ACI Asia-Pacific

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GREEN AIRPORTS
RECOGNITION

GREEN AIRPORTS RECOGNITION 2018

Waste Minimization

Disclaimer

This document consists of summary of submissions received by Airports Council International (ACI) Asia-Pacific Green Airports Recognition. All figures, numbers, statement, and/or any other information contained in this document are only indicative, intended solely for reference purposes, and do not necessarily represent those of airports in general.

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July 2018
ACI Asia-Pacific

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Introduction and Acknowledgements

The Green Airports Recognition was established with the support of ACI Asia-Pacific Regional Environment Committee. The Recognition's objective is to promote environmental best practices to minimize aviation's impact on the environment and to recognize the region's airport members who have outstanding accomplishments in their environmental projects.

The theme of this year's recognition is Waste Minimization. Waste Minimization is an important environmental issue for airports. One of the Environmental Survey 2017 findings reflected that "Waste" was among the top three management priorities of Asia-Pacific and Middle East airports, the other two being Energy and Water. The implementation of efficient and cost-effective waste minimization practices presents many challenges to airports. Nevertheless, successful airport waste management implementation has the potential to positively impact airport authorities, customers and surrounding communities.

To help airports address this issue, Airports Council International's (ACI) Policy Handbook provides guiding principles for waste management at airports; "Airports should promote the culture of avoiding solid waste generation and, where possible, extracting value from remaining waste with the ultimate goal of sending zero waste to landfills." The Handbook provides a waste decision hierarchy that shows – in order of decreasing priority – what constitutes the best overall environmental waste management choices: to avoid; to reduce; to reuse; to recycle; and finally, to dispose. The ultimate goal is to eliminate waste going to landfills so that value may be recovered, for example, by recycling valuable materials or converting waste to energy, biofuels or compost.

There is also a new concept approach of waste management – "Circular Economy" as an alternative to the traditional linear economy (make, use, dispose), where waste management is an important component that elevates waste management into a new economic business model. In a circular economy, products are designed for reuse, disassembly, refurbishment, remanufacturing and/or recycling. This results in minimal use of primary materials and waste production.

This year, 19 eligible submissions were received, ranging from Composting, Grass reuse, Waste segregation and recycling, Integrated waste management program, and Waste reduction award scheme. Participating airport members represented 16% of the total passenger traffic in Asia-Pacific and Middle East region, and 14 of whom are accredited under the Airport Carbon Accreditation program, with 4 airports being carbon neutral.

The submissions were reviewed by a panel of judges comprising:

- Mr. Christopher Paling, Senior Lecturer – Climate Change, Centre of Aviation, Transport, and the Environment, Manchester Metropolitan University
- Mr. Christopher Surgenor, Editor/Publisher, GreenAir Online
- Ms. Juliana Scavuzzi, Aviation Environmental Specialist, ACI World
- Dr. Panagiotis Karamanos, Aviation Environmental Consultant
- Mrs. Patti Chau, Regional Director, ACI Asia-Pacific

After collective assessment with eight relevant criteria, recognitions were given by the panel of judges to the following airports:

Airports with 35 million passengers per annum and above:

- Platinum – Hong Kong International Airport
- Gold – Chhatrapati Shivaji International Airport
- Silver – Indira Gandhi International Airport

Airports with 15 to 35 million passengers per annum:

- Platinum – Auckland Airport
- Gold – Abu Dhabi International Airport
- Silver – Osaka International Airport

Airports with less than 15 million passengers per annum:

- Platinum – Adelaide Airport
- Gold – Rajiv Gandhi International Airport
- Silver – Christchurch International Airport

The outstanding work of the above 9 airports plus other airports submissions are summarized in this publication to promote best practice sharing.

It should be emphasized that all the airports in this publication deserve to be recognized because of their commitment to Waste Minimization and willingness to share their stories with the airport community, fully reflecting the objective and spirit of this Recognition.

Section 1: Composting

Adelaide Airport - War on Airport Waste

Adelaide Airport Ltd (AAL) has implemented a waste program, for its Terminal and offices, which has so far achieved 28% diversion from landfill (by weight). The challenge for AAL has been to take the next step towards significant resource recovery. When a waste audit report found food scraps comprised 62% of total waste, AAL launched an aggressive program aimed at becoming (a) a fully-compostable food and beverage packaging site and (b) generating energy from organic waste.

In 2017, AAL:

- facilitated a back-of-house organics waste scheme with all Terminal food and beverage (F&B) tenants collecting coffee grounds / food waste in supplied bins for offsite composting
- facilitated the trial of compostable takeaway packaging with one Terminal F&B outlet
- collaborated with all F&B tenants and multiple stakeholders in running a successful two-week trial of compostable coffee cups, which were collected for offsite composting
- ran a tenant recycling education campaign
- established an organic waste service in all AAL offices
- transitioned AAL to fully compostable crockery, cutlery and cups
- distributed free reusable coffee cups (KeepCups) to AAL staff and Terminal tenants
- ran an extensive staff education campaign involving Executive management
- completed a waste-to-energy feasibility study

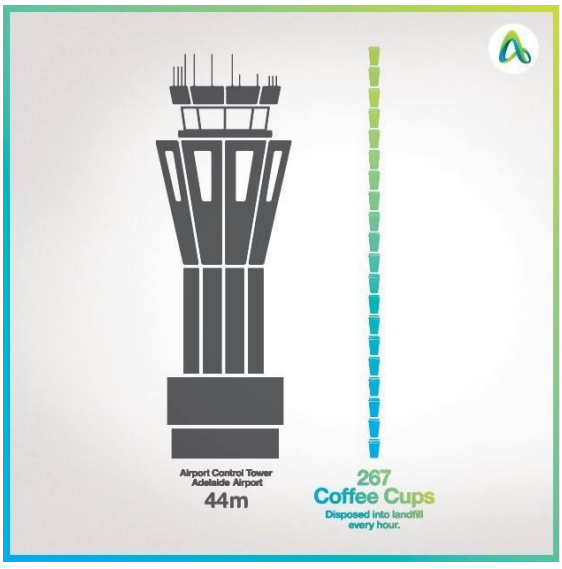
AAL's organic waste program has to date achieved an additional 3.5% diversion (by weight). Based on preceding waste audit results, the compostable coffee trial is estimated to have increased diversion by a further 10% (by weight) during that period.

There is currently no Australian airport that has implemented a compostable coffee cup campaign. Proving the concept technologically, practically and commercially through the trial forms the basis for broad-scale adoption. The waste-to-energy study, undertaken in parallel with the organic waste scheme, has shown the potential for either onsite or offsite generation in the future.

