3R Guidebook for Shopping Malls

Image Courtesy of Goh Hak Liang, Singapore Tourism Board

National Environment Agency

Safeguard · Nurture · Cherish

TABLE OF CONTENTS

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About this Guide

This 3R Guidebook is produced by the National Environment Agency (NEA) to help shopping malls assess their current waste management practices, and identify opportunities to reduce, reuse and recycle waste materials so as to reduce waste disposal needs.

By adopting the 3Rs (reduce, reuse, recycle), shopping malls can potentially reap some cost savings in procurement and waste disposal cost while contributing towards environmental sustainability.

Employees of shopping malls tasked to promote 3R practices in their organisations can refer to this guide for the planning and implementation of 3R plans.

Waste management companies and recycling service providers can also refer to this guide to map waste reduction plans and set targets for their shopping mall clients.

What can be learnt from this Guide?

This guide does not provide a “one-size-fits-all” solution to developing the best 3R programme for shopping malls. Rather, it seeks to provide general concepts and factors for consideration during the planning phase.

National Environment Agency (NEA)

Formed on 1 July 2002, the NEA is the leading public organisation responsible for improving and sustaining a clean and green environment in Singapore. The NEA develops and spearheads environmental initiatives and programmes through its partnership with the People, Public and Private sectors. It is committed to motivating every individual to take up environmental ownership and to care for the environment as a way of life.

By protecting Singapore's environment from pollution, maintaining a high level of public health and providing timely meteorological information, the NEA endeavours to ensure sustainable development and a quality living environment for present and future generations.

Visit http://www.nea.gov.sg for more information.

Overview of the Solid Waste Management in Singapore

Over the years, Singapore's waste disposal quantities have increased significantly. From 1,260 tonnes of disposal per day in 1970, the amount of waste disposed of has risen more than six times to more than 8,400 tonnes per day in 2015, and is projected to continue to increase in tandem with population and economic growth.

Since 1979, much investment has gone into the building of waste-to-energy incineration plants and landfills to manage the increasing amount of waste disposed. The waste-to-energy incineration plants are designed to incinerate waste safely and are equipped with air emission cleaning equipment. These plants reduce the volume of waste by up to 90%, and recover energy to supply about 3% of Singapore's electricity demand. Ferrous and non-ferrous metals are also recovered from the incineration bottom ash for recycling.

The remaining ash is then transported to the offshore Semakau Landfill, the only landfill in Singapore.

If waste quantities continue to grow, there would be a need to build more waste-to-energy incineration plants and offshore landfills. This presents a key challenge for land-scarce Singapore.

Tuas South Incineration Plant

Semakau Landfill

CHAPTER 1: INTRODUCTION

Strategies for a Sustainable Solid Waste Management

As a small city-state with limited space, Singapore has to ensure prudent use of land for continued economic growth. Building more waste disposal facilities to handle the increasing amount of waste will mean less land for other uses such as industries, housing, water catchment areas, transportation and recreation.

The Sustainable Singapore Blueprint (SSB) 2015 outlines our national vision and plans for a more liveable and sustainable Singapore. For a vibrant and sustainable city, Singapore will work towards becoming a Zero Waste Nation and a Leading Green Economy. Among other goals, the SSB has set an overall waste recycling rate target of 70% by 2030.

To achieve our vision, the National Environment Agency (NEA) has adopted a multi-pronged waste management strategy of waste minimisation. This is through the first 2Rs of reduce and reuse, maximising resource recovery through recycling, and volume reduction through incineration of all remaining incinerable waste to reduce waste sent to the landfill.

To achieve these targets, NEA will continue to engage and work in partnership with various organisations in the people, private and public sectors to plan and implement 3R and related educational programmes.

Shopping Malls Play An Important Role In Waste Minimisation and Recycling

Shopping malls are visited by people of all ages. Hence any 3R initiatives adopted by the mall can involve the participation of many people.

Significant quantities of waste are produced in shopping malls which provide great potential for waste minimisation and recycling.

Ion Orchard

CHAPTER 2: BENEFITS OF REDUCING, REUSING AND RECYCLING SOLID WASTE

What are the 3Rs?

The **3R**s stand for:

- **Reducing** waste – to avoid waste at source so as to minimise the quantity of waste that needs to be treated or disposed of
- **Reusing** waste – to use an object or material again, either for its original or similar purpose, without significantly altering the physical form of the object or material
- **Recycling** waste – the process of transforming waste materials into reusable form which may or may not be similar to the original product

3R practices encompass all measures that minimise the amount of waste disposed of.

The preferred waste management practice is to **reduce** waste at source, i.e. to prevent waste from being generated. Where waste generation cannot be prevented other options such as **reusing** the item(s), followed by **recycling** of the waste should be considered.

