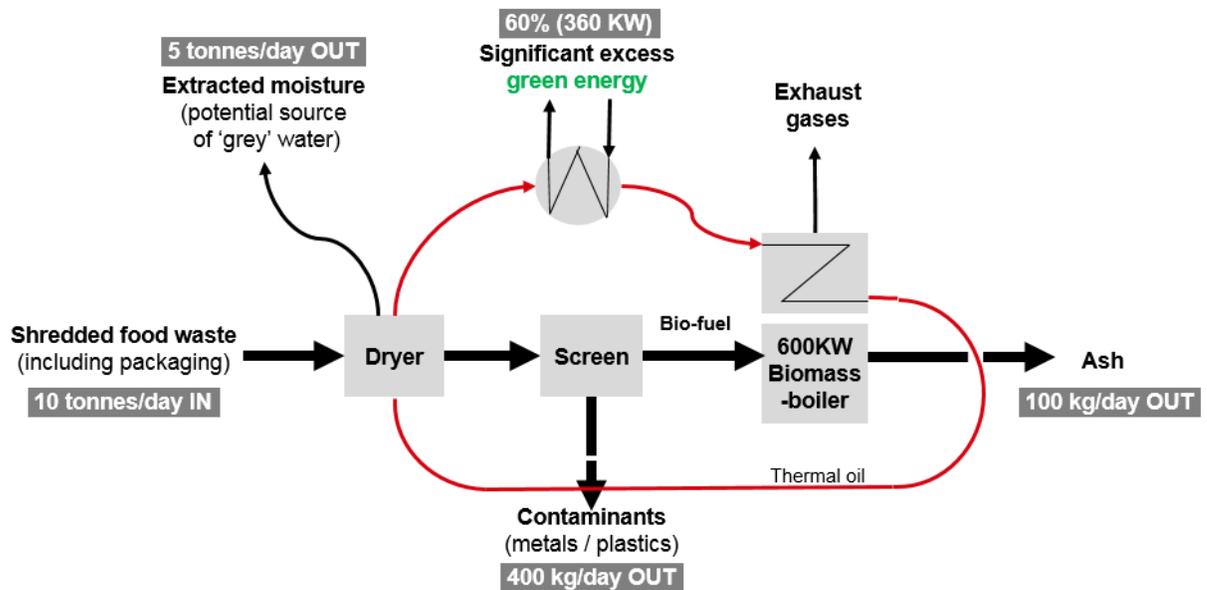
Decision-Making Process:

Estimated Cost and Financial mechanisms available: Images:

Case Study: Gatwick Solution



Inputs and outputs



Results (Environmental Benefit/Cost Benefit):

Impact on recycling performance

- 30% Improvement in recycling following the implementation of the MRF (mixed recovery facility) since 2016
- 428 Fewer waste collections per annum

- 2 million litres of grey water harvested from the Biomass Boiler per annum
- 4.75 Million KWH of reusable heat energy from the Biomass Boiler per annum
- On target to achieve Decade of Change recycling rate early in 2018, two years before deadline (70% recycling and re-use)
- Expected 2020 performance circa 85% recycling
-

Waste Minimisation

- Grey water extracted and discharged for recovery
- Combustion reduces organic fraction to ash
- Only screened contaminants and ash are sent for disposal

Financial

- Estimated £700K+ saving in disposal costs per annum

Lessons Learned