Project Graphics

Compostable coffee cup trial in Terminal 1

AAL staff 'Reducercise' organics waste poster



Stakeholder education graphic relating to coffee cup waste in Terminal 1

Stakeholder education graphic relating to coffee ground waste from Terminal 1

Chhatrapati Shivaji International Airport - Waste Minimization by Composting-Organic Waste Treatment(OWC)

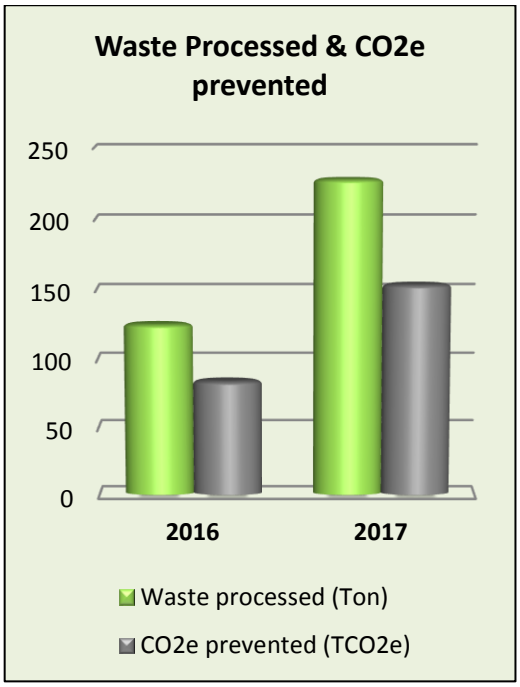
Mumbai International Airport Limited (MIAL) being a responsible corporate citizen has undertaken various measures towards safeguarding the environment and has put strenuous efforts to enhance our operational excellence while confirming to highest standards of environment management. Waste management is identified as a key material issue as per MIAL's materiality & Sustainability Matrix. Our waste management system is based on well recognized 3-R principle and comprises of five stages – Identification, Storage, Segregation, Recycling and Disposal. Emphasis is being given on the Waste Minimization programs at Airport. All the waste generated from airport operations is being collected, segregated at source into hazardous and non-hazardous category, stored and disposed as per the regulatory requirements. Techniques such as Waste minimization, segregation at source, improved operational efficiency, recycling and reuse are practiced at MIAL proactively.

Installation of Organic Waste Converter (OWC) is a unique and innovative initiative taken by MIAL to convert the food waste into compost and add value to the environment and society as a whole. MIAL commissioned the OWC of 1 MT/day capacity in Jan 2016 and has successfully completed ~2 years of operations. As on date, we have converted 353 MT of organic waste (food waste) to compost and avoided disposal of waste in already constrained landfills of Mumbai. The compost produced from OWC is used for landscaping activity in the airport premises. It has also helped MIAL to create awareness among its stakeholders regarding reducing, reusing and recycling waste through regular distribution to employees, passengers and other stakeholders.

Installation & operation of OWC has helped MIAL to reduce its annual GHG emissions to the tune of ~238 T CO2e, avoid land filling of 353 MT food waste, generate ~276 MT compost for landscaping and horticulture as well as generate social value by creating employment and awareness amongst stakeholders.

Project Website Link http://www.csia.in/pressrelease/SR_2016.pdf *Page 60

Project Graphics



OWC -Waste processed & CO2e prevented


hindustantimes

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Waste makes airport plants bloom

Ever wondered what keeps hedgerows and plants at the Mumbai airport's new T2 in the green of their health? An in- house waste disposal plant, facing the Kurla-end of the secondary runway, generates compost to cater to the Chhatrapati Shivaji International Airport's (CSIA) green cover — a move which will encourage other organisations to adopt similar eco-friendly measures.

Updated: Jun 20, 2016 00:43 IST

Soubhik Mitra
Hindustan Times

MIAL OWC coverage in National News Paper

Roof top Solar plant installation(5Kwp) at OWC

Compost packet for distribution to stakeholders

Rajiv Gandhi International Airport - Innovation and Technology in Waste Minimisation process

Since commissioning of Rajiv Gandhi International Airport (RGIA) in the year 2008, sustainable growth and environmental protection has been one of the primary objectives of GMR Hyderabad International Airport Ltd. (GHIAL) which built and operates RGIA. GHIAL considers waste minimization / reuse and efficiency as an integral part of airport operation and is committed to conduct business in an environmental friendly manner. GHIAL's environmental policy includes waste minimization as one of its core themes holistically.

Chemical fertilizers and pesticides, though known for good yields, have been also known for concerns like degradation such as land pollution, infertility of soil, contamination of water bodies and further health disorders in humans and other animals.

Taking serious view of the above environmental concern, RGIA has developed a comprehensive plan to focus on organic farming by exclusive use of compost, which can be produced in-house from food waste generated at the airport. RGIA is one of the greenest airports in terms of beautiful landscapes with different varieties of flora which exclusively uses compost by converting food waste generated at the airport. With this objective, a composting plant was established by GHIAL within RGIA premises in the year 2013.

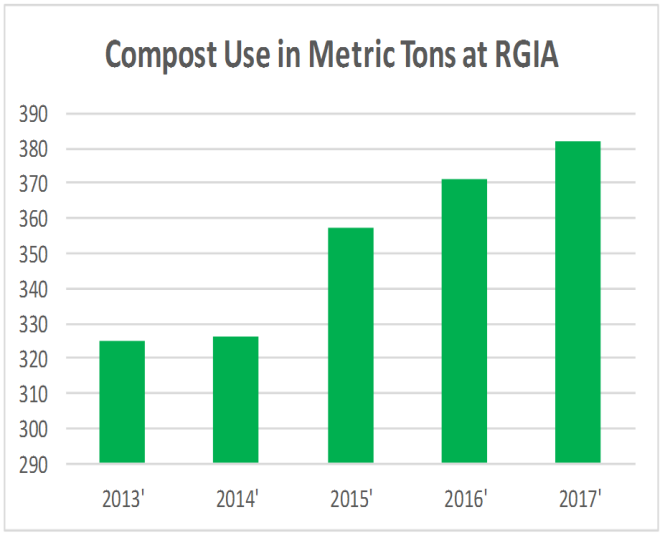
At the time establishing, RGIA's composting plant was the first of its kind 'food waste processing facility' among all the Indian Airports. Scaled to a capacity of processing 2 tons of food waste/day, it meets the major demand of the airport's landscape requirement. With this, GHIAL has achieved significant cost saving by avoiding chemical fertilizer which amounts to ~ INR 0.14 million per annum.

GHIAL's noble endeavor also signifies support and contribution towards United Nations Sustainable Development Goal-2 **"End hunger, achieve food security and improved nutrition and promote sustainable agriculture."**

Project Graphics

Stage-1: Collection/Segregation/loading in compost machine

Stage-2: Processing/collection and application of final product compost



Year on Year increase in Compost usage at RGIA

Waste minimization awareness by staff/family & children/Public at RGIA

Section 2: Grass Reuse

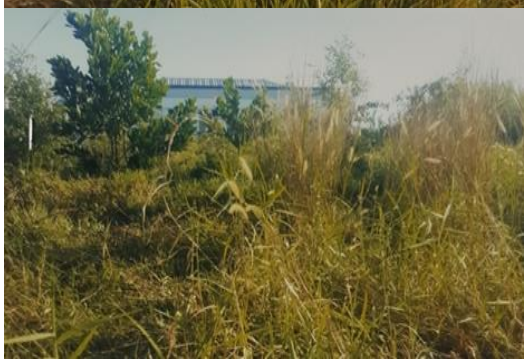
Melaka Airport - Waste Minimisation through Recycling of Green Waste

The Carbon Management Plan introduced by ACI and adapted by Malaysia Airports Holdings Berhad in recent years have provided domestic airport to generate idea and creativity in waste management and toward the minimisation of waste to landfill. Green waste initiative has been started in 2014, after various initiative to clean the boundary area of Melaka Airport. With great concern of environmental and sustainability of the area surround the airport, the waste minimisation and carbon emission reduction on waste and its transportation are considered. Airport Melaka has set good example to other domestic airport operators to get rid of unwanted vegetation of landside with population of selected animals.

To ensure the continuity of the project and green waste management, Melaka Airport is in constant communication with the local farmer without compromising the safety of the airside, any potential animal intrusion and any damage to the perimeter fence. The units such Operations, Aviation Security, Engineering and Fire Rescue personnel are taking turn to monitor the project implementation and highly supervised by the Airport Manager.

This report provides the insight of domestic airport with low passenger movement on the environmental related activities, as part of the cost management for the operations. The cost avoidance of RM0.03 mil per year on partial grass cutting contract will give significant impact towards environmental 5-year-plan. In total, green waste contributed to 2484 tonnes from 2014 to 2017 which translated into 3478 tCO2.