Benefits to Shopping Malls

Good waste management can make good business sense. The benefits of practising the 3Rs go beyond reducing waste sent to disposal sites. It also yields many positive outcomes such as:

1. Reduced Disposal Costs

   Practising waste minimisation in a business process can help reduce business costs. This helps improve efficiency and down waste handling and disposal costs.

2. Enhanced Corporate Image

   Public awareness of environmental issues is growing around the world, and the environmental profile of a shopping mall forms an increasingly important part of its overall reputation.

   Shopping malls which incorporate environmental considerations into their business operations will benefit from a better corporate image which helps distinguish them in the marketplace as forward-looking and responsible businesses who are sensitive to environmental issues.

CHAPTER 2: BENEFITS OF REDUCING, REUSING AND RECYCLING SOLID WASTE

Benefits to the Environment

Practising the 3Rs is an effective way to protect our environment and conserve resources for the benefit of present and future generations.

Reducing waste at source leads to lower demand for virgin resources required to make new products, thereby conserving limited natural resources. Similarly, used products can be reused or recycled into new products, which would avoid further depletion of natural resources, reduce the amount of waste thrown away and lessen the need to build more disposal facilities.

An effective 3R programme will help to reduce the carbon footprint of an organisation.

Benefits to Singapore

Despite recycling, Singapore has had to increasingly commit more resources, including land to build disposal facilities, to manage the growing amount of waste. Presently, Singapore disposes about 3 million tonnes of solid waste a year, which is enough to fill more than 5,700 Olympic-sized swimming pools.

Notwithstanding, this amount could have been significantly higher if Singapore had not ramped up recycling over the years.

There are eight crucial steps for the implementation of a successful 3R programme in a shopping mall. The steps are as follows:

Step 1: Management to Commit to 3R efforts

Step 2: Appoint a 3R Manager and Form a Green Committee /3R Team

Step 3: Conduct a Waste Audit

Step 4: Identify Opportunities to Reduce, Reuse and Recycle

Step 5: Engage Waste Disposal and Recycling Service Provider(s)

Step 6: Develop a 3R Programme

Step 7: Implement the 3R Programme

Step 8: Monitor, Evaluate and Improve the 3R Programme

Step 1: Obtain Management's Commitment and Support

Management support is vital for the success of any 3R Programme as 3R initiatives could require an investment in time and possibly finances. It could also entail changes in responsibilities of some employees or in operational procedures.

A supportive management is crucial to the alignment of the environmental goals of all stakeholders and supports the formation of a culture of practicing the 3Rs amongst employees and tenants. Therefore, the first step is to secure and project a clear and strong signal of the management's commitment to supporting 3R efforts.

To put up a case to management, there is a need to show how embarking on a 3R programme is advantageous for the mall e.g. in terms of cost savings and enhanced reputation. To estimate the potential savings in waste disposal cost, data on the amount of waste generated in the mall would be required. This can be requested from the waste collector or by investing in a weighing machine. With the information, opportunities to reduce, reuse and recycle waste can be identified and the cost savings from the wasted raw materials/consumables can be estimated.

CHAPTER 3: A STEP-BY-STEP GUIDE TO A 3R PROGRAMME

3R Guidelines

There is a need to draw up 3R guidelines to communicate the objectives of the 3R Programme to employees and tenants, and they may encapsulate these main points:

1) Motivations for practising the 3Rs, such as reducing waste to landfill, cost reduction, and being an environmentally-responsible corporate citizen;
2) Reducing waste at source to eliminate waste is one of the main goals of the 3R programme;
3) Reuse and recycle as much waste materials as possible before disposing them as waste.

The 3R guidelines can be part of the mall's overall Environmental Policy.

They can be endorsed by the senior management and displayed prominently to disseminate the information to all employees.

It would be desirable to have a staff meeting to explain the rationale and/or circulate the information through other communication channels. The meeting would be a good platform to seek feedback and ideas from employees as well. A positive signal from the management team will encourage staff to be involved in following the 3R guidelines.

Step 2: Appoint a 3R Manager and Form a Green Committee/3R Team

The next step is for management to appoint a competent 3R Manager. The 3R Manager should be an individual with a passion for protecting the environment and who possesses strong leadership and communication skills, as well as be knowledgeable about the mall's operations, procurement and waste management procedures.

The formation of a Green Committee or a 3R Team helps to ensure the success of the 3R Programme. Together with the 3R Manager, they will plan, develop and implement the 3R programme for the mall. The 3R Team should be well represented in terms of experience and knowledge of waste management issues. It should comprise personnel from different parts of the mall's operation, such as facilities management, cleaning and tenant management.

The Cleaning Manager should be involved in the planning of the 3R programme, as cleaning staff are involved in waste management operations and are pivotal to the successful implementation of the programme.

Tenants' inputs are also valuable in designing the collection arrangement for the recyclables.

Lastly, work with your recycling service provider to determine the storage location of the recyclables and the frequency of collection.

CHAPTER 3: A STEP-BY-STEP GUIDE TO A 3R PROGRAMME

Role of Green Committee/3R Team

The functions of the Green Committee are:

1. Plan, develop and implement a 3R programme , including:
    - Setting of goals and targets for the mall's 3R Programme
    - Establishing 3R procedures and providing the necessary infrastructure to complement the operational practices of the mall
    - Organising programmes to train employees in the 3Rs
    - Organising regular activities to raise overall awareness of the 3Rs
    - Engaging partners and customers in 3R initiatives

2. Work out and propose a budget for the mall's 3R programme

3. Conduct waste audits to:
    - Determine baseline waste tonnage and composition
    - Identify areas where waste can be reduced, reused or recycled
    - Monitor waste output over time

4. Monitor and ensure compliance with the established 3R procedures

5. Establish an accounting system that reflects monthly waste management amounts and costs, as well as savings arising from waste avoided

6. Generate reports on progress in meeting the mall's 3R programme goals and targets

7. Keep management, staff and tenants informed of the progress in meeting the goals and targets for the mall's 3R Programme

8. Incorporate descriptions of the roles and responsibilities of the committee members

9. Meet regularly to track the progress in implementing 3R initiatives, and brainstorm for new initiatives to cut waste further

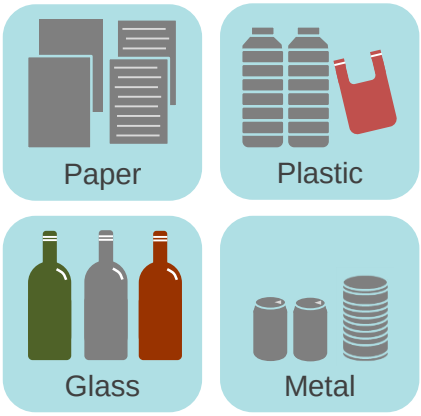
Step 3: Conduct a Waste Audit

What is a Waste Audit?

A waste audit is a structured process of identifying and quantifying the sources, amount and types of waste being generated.

The objective is to profile the waste types by obtaining information on:

- types of waste,
- quantity of each waste type,
- how they are generated,
- why they were generated,
- where they are being generated, and
- how they are managed after being generated.



Doing this will help to identify areas of wastage, and uncover opportunities to reduce, reuse or recycle waste materials. It will also help collect baseline data for measuring the effectiveness of the 3R programme, after its implementation.

How to Conduct a Waste Audit?

There are different ways to conduct a waste audit. Some malls might choose to hire a waste management company or contractor to perform the audit. Others might carry out an in-house audit. You may follow the steps below to conduct a waste audit.

(a) Conduct an Inspection with Tenants

Work with the individual tenants to walk through their various operational areas on different days of the week and make a visual inspection of the contents of the refuse/ litter bins. Take note of the types of waste in these bins. Gather information from relevant operational staff and document the findings.

Pay attention to tenants that tend to generate the large amounts of waste. Create an audit checklist and indicate the different types of waste streams observed during the inspection. A sample audit checklist is provided on the following page.

Generally, large amounts of waste are usually generated at the following areas:

- Food courts and restaurants
- Supermarkets
- Retail shops
- Cinema halls

Sample Audit Checklist

Create a checklist for all waste types generated from each area of the mall. This makes sure that relevant 3R initiatives can be tailored for the respective areas if needed.

A sample audit checklist is shown below.

Types of waste	Point of origin	Disposal (kg/month)	Cost of disposal	Recycled (kg/month)	Cost of recycling	Other comments
Paper						
Carton boxes						
Plastic bottles						
Plastic packaging						
Glass						
Ferrous Metal cans						
Aluminium cans						
Food waste						
Landscaping waste						
Others						
TOTAL						

(b) Collect Waste Samples from Different Areas

Collect a number of waste samples from each area of the mall, such as the food courts, supermarkets, retail shops, offices, etc. To ensure that the waste samples collected are representative, collect samples for an entire week for each area.

To avoid confusion, you may wish to collect waste samples from different areas on different weeks. For instance, collect waste samples only from the food court for sorting and recording in week 1, and collect waste samples from another area (e.g. supermarket) in week 2 and so on.

Give clear instructions to staff or cleaners collecting the waste samples, such as details on the locations of the refuse/litter bins, the labelling of the collection bags/bins for identification and types of waste to be recorded. Supervisors should closely oversee the waste sample collection process.

(c) Sort the Waste

After sample bags of waste are collected, labelled and recorded from each area, they are to be emptied onto a large plastic sheet placed on a flat ground. The waste materials from each area can then be sorted into different types according to the audit checklist.

(d) Analyse the Data

After sorting, each sorted type of waste is then individually weighed and recorded.