Project Graphics



90 acres of landside area before clean-up (boundary area)

Boundary of clearance work and electric fence installation

It's a regular site on the corner of the airport where the animals graze behind a fence

Animals do the job better than mowing equipment because the terrain can get a little rough. And, it’s better for the environment.

Osaka International Airport - Reuse of grass cuts for livestock feeding

At Osaka International Airport, grass cutting takes place three times a year. The annual grass clippings amount to 950 tons. Before 2010, the clipping was burned for a cost of 32 million yen per year and 1490 tons of CO2 emission.

In order to reduce this cost and CO2 emission, the team started in 2010 a study on how to reduce or reuse the amount of disposed grass clippings.

The most effective solution to this issue was to use it for livestock feeding, and this approach has been employed up to today. In the process of applying it to our daily operations, the biggest challenge faced was to find livestock farmers able to use it. The team worked with neighboring livestock farmers to identify the suitability of the silage as livestock's feeds and improve its quality. As a result, the team successfully found several farmers willing to accept it.

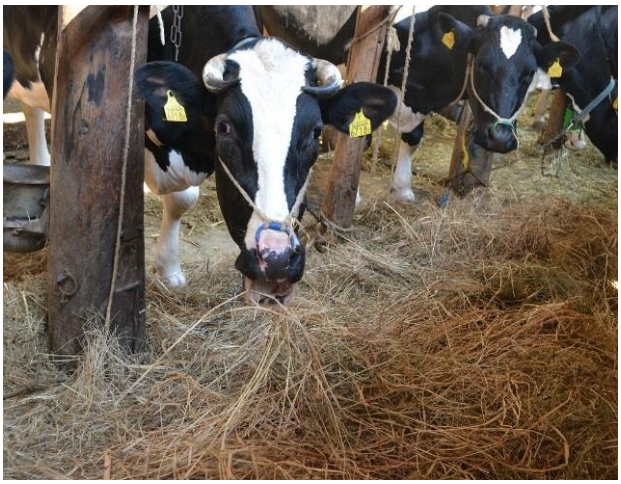
In May 2017 the team built a storage facility for grass clippings. This allows for long-term storage of round hay bales which are protected from meteorological conditions. Hence, the neighboring farmers get more interested. The team is currently providing the feed to nine neighboring farmers at no cost. The amount of grass clippings disposed is reduced by 510 tons, nearly 50% of the total. As a result, cost saving is 14 million yen and CO2 emission saving is 800 tons.

Project Graphics

Mowing

Silage

Round hay bales



Cows eating the produced feed

Section 3: Waste Segregation and Recycling

Auckland Airport - Transitional Waste Facility

In 2015, Auckland Airport partnered with Air New Zealand, ground handlers and specialist waste company OCS to look at ways to reduce waste to landfill. At the time, border quarantine requirements meant that all cabin waste had to be steam- sterilised and disposed of to landfill.

The partners reviewed the waste streams and volumes and approached the New Zealand biosecurity authority, the Ministry for Primary Industries, to discuss a new approach to cabin waste. The approach was to set up a dedicated Transitional Waste Facility airside to identify non-risk items that could be separated for reuse and recycling, without compromising biosecurity.

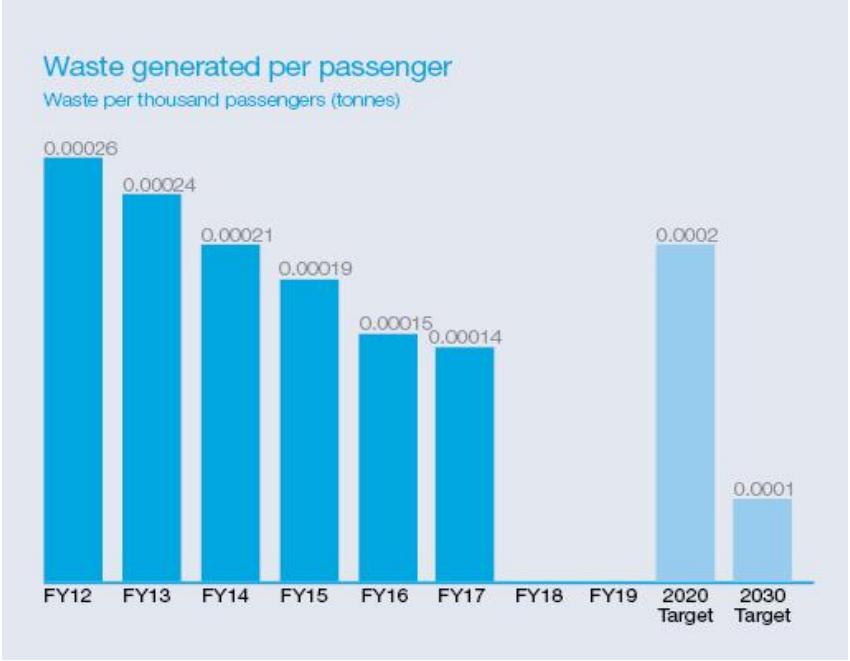
Following agreement from all partners, the facility was set up over six months and local people were trained in the specific biosecurity requirements.

The facility has been highly successful and is the first such facility in the Asia Pacific region. In the first three months of operation the average recycling rate was 695kg each day, which is an overall 57% reduction in waste to landfill.

The new process also improves biosecurity through making risk items easier to sterilise, has reduced the costs associated with managing waste, and has provided jobs for seven local people.

Project Graphics

Newly trained local workers sort waste in the upgraded facility



Reduction in waste per passenger

Brisbane Airport - Aerosol Donation Station

A need for an 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 has 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, and to potentially donate good quality aerosols to disadvantaged and vulnerable people instead.

The project identified an opportunity to allow further segregation than the usual 'general waste' and 'comingled' recycling. New processes for waste segregation and aerosol donation had to be developed. Once these were arranged, designs for the waste station were developed and the station installed in September 2017.

Several organizations were involved in the project including BAC staff, SQT (BNE Ambassadors), SecureClean (BAC Cleaning Contractor), GIVIT (Local charity).

The aerosol donations were planned as a trial as it is the first of its kind in Australia and process refinement would be required. The trial commenced in October 2017.

In the 3 months the trial has been running, a total of 150 aerosol containers have been surrendered and donated to local charities. In addition to the aerosols donated, a significant increase in plastic water bottle segregation into the comingled recycling bins was achieved – specifically of 300kg of comingled recycling between October 2017 and December 2017.

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 replicated across all Australian international airports.

Project Graphics

Image of final installed waste station

Surrendered Items after 30 Days of implementation

Christchurch International Airport - Project Coffee Cup

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 the 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

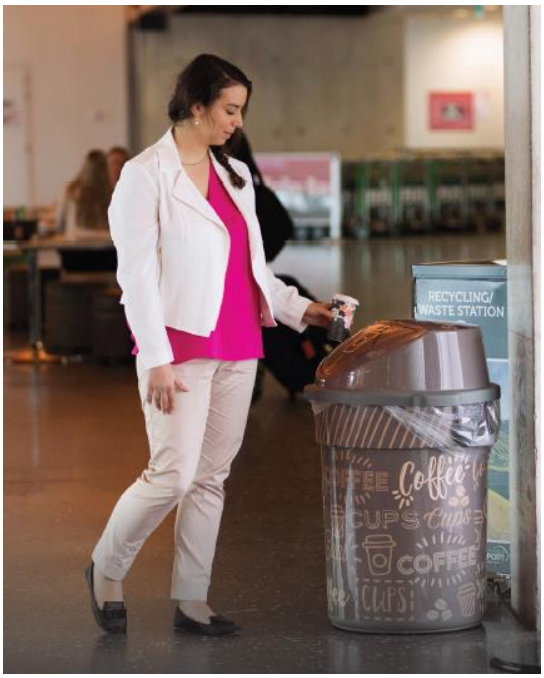
   Staff were given a bespoke Christchurch Airport coffee cup with messaging explaining they were reducing their personal waste footprint by 3.6kgs/yr

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%.