Certain types of waste may not be seen in the refuse/litter bins during a waste audit, but have been identified as possible waste materials from purchasing records. In such cases, you may estimate the types and quantities of the waste materials based on the volume of materials purchased throughout the year.

The 3R Team can then compile and enter all the data gathered into the checklists, by different areas of the mall, for analysis to reveal opportunities for 3R initiatives. When analysing the data, pay special attention to how these wastes are generated, why they are generated, at which point they are being generated, and how they are managed after being generated. These analyses will be useful when developing 3R strategies and procedures.

Step 4: Identify Opportunities to Reduce, Reuse and Recycle

Using the analysis, identify opportunities for intervention and develop strategies and procedures for 3R outreach and initiatives to target each waste stream.

Tips on Waste Reduction

<u>Processes</u>

- Where possible, encourage change in processes to reduce material consumption
- Encourage the use of reusable and refillable products

<u>Packaging Materials</u>

- Avoid the need for plastic shrink wrapping
- Discourage the use of foam boxes and filling
- Negotiate with suppliers to remove excessive packaging from products
- Encourage retailers to use products made of recyclable material and/or packaged in recycled material
- Encourage the use of non-disposable cutlery and crockery in the food court

Paper Waste

- Encourage the use of recycled paper
- Organise collection of used office paper for recycling
- Print documents on both sides of the paper
- Reuse the blank side of used paper for notes or in-office memos
- Recycle used printer cartridges
- Limit printouts to necessary items only

Tips on Reuse

Packaging Materials

- Encourage suppliers to provide reusable plastic crates instead of disposable cardboard boxes
- Identify and encourage suppliers/retailers to reuse cardboard boxes or other 'waste' containers as much as possible before disposal
- Encourage suppliers and retailers to look at using alternatives such as refills
- Encourage shoppers to bring their own reusable shopping bags
- Incentivise tenants to have a rebate or award system to incentivise shoppers to minimise the use of single-use carrier bags.

Encourage shoppers to use their own reusable bags instead of single-use plastic bags to reduce the amount of disposed plastic bags

Tips on Waste Recycling

Identify Waste that can be Recycled

For waste materials that cannot be reduced or reused, identify whether they can be accepted by local recyclers for recycling.

Recyclable waste generally found in a shopping mall includes:

Common waste types	Paper	Flyers , office paper, cardboard boxes/packaging, newspapers, telephone books, magazines, brochures, posters, junk mail, shoe boxes, milk and juice cartons
	Metal	Used aluminium cans and containers, tin and steel cans and containers
	Glass	Used wine and beer bottles, sparkling/still water bottles, sauce bottles, jars
	Plastic	Mineral water bottles, food containers, food and goods packaging, shrink wraps, plastic garment bags
Other waste types	Food	Raw and cooked food waste (excludes used cooking oil)
	E-waste	Photocopier and printer cartridges, electrical and electronic equipment of any kind to be discarded
	Lighting	Fluorescent lamps and compact fluorescent lamps
	Others	Used wooden pallets, horticultural waste

CHAPTER 3: A STEP-BY-STEP GUIDE TO A 3R PROGRAMME

Step 5: Engage Recycling Service Provider(s)

After the potential recyclables and their estimated quantities in the mall have been identified, engage a contractor to supply recycling bins and provide services for the regular collection of the recyclables.

There are a number of recycling companies in Singapore which accept the four common waste types for recycling. Some waste disposal contractors are also able to provide recycling services.

The mall can either engage a contractor who can provide both recycling and waste disposal services, or engage two or more contractors who can provide recycling and waste disposal services separately.

Cost Components of Waste Disposal and Recycling Contracts

- **Disposal Costs**

Waste disposal service fees usually comprise three cost components:

i. Container Rental Fee	This is the monthly fee charged by the contractor for the rental of a compactor/open top container/waste bins on-site.
ii. Haulage Charge	This is the fee charged by the contractor for collecting and transporting the waste to a waste-to-energy incineration plant for disposal.
iii. Disposal Tipping Fee	This is the fee charged by the waste-to-energy incineration plant for the amount of waste disposed. It is based on the weight of the waste collected from the mall and the contractor will pass on this fee to the mall. As of Dec 2016, the disposal fee is $77/81 per tonne. The fee standard can be found at http://www.nea.gov.sg/energy-waste/waste-management/refuse-disposal-facility.

Some waste contractors may charge a flat fee, combining all three cost components, while some contractors give a total monthly fee and provide a cost breakdown, depending on the contract agreed upon.

However, it is recommended for malls to have a usage-based waste disposal contract, i.e. pay less when the mall throws less waste and vice versa, as this would allow the mall to reap immediate savings from any reduction in waste disposed of.

- **Recycling Costs**

For recycling service fees, there are also a few elements of costs and revenue involved:

i. Container Rental Fee	This is the monthly fee charged by the contractor for rental of large recycling bins on-site.
ii. Haulage Charge	This is the fee charged by the contractor for collecting and transporting recyclables to their Material Recovery Facility (MRF) or to other recycling companies for further processing.
iii. Processing Fee	This is the fee charged by the MRF or recycling companies for sorting, baling and processing the recyclables.
iv. Revenue	There is a market value for some sorted and/or processed recyclables. When your contractor sells sorted and/or processed recyclables to traders or manufacturers, they will earn and keep this revenue.

Malls may consider bundling waste and recycling collection services to reap cost savings from reduced amount of refuse. If the value of the processed recyclables (revenue) is greater than the total cost of (i) to (iii), it is likely that the contractor will be able to offset part of the cost to the mall. If the total cost is higher than the revenue, the contractor will charge a fee for the recycling programme.

A list of recyclables collectors for individual waste streams can be found at http://www.nea.gov.sg/energy-waste/3rs/collectors-traders-and-local-recycling-facilities.

To achieve a better price for recycling and waste disposal services, the mall may like to invite a few companies to submit their bids and then choose the one(s) which can meet your needs at a better overall price.

If the mall is small and does not generate many recyclables, you may wish to consider sharing recycling and disposal services with nearby businesses which also want to reduce their waste. This may help reduce the service cost.

CHAPTER 3: A STEP-BY-STEP GUIDE TO A 3R PROGRAMME

Step 6: Develop a 3R Programme

The 3R Team can develop a 3R programme including:

- Targeted waste types for waste reduction, reuse and recycling,
- Details of the proposed 3R initiatives for targeted waste types,
- Estimated costs and/or cost savings involved,
- Estimated quantity of waste reduced (i.e. kg) for each waste type,
- Implementation schedule of the options (steps or phases and timing for implementation)
- Implementation requirements, such as equipment, tasks and manpower,
- Training of personnel involved,
- Measurable performance indicators and targets, such as waste reduction or recycling rate,
- Timeline for achieving the targets

In addition, a summary table of the 3R Programme, similar to the one below, can be created for ease of reference for the 3R Team.

Summary of 3R Programme

Location	Waste Type	Existing Quantity (kg)	Proposed 3R Measure	3R Goal (kg)	Estimated Costs/ Savings	Start Date	End Date	Status

Definitions:
- Existing Quantity: Found from waste audit
- 3R Measures: Measures to reduce, reuse or recycle
- 3R Goal: Estimated amount to be reduced, reused or recycled, by weight, through the proposed 3R measures

Setting up Recycling Infrastructure

Evaluate the existing recycling infrastructure and ensure that a comprehensive and convenient network of recycling bins is set up to facilitate recycling among shoppers and tenants.

Selecting Locations for Recycling Bins

Recycling bins should be placed in conspicuous and strategic locations where shoppers and tenants can conveniently deposit their recyclables. The following are a few considerations for the placement of recycling bins. They should:

- be easily accessible to tenants or shoppers
- be larger sized for tenants compared to those for shoppers as the recyclables generated by tenants (e.g. packaging waste) are larger
- match the type of recyclable waste produced at that location (e.g. food waste bin for kitchens, paper recycling bin for offices, etc.)
- **be placed alongside general waste bins** – to prevent misuse of the recycling bins for general waste

Recommendations of types of recycling bins for different areas in a shopping mall are listed below.

F&B outlets	• Food waste recycling bins/digester
Public areas (near escalators, lift lobbies, etc.)	• Recycling bins (for paper, metal, glass and plastic) placed next to litter bins at strategic areas
Offices	• Paper recycling bin • Ink cartridge recycling bin
Retail Tenants	• Recycling bins (for paper/cardboard, metal, glass and plastic)
Bin Centre	• Large recycling bins for larger recyclables

CHAPTER 3: A STEP-BY-STEP GUIDE TO A 3R PROGRAMME

Distinct Bin Design

The design of your recycling bins should be easily distinguished from that of litter bins. A good recycling bin design includes clear labelling, is colour-coded and comes with customised openings for easy identification and proper usage by shoppers and tenants.

Examples of segregated recycling bins with labelling at Marina Square (left) and Changi Airport (right).

Contamination of Recyclables

Contamination of recyclables, for example, by food or liquid waste lowers the value of recyclable materials, and materials that are badly contaminated cannot be recycled at all. Proper segregation is thus important and containers should be emptied before being deposited into recycling bins.

Promote awareness among shoppers and tenants not to deposit food or liquid waste into the recycling bin, by way of a bin label.

Segregated or Commingled Recycling Bins

Recyclables can be collected in segregated or commingled recycling bins. Either type can be used depending on the collection method of the recycling service provider.