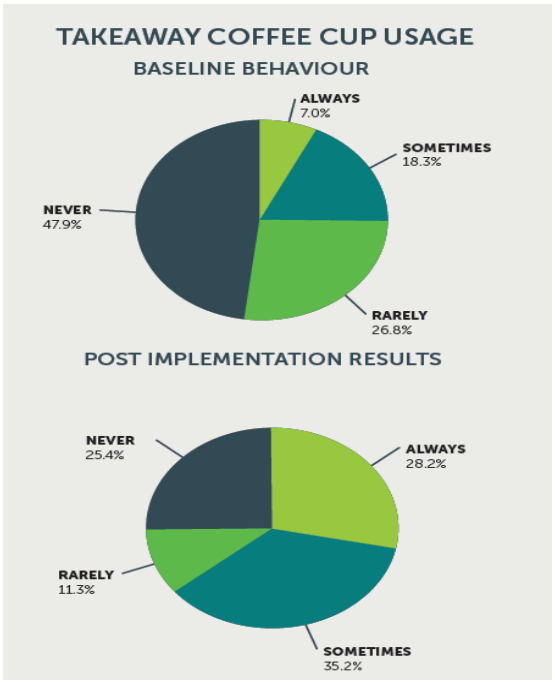
Project Website Link http://www.christchurchairport.co.nz/media/877828/cial_sustainability_report_fy17_fa_lr_v2.pdf

Project Graphics

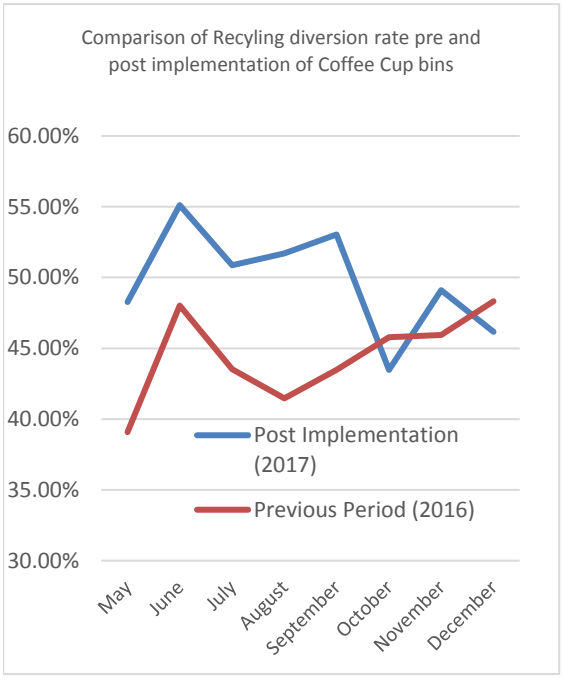


Making it easy to put a used coffee cup in the correct bin

A constant reminder of the sustainability message for all airport company staff



Changing behavior one coffee cup at a time



Terminal recycling diversion rates (%)
Note: 2017 Oct and Dec fluctuations due to end of month collection cycles

Haikou Meilan International Airport - Green Airport Construction

海口美兰国际机场
Haikou Meilan International Airport

Green development has become an important trend in today's world, with many countries taking the development of green industry as a key measure in boosting economic restructuring. As a large-scale infrastructure as well as an image window unit in Hainan Province, Haikou Meilan International Airport has been actively responding to the government's call since it was put into operation. It attaches great importance to solid waste disposal and environmental protection and focuses on standardizing the operation of "classified delivery-classified collection-classified transportation-classified Treatment" system, and comprehensively promotes household garbage harmlessness, reduction and recycling, and achieves the simultaneous improvement of environmental, social and economic benefits.

Meilan Airport takes garbage disposal and recycling, economic operation, energy saving and pollution reduction as the principle, and it takes waste division, production, collection, storage, transfer as disposal process.

The CNY150 million Meilan Airport solid waste harmless disposal management and operation system, formulate and improve relevant management policies, establish and improve the corresponding standard system and long-term management supervision and evaluation system, replaces manual operations with new efficient information technology.

The capacity of daily domestic waste of Meilan Airport Solid Waste in 2017 is 26 tons, and the annual handling capacity of international aviation waste is 12 tons. Compared with the previous year's throughput, the daily handling capacity of ordinary life is reduced by 20%. Due to the increase of the flight volume, the corresponding increase of the volume of international aviation refuse wastes and the annual throughput has increased by 4.5 tons compared with that of last year. The root causes of secondary energy use and environmental pollution.

Project Graphics

Garbage classification

Garbage storage

Garbage disinfection

Garbage transfer

Hamad International Airport - Improvement on Plastic Waste Recycling

As part of the Hamad International Airport's (HIA) waste minimization program, a project for improvement on plastic waste recycling was successfully implemented in January 2017. HIA waste management team has made an agreement with a local contractor for generating revenue through its recyclable waste. In coordination with the contractor, HIA developed a plan to improve the collection and transportation of plastic waste by using truck mountable cages. The cages are designed and fabricated taking into account of aesthetics, space constraints, safety risks, operational, commercial and environmental opportunities. It can be easily hooked by a truck and delivered to the recycling facility without manual loading the waste. The strategic locations were identified to allocate the cages for central collection of plastic waste at the solid waste handling facility and both airside and landside of cargo.

The innovation of the truck mountable cage helps HIA in reducing the manpower for loading the waste, on-site storage space, FOD risks, daily trips, fuel consumption and carbon emission. More plastic waste is collected and recycled due to the higher capacity of transportation. The funding of the project is 100% covered by the recycling contractor as it reduces their operational cost and enhance their service performance.

In 2017, a total of 137 tonnes of LDPE plastic waste has been collected and recycled. The commercial benefit of this project is approximate USD25,400 per annual including revenue through recycling, reduction of fuel consumption and manpower.

Project Graphics

The above picture shows the truck mountable cage for plastic recycling with a hook for easy removal by a skip loader truck. Plastic is deposited into the cage and the door is always kept closed to avoid materials from flying out.

When the cage is full, the truck will bring an empty cage for replacement without extra manpower for transferring the waste from the cage to the truck. The capacity of transportation is doubled compared to the previous truck.

Two staff in the process of transferring plastic waste from the previous cage and loading into a truck. The plastic waste can easily be blown away by wind creating FODs.

The capacity of the truck is very limited. Extra manpower was spent to fix the net for covering the waste for each trip. The plastic waste would be blown away by wind creating FODs during transportation.

Suvarnabhumi Airport - Waste Separation and Recycling

The project, at Suvarnabhumi Airport, initiated as AOT concerns about a large amount of wastes generated by its operation. AOT aims to reach zero-waste operation by bringing out benefits from wastes. This also helps reducing energy consumption and impacts from landfill and wastes incineration. The project covers the whole physical boundary of Suvarnabhumi Airport. Wastes are removed from the designated collection sites daily to minimize pests, reduce odor and prevent germs.

The sub-contractor must have waste management system complying with ISO 14001 standard, appropriate equipment, sufficient personnel and experiences managing wastes similar amount to Suvarnabhumi Airport. AOT only selects high-standard incinerator for treatment of general wastes and infectious wastes.