Segregated recycling bins can be provided for different types of materials such as metal (drink cans), plastics (packaging, bottles), paper (flyers), and glass (bottles). Bins with openings that are appropriately shaped for each type of recyclables can also potentially reduce contamination of the recyclables as shoppers will be reminded of the type of the recyclable which can be deposited into the bin.

Segregated recycling bins will occupy more space in the mall. Premises should ensure that their cleaners do not mix the segregated recyclables during collection. While segregated recyclables might result in higher collection costs, the value of properly sorted recyclables are also generally higher.

Workers sorting out recyclables at the manual sorting line at SembWaste's Materials Recovery Facility

In a commingled recycling system, all recyclable materials are mixed and stored together. Commingled recyclables are sent to a Materials Recovery Facility (MRF) where they are sorted and baled. This system requires fewer recycling bins, and occupies less space.

Other Waste Types

There are separate collectors or suppliers that provide recycling solutions for less common waste types, such as food waste, electronic waste and lighting waste.

Other Waste Types

Food Waste

For food that is not redistributed, there are suppliers of on-site food waste digesters that convert food waste into organic fertiliser/compost or water in 24 hours. The organic fertiliser/compost can be used for landscaping and gardening, while the non-potable water can be used for general washing.

Electronic/Electrical waste (E-waste)

For any electrical or electronic equipment that cannot be reused or repaired, it should be recycled properly as e-waste contains valuable materials and trace amounts of hazardous substances.

Under StarHub's RENEW (REcycling Nation's Electronic Waste) programme, StarHub provides a dedicated recycling bin for e-waste, while its programme partners DHL and TES-AMM collect and recycle the e-waste respectively for free. More information can be found at http://www.starhub.com/renew.

Your mall may engage e-waste recyclers directly or, if the amount is not large, consider placing a free RENEW bin at the mall for shoppers to recycle their e-waste (send your request to starhubcsr@starhub.com).

Lighting Waste

Used fluorescent lamps and compact fluorescent lamps can be recycled via Global Lamp Recyclers (GLR).

Other Types of Waste

For used wooden pallets, your mall can work with suppliers to take back the pallets for reuse.

Horticultural waste produced from landscaping activities should be removed by the landscaper contractor for recycling, or composted on site.

Step 7: Implement the 3R Programme

Education and Awareness

The success of the mall's 3R programme depends on the collective efforts of the mall tenants and shoppers. Before launching the programme, the recycling initiatives should be effectively communicated and promoted to tenants and staff.

A checklist for developing and maintaining a 3R programme can be found in the Appendix.

Communication of the 3R Programme

Training sessions should be organised for staff who will be involved in operationalising the 3R programme. Ensure that they understand their roles and take into account their feedback.

Wherever possible, face-to-face communication should be arranged with tenants to explain and elaborate on the details of the programme and to engage them to align their waste disposal with the waste management policy of the mall.

Staff:

- Conduct briefing for all staff on 3R initiatives and how they can participate (e.g. 3R tips, locations of recycling bins, how not to contaminate the recyclables, etc.). For new staff, this should be part of the orientation programme
- Arrange special training for those who are directly involved with the handling of recyclable waste, e.g. cleaners
- Make the 3R Programme (implementation schedule with goals, 3R tips) easily accessible through the intranet, emails or via notices/posters at prominent staff locations
- Display reminder notices at strategic locations, e.g. poster/e-message to reduce paper waste at printing or photocopying room, poster to reduce food waste at staff canteen
- Collaborate with NEA to organise 3R talks for staff
- Share and update 3R initiatives and waste reduction results periodically with staff

Shoppers:

- Make the mall's environmental policy (and 3R Programme) available on the mall's website and other communications channels
- Organise mall events or promotions to raise shopper awareness of the 3Rs
- Put up posters at the food court to remind patrons to reduce their food waste.

CHAPTER 3: A STEP-BY-STEP GUIDE TO A 3R PROGRAMME

Tenants:

- Circulate the mall's environmental policy to inform tenants of the mall's 3R initiatives
- Organise visits to waste management facilities (e.g. Waste-To-Energy (WTE) plants, Semakau Landfill) as part of 3R outreach to staff. More information can be found at http://www.nea.gov.sg/energy-waste/waste-management/visit-nea-installations-plants

> *Motivating tenants to participate in the mall's 3R programme remains critical to the success of the programme. This could be done through a rebate system such that when cost savings are realised through the reduction in the mall's waste, the cost savings can be passed on to the tenants proportionately.*

Cleaners

- Educate new cleaning staff on the mall's 3R programme and the need to segregate recyclables from general waste
- Engage the mall's cleaners periodically on the need to properly segregate the recyclables from general waste during their collection rounds

Promotion of the 3R Programme

The official launch of the 3R programme should preferably be presided by the CEO or Managing Director of the mall. Alert tenants and staff about the programme in advance by sending kick-off memos from the management to the retail tenants, announcing the programme and requesting their full participation. The memos should be concise in highlighting the benefits of the 3R Programme and explaining the recycling procedures.