Suvarnabhumi Airport has an average of 55.9 tonnes of wastes per day which can be separated into 99.7% of general wastes, 0.28% of dangerous wastes and 0.02% of infectious wastes. The 30.8% of general wastes are recycled and the rest of 69.2% is sent for disposal. The 93.7% of wastes for disposal are further used as Refuse Derived Fuel (RDF) source for cement production. Organic wastes are used as fish feed.

This high-protein organic wastes enhance fish growth and indirectly improve local economy. Finally, only 6.3% of wastes is left to be sent to landfill. Training on wastes management is given to staff and stakeholders annually. The innovations that AOT has initiated include 1) turning wastes into useful products 2) adjust working procedure to accelerate the process and 3) improve wastes separation method by assigning each personnel to separate only one type of wastes. With this recycling methodology, AOT can save 63% of waste management cost. AOT adopts Polluter Pays Principle to penalize operators that generate large amount of wastes.

Project Graphics

Turning of pallet woods into furniture

Staff training on wastes management

Turning of organic wastes into fertilizer

Wastes separation process

Section 4: Integrated Waste Management Program

Abu Dhabi International Airport - Midfield Terminal Project - MTB

Abu Dhabi Airports Company (ADAC) is committed to the successful development of the Midfield Terminal Building (MTB) through close collaboration with partners and stakeholders. ADAC recognizes the significance of the development both to the local community and industry, but realizes its impact on the environment; therefore, ADAC has committed to align its activities and conduct towards the overall vision of sustainable growth, environmental protection and inspiring goals set for the UAE and more specifically for the Emirate of Abu Dhabi. Accordingly, ADAC developed a stringent set of Sustainability & Environmental specifications and imbedded it in all construction contracts.

These specifications include a requirement for a minimum target of a 75% rate of waste diversion from landfill through the principles of the 4Rs - reduction, reuse, recycling and recovery. While the main aim is to eliminate, reduce, and recycle the waste wherever possible, alternative solutions are explored for the onsite processing and the reuse of C&D debris promoting resource conservation and supporting carbon footprint initiatives while achieving economic viability.

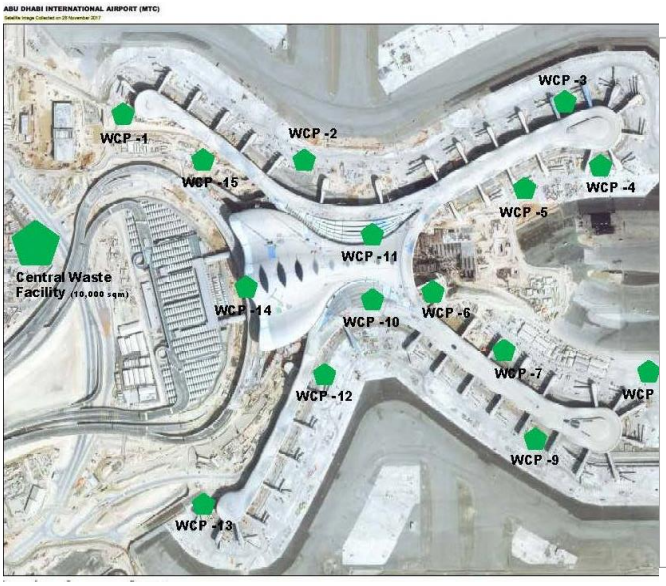
Today, the MTB construction achieves a rate of 92% waste diversion from landfill, reusing 100% of its concrete waste, while other recyclables are either reused for temporary works or sold to recycling operators. A net profit of 17% over the waste management scope cost was achieved in its peak year (2014); other related cost savings are estimated around USD 5.2million, and about 2,625 tonnes of harmful emissions were avoided.

The sustainability training programs record more than 430,000 training man-hours and 119,000 people trained.

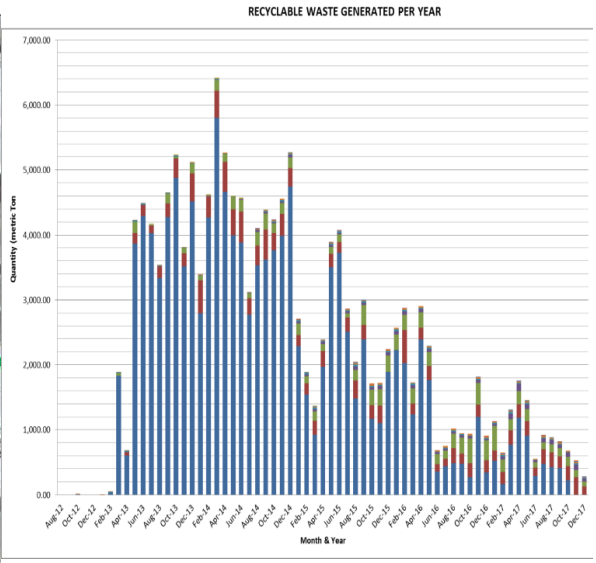
ADAC's Sustainability & Environmental specifications and results reflect the program's overall commitment to environmental protection, starting at the most senior level; this was clearly exhibited in the recent Clean-up campaign in November 2017, where 500 people from 16 entities participated in the cleaning of 100,000m² of areas onsite collecting 900 tonnes of waste in one day.

Project Website Link http://www.adac.ae/english/mtp/

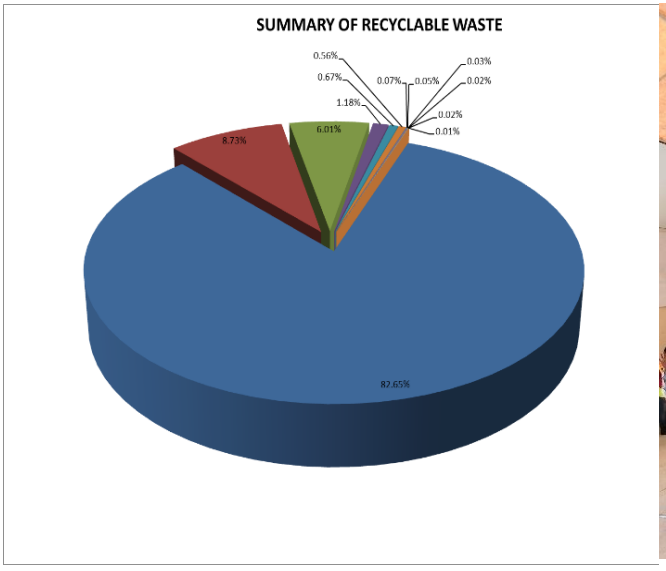
Project Graphics



MTB waste management scope



Recyclable waste records (2012-2017)



Recyclable waste by type (2012-2017)

Clean-up Campaign – Nov. 2017

Indira Gandhi International Airport - Integrated Waste to Wealth Program for Waste Minimization

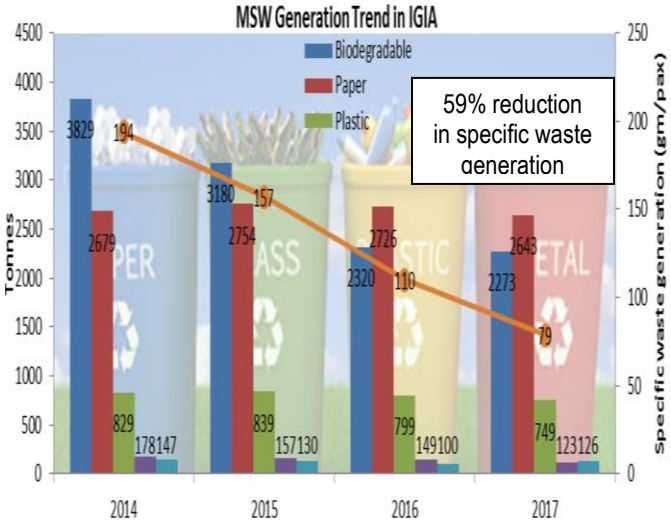
Delhi International Airport Limited (DIAL), a GMR Group led consortium that Operates, Modernizes & Develops Delhi's Indira Gandhi International Airport (IGIA). DIAL has brought numerous global reorganizations to IGIA for its service quality and environment sustainability initiatives, including ACI's World No. 2 Airport in the category of 40 MPPA and above and 1st Carbon Neutral Airport in Asia Pacific region as per ACI's Airport Carbon Accreditation.