The goals, plans and implementation timeline of the 3R Programme should be displayed prominently in staff offices. Regular updates on the progress of the programme should also be communicated clearly to the staff, tenants and the public.

This 3R poster and other posters are available at NEA's Customer Service Centre at the Environment Building, for use at your mall.

Softcopies are also available at http://www.nea.gov.sg/training-knowledge/educational-materials-and-exhibits

Step 8: Monitor, Evaluate and Improve the 3R Programme

After the 3R programme is up and running, monitoring and evaluation should be carried out on a regular basis.

Track the Quantity Of Waste Reduced/Reused/Recycled After the Implementation of the 3R Programme

Request the recycling service provider to provide monthly tonnage reports on the amount of recyclables collected to monitor waste reduction and recycling performances against the targets set. Alternatively, the mall can invest in a weighing machine to obtain the tonnages.

Calculate Cost Savings Achieved After Implementation of the 3R Programme

Maintain accurate and up-to-date records of the waste disposal fees and recyclable collection fees or revenue. Calculate and record the monthly cost savings in the form of reduced disposal costs and/or revenue obtained from the sale of recyclables.

Monitor Contamination Levels of the Recycling Bins

Work with your recyclables collector to report on the contamination levels of each type of recyclables. Conduct routine visual inspections of the recyclables to get a gauge of the levels of contamination. If contamination levels are high, engage staff and tenants via educational pamphlets to inform them of what can or cannot be thrown in to the recycling bin.

Obtain Feedback from Tenants and Staff

Solicit feedback from tenants and staff to evaluate the 3R Programme and make changes where required. Involve vendors and suppliers in discussions for 3R best practices.

Conduct Annual Reviews of the 3R Programme

Conduct annual reviews of the 3R Programme, including a waste audit to identify new 3R opportunities, making changes to initiatives if needed and setting higher waste reduction or recycling targets

CHAPTER 4: MANDATORY WASTE REPORTING FOR SHOPPING MALLS

Mandatory Waste Reporting for Large Commercial Premises

The mandatory reporting of waste data and waste reduction plan by large commercial premises under the Environmental Public Health Act, starting with shopping malls (with nett lettable area of more than 50,000 square feet) and large hotels (with more than 200 rooms), took effect on 1 Apr 2014.

The mandatory reporting requirement aims to better draw and sustain greater management attention to the amount of waste produced by the premises and help build greater awareness of the potential for improving their waste management systems.

Implementing a 3R Programme will help large shopping malls to meet the reporting requirements of mandatory waste reporting. Malls can consider procuring weighing equipment to measure the amount of waste/recyclables generated on-site.

More information, including the reporting templates, can be found at www.nea.gov.sg/waste_reporting.

Methods of Data Collection

Shopping malls can choose one or a combination of the following three methods to properly measure the waste disposed and recyclables collected.

Method 1: Engage the mall's waste collectors to provide waste and recyclables tonnages.

Method 2: Procure weighing equipment for in-house measurement of waste and recyclables.

Method 3: Estimate the weight of waste and recyclables via density computation and volume tracking. The 3 steps to this method can be found below:

- Step 1 – Record the daily waste and recyclable volumes (V_{daily})

  The 3R Team should record the waste volumes of each refuse bin disposed of daily in a table. The same should be done for recycling bins on collection days. An example of the entries of a building with two 660L bins and a 120L bin is shown below:

Date of the month	Refuse bins used and sizes (i)	Proportion of refuse bin occupied by the waste (ii)	Volume of waste in the refuse bins = (i) x (ii)	Daily waste volume V_{daily}
1	660L	Full	660L	V_1 = 660L + 495L + 120L = 1,275L
	660L	3/4 full	3/4 x 660L = 495L	
	120L	Full	120L	
2	660L			V_2 = …
	660L			
	120L			
…	…	…	…	
30	660L			V_{30} = …
	660L			
	120L			
Total waste volume for the month (V_{month})				

- Step 2 – Make a one-time measurement of density (D) of the waste/recyclables for the month

  Shopping Malls can compute the average waste density by performing a one-time average weight measurement of waste disposed, or recyclables collected, in fully-filled bins of various sizes (e.g. 120L, 240L, 660L) used in the premises. Shopping malls should re-measure as and when necessary, e.g. when there are major infrastructural changes resulting in a change in waste composition.

$$\text{Density of waste/recyclables, (kg/L)} = \frac{\text{Weight of waste/recyclables in fully-filled bins (kg)}}{\text{Total Volume of fully filled bins (L)}}$$

- Step 3 – Compute the weight of the waste for the month

  The total weight of waste disposed of, or recyclables collected, for the month is the product of the waste/recyclables density and the total waste/recyclables volume for the month.