At IGIA, waste management is identified as one of the key material aspects in terms of improving bottom-line, conserving resources and ensuring environment sustainability. We believe that there is nothing called "waste", but only "resources" which will benefit DIAL by saving cost in terms of buying new materials or by reducing disposal cost and creating new revenue and meet environmental obligations. To have an effective waste management program at IGIA, we adopted Integrated Waste Management Program (IWMP) with the objective of effectively manage, minimize and achieve "zero waste to landfill" based on the "4R framework"- Reduce, Reuse, Recycle & Revenue.

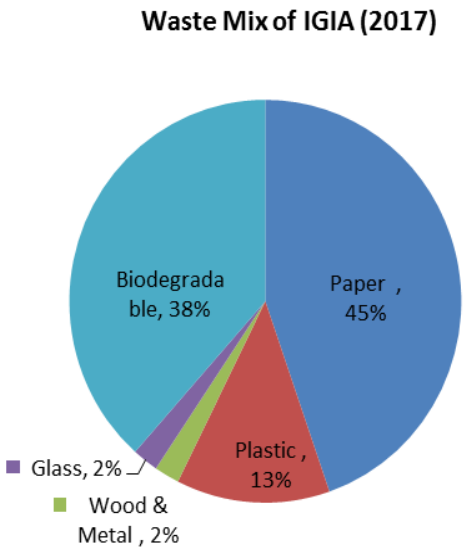
This program includes employee & stakeholder engagement, awareness creation for effective waste management & minimization, improved waste collection and segregation and a robust waste monitoring mechanism. The implementation of the "4R framework" was integrated with Green Building Principles along with Plan > Do > Check > Act philosophy of Environment Management System (EMS) of IGIA, presently certified under ISO 14001:2015.

Currently, IGIA generates 15 TPD of waste, 40% of which is biodegradable and remaining 60% is recyclable. The IWMP has helped DIAL reduce total waste generation by 24% (reduce, reuse & recycle) and also earn revenue of 9 million rupees (revenue) per year by improving waste collection efficiency, adopting segregation at site and through collaboration with stakeholders. The revenue is paid after adjusting the cost of waste infrastructures, manpower, transport and other operating expenses.

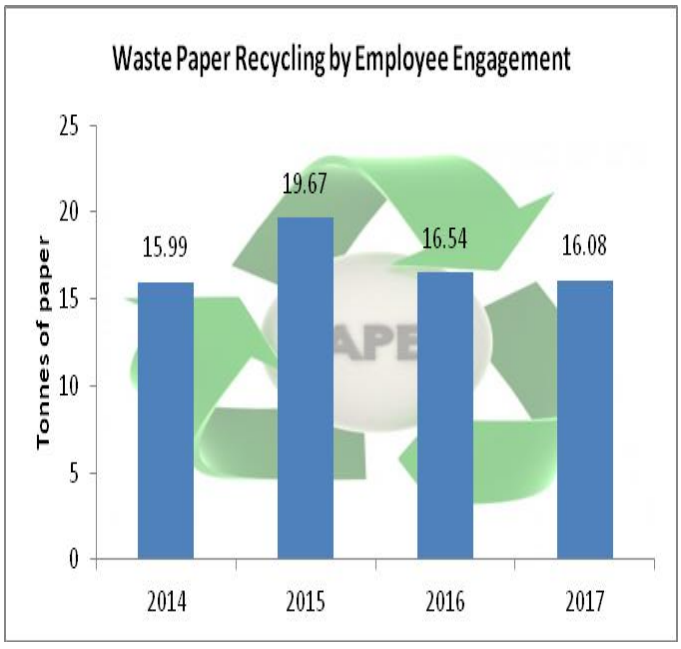
Project Graphics



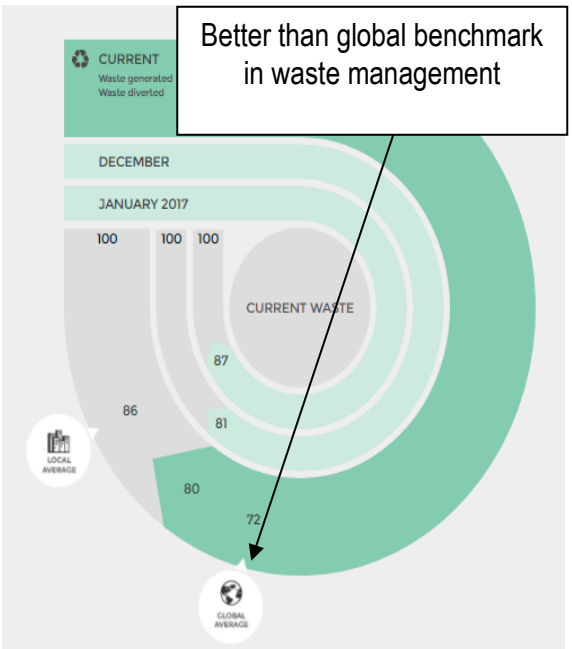
Waste Generation Trend of IGIA since implementation of IWMP



Specific Waste Generation Trend in IGIA since implementation of IWMP



Waste Paper Recycling at IGIA



Online tool “Arc” snapshot

Melbourne Airport - Waste Management Foundations Project

Melbourne Airport has re-committed to waste management as a priority. Starting in areas where Management has most control, Melbourne Airport introduced Ecobins to all management offices across the site. This project was undertaken following extensive consultation with key contacts, included Q and A's, and a number of 'launches'. These launches included participation by Senior Leadership and the entire initiative was sponsored by our Executive General Manager Corporate Services.

Following the launch of Ecobins, the Environment Team has been implementing other complimentary waste management initiatives:

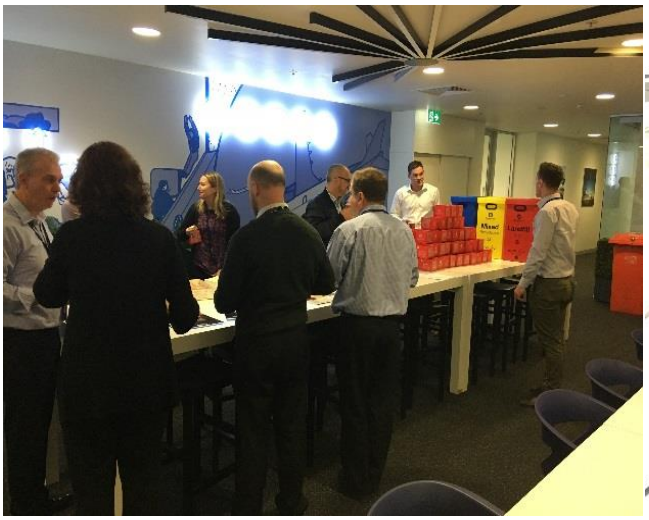
1. Development of a site wide Melbourne Airport Environmental Management Plan (EMP) to outline Management's expectations in relation to waste management
2. Updating Melbourne Airport's Waste Minimisation Policy to support the EMP, and other site initiatives
3. Updating Melbourne Airport's Code of Environmental Practice for low risk tenants to support site initiatives
4. Updating Melbourne Airport's Environment Policy to include consideration of the life-cycle costs of products and services
5. An enhanced focus on waste management during site inspections of tenants and construction sites
6. Re-tendering Melbourne Airport's Cleaning Services contract that includes requirements for a higher level of training and education
7. Inspection of the waste management supply chain
8. Updating employee inductions to include waste management
9. Introduction of a dedicated collection bin for out-of-date or damaged hard hats. These are collected and recycled through our waste management contractor

All of the above initiatives will be reviewed and considered in a new Melbourne Airport Waste Management Strategy: to manage all airport and construction wastes (including hazardous materials). The strategy will identify the type, amount and impact of waste streams and provide recommendations for improvement in accordance with the waste management hierarchy.

Project Graphics

Joe Cremona, Melbourne Airport Presentation Services Manager verifying waste management supply chain.

New Ecobins and Coffee cup recycling station in place including signage.



Launch 2 of 3 of Ecobins – morning tea and Q and A session.

Lisa Evans, Executive General Manager Corporate Services and Company Secretary was the face of the Ecobins launch, and roll-out sponsor.

Narita International Airport - Waste Management to Achieve Targets on Eco-Airport Master Plan

Narita International Airport Corporation (NAA) has worked in close collaboration with airport-related business entities to promote the eco-airport concept under Eco-Airport Vision 2020, adopted in 2011 as a statement of our vision for the next 10 years, and Eco-Airport Master Plan (FY 2011–2015), which was established to realize Eco-Airport Vision.

The master plan set concrete action targets based upon its five themes. To achieve the targets, Eco-Airport Development and Planning Council, which is made up of airport-related business entities including airlines, air freight forwarders and governmental agencies, plays a central role in analyzing environmental measures and undertaking environmental initiatives from a variety of perspectives to further airport-wide environmental initiatives.

The council meets about twice a year to hold progress reports on initiatives, and their results towards achieving the targets of the master plan. The specific measures under the individual initiatives are examined and implemented by the council's three subcommittees.

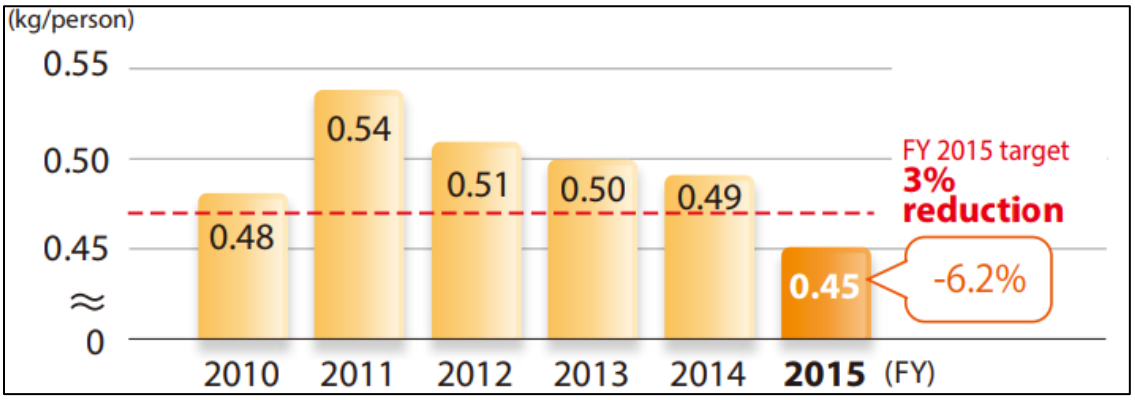
Waste Material Committee, one of the committees under the council, has aimed at promoting 3Rs of waste with two targets according to the master plan. One was to reduce solid waste generation (per airport user), calling for a 3% reduction by fiscal 2015 compared to fiscal 2010. As a result, it met the goal (6.2% reduction). The other was to improve 3 points over fiscal 2010 in waste recycling ratio by fiscal 2015. The ratio by the end of fiscal 2015 reached 27.8%, which was 3.1 point improvement.

To achieve the targets, the committee implemented various measures, such as shredded paper recycling, grass clippings provided to local farmers, composting of kitchen refuse from airport restaurants and other actions.

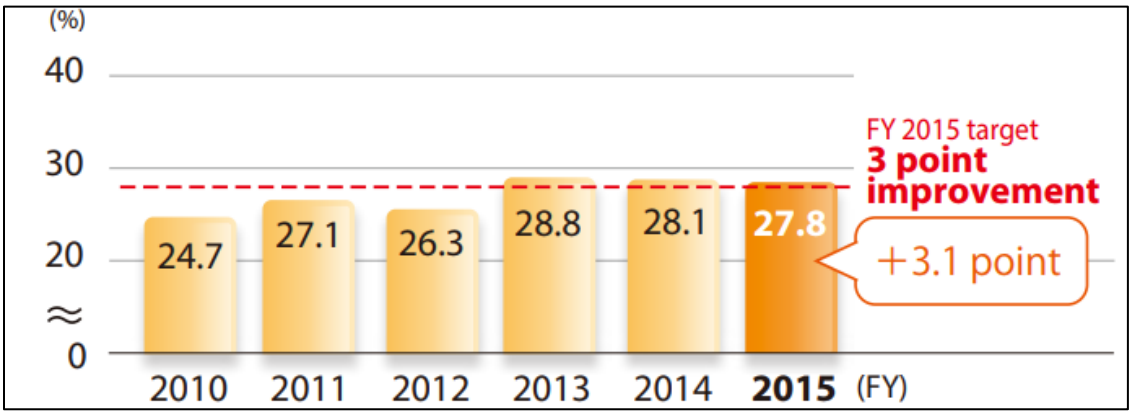
Through these efforts, the committee has been encouraging best practice of 3Rs at Narita Airport. Led by the council, recycling initiatives have been expanded to include the airport as a whole.

Project Website Link https://www.naa.jp/en/environment/index.html

Project Graphics



Reducing General Waste Incinerated (per airport user)



Increasing Recycling Rate of Waste

Compost handed out to local residents

Provided grass clippings

Queen Alia International Airport - Integrated Waste Management and Minimization program (IWMM)

In November 2007, and under the terms of a 25-year concession agreement, Airport International Group (AIG) became the Jordanian company responsible for the operation of Queen Alia International Airport (QAIA), the rehabilitation of the airport's facilities, and the construction of the new state of the art passenger terminal.

A part of the new terminal construction and the additional capacity which reaches 12 million passengers, AIG launched environmental initiatives to enhance and promote environmental management which positioned QAIA as the leading airport of environmental management in Jordan and in the region.

Currently, QAIA is one of few establishments in Jordan that are implementing integrated waste management and waste minimization (IWMM), an objective that had been set to be kicked-off with the new terminal opening back in 2013, implemented in 2014 and fully matured by end of 2017.

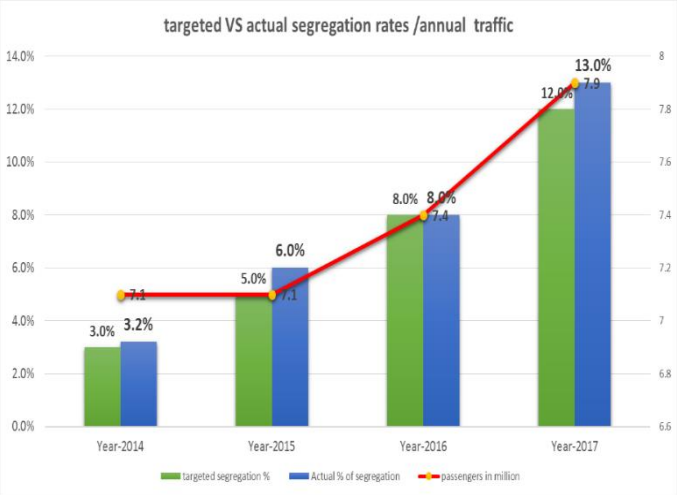
In the planning phase of the IWMM, AIG had to address three major milestones: availing the terminal segregation bins and waste collection containers, availing contractors which are able to perform the task inside and outside the terminal in terms of collection and transportation, and finally adapting procedures and promoting waste segregation and minimization practices inside the airport for all stakeholders.

Segregation bins (Plastic, Paper, General waste) were deployed throughout the terminal beginning of 2013 and were followed by segregation waste containers by the end of the same year.

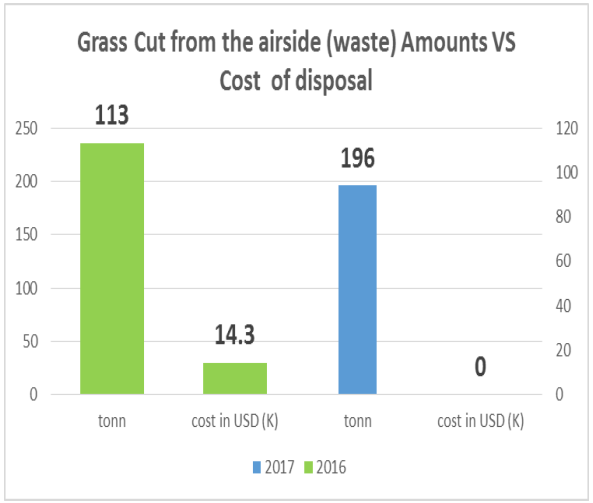
The service provider was selected in Q3 2013 to collect and transport the segregated waste (paper, plastic, general waste, Hazardous waste, green cut grass), which was a challenge as experienced local companies that are able to provide the full scope of the service were not available.

The project got full momentum in 2014 by targeting 3% of waste segregation and by the end of 2017 this percentages reached 13.3% and expected to increase to 18% in 2018.

Project Graphics



Targeted segregation rates VS actual achieved rates in relation to traffic



Total cost of disposing of the cut grass from the air field over two years, reason why 2017 had more grass amounts is due to operating the North Runway (second runway) which was closed for few years back since 2010

Shredding process for the paper waste that supports the minimization of the waste generated by the terminal activities

Awareness sessions conducted for airport stakeholders on the topic of waste handling, minimization and segregation

Sharjah International Airport - Solid Waste Management Project at Landside

مطار الشارقة الدولي
Sharjah International Airport

At Sharjah International Airport the source of solid waste is from three major areas. Inside the terminal building, the airside of the airport and the landside of the airport. For the airside and inside the terminal building there is well established system to collect, move and dispose the solid waste which ensure zero landfill waste at Sharjah International Airport (SIA). To manage the solid waste from the landside of the SIA, Sharjah Airport Authority in coordination with Beeah, the Sharjah Environment Management Company introduced a waste Management Project.

The Project Include the segregated collection, removal and recycling of Solid waste from the landside of SIA. As part of it a total of 35 three stream bins were installed at different locations at SIA. Locations include terminal building, departure and arrival car park, Engineering Building, Cargo Terminals and Engineering building etc. Beeah scheduled a daily collection of waste on specified timings.

Beeah collection vehicles move the segregated waste to the beeah Material recovery facility. At the material recovery facility there is a comprehensive segregation of waste will carry out. Beeah Material recovery facility is a specialized facility that sorts and separates recyclables materials form solid waste, through mechanical and manual process. It has an annual capacity of 6000,000 tons, processing around 2000 tons per day of which an estimated 70% is being recycled and thus, diverted from landfill. As the waste from SIA got segregated during the collection itself it will undergo a secondary level segregation and then paper, plastic, aluminum and steel cans are send to specialized facilities and processed for reuse in the economy while the organic waste is sent to the compost plant.

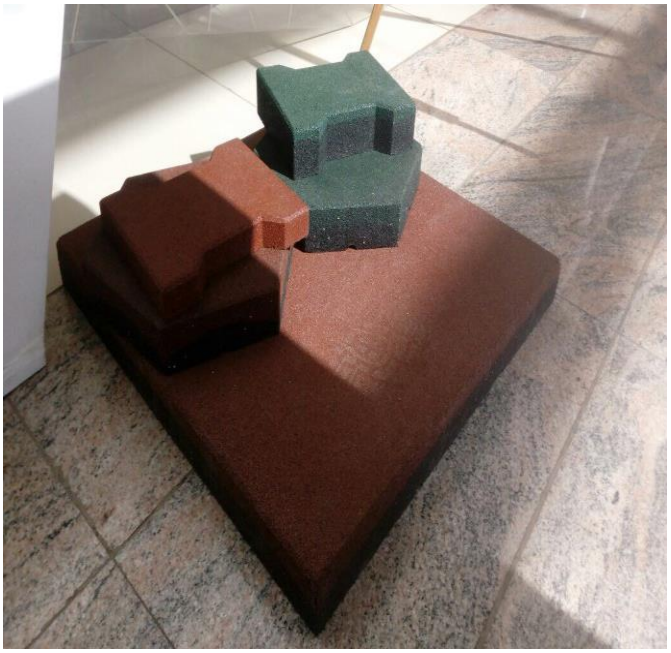
The whole process ensures the recycling and re use of solid waste from landside of SIA which ultimately reduce the total environmental impact of SIA.

Project Graphics

3 Stream bins kept outside the Terminal

Moving the segregated waste from three stream bin to material recycling facility

Segregated waste at Beeah material recycling facility



One of the final product from recycling process at Beeah

Section 5: Waste Reduction Award Scheme

Hong Kong International Airport - HKIA Environmental Management Recognition Scheme

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.

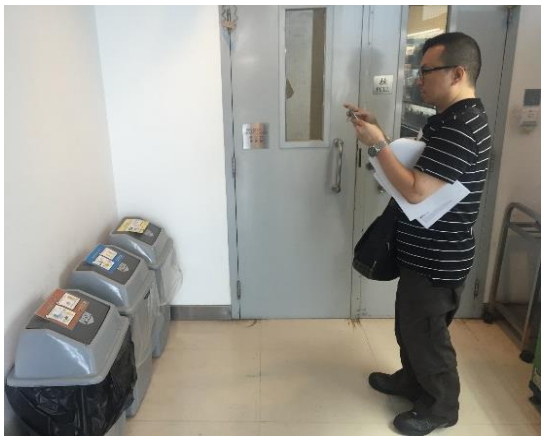
In 2014, the Scheme was designed to rate participating outlets/shops under two sectors (F&B and retail) on their achievements within six environmental categories, of which waste management carried double weighting. Other categories included energy efficiency, water efficiency, air pollution management, 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) programs to encourage customers to bring their own bags.

AAHK selected a judging panel that included AA'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.

Riding on the success of the 2014 program, the scheme was launched again in 2017 and expanded to 20 months which attracted 106 tenants from four sectors.

Project Graphics

42 airport tenants were presented with awards recognizing their exceptional efforts in environmental management at the HKIA Environmental Management Recognition Scheme award presentation ceremony.



Onsite assessment to verify tenants' implementation of waste management initiatives.

Catalina's restaurant replaced hardcopy menus with electronic menus to save paper.

The Magic of Hong Kong Disney Land developed an agreement with suppliers to use reusable containers for stock deliveries to minimize packaging waste.

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