CHAPTER 5: CASE STUDIES

Case Study – 313@somerset

313@somerset, a Building and Construction Authority (BCA) Green Mark Platinum certified mall, has put in place various initiatives to reduce waste generation over the years.

3R practices

Reducing food waste

Apart from collecting common recyclables such as paper, plastic, metal and glass, 313@somerset has also taken steps to tackle food waste, such as informing F&B tenants of the donation avenues available for excess food, and encouraging them to reduce excess food or large serving sizes through internal circulars. These circulars contain information on specific waste streams that can potentially be recycled more.

Recycling bins placed between escalators.

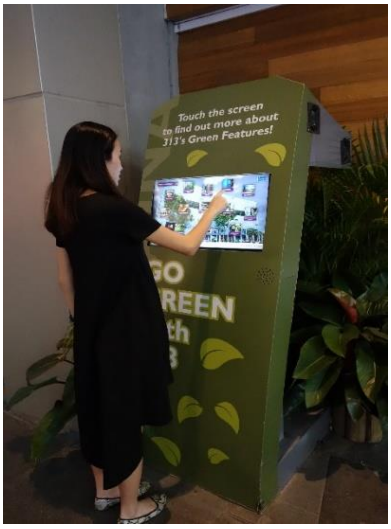
Reuse and recycle efforts

In the management office, printing jobs from each employee is monitored to minimise paper wastage. The office also uses a default setting for double-sided printing, and unofficial documents are printed on used paper. All paper products purchased by the mall, including brochures, festive wrapping paper and Chinese New Year red packets, are either 100% FSC (Forest Stewardship Council) certified or contain recycled material. Festive decorations are reused creatively to make new decorations. The office also purchases refillable pens and correction tape, and returns empty printer cartridges to its supplier for re-filling.

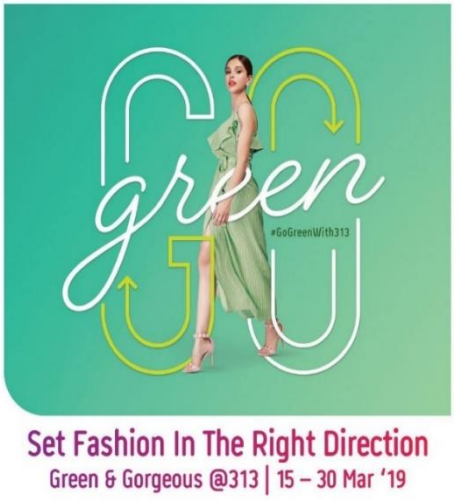
To ensure that both staff and public understand what and how to recycle, 313@somerset provides 3R information and recycling infrastructure to enable them to recycle conveniently. Recycling bins are co-located with waste bins and placed strategically at escalators and lift lobbies for shoppers. Recycling bins are also placed at office pantries and printing areas for staff.

Raising Public Awareness

An interactive display board at 313@somerset communicates the mall's green features and contains 3R information such as the amount of waste collected for recycling by the mall. This helps to create awareness among shoppers and tenants of the milestones in the mall's waste reduction and recycling efforts, among its other sustainability initiatives. Additionally, posters on food waste reduction tips are placed at lift lobbies and staff pantries.



A shopper uses the interactive display board featuring sustainability information.



E-poster for Green & Gorgeous Fashion Swap 2019.

Green & Gorgeous Fashion Swap

Introduced in 2011, the "Green & Gorgeous Fashion Swap" held in conjunction with Earth Hour is an event organised by 313@somerset to promote the reuse of pre-loved clothing and accessories. Participating shoppers would drop off their unwanted clothing a few weeks before the event, and the actual swap would be held over a day. For the first time, in 2019, 313@somerset partnered Swapaholic, which promotes and facilitates the swap of pre-loved clothing and accessories instead of throwing them away, and garnered over 6,000 pieces of pre-loved fashion apparels and accessories, which were swapped among more than 300 participants.

CHAPTER 5: CASE STUDIES

Case Study – IKEA

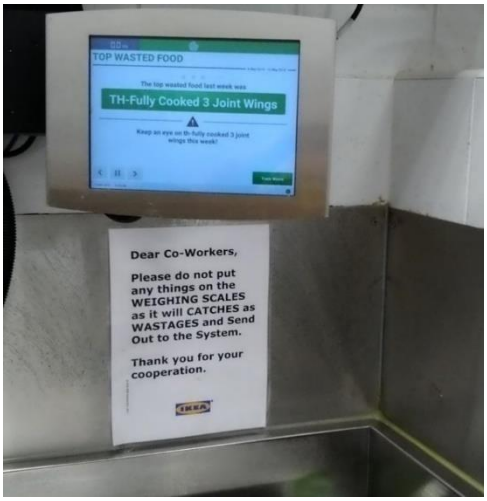
With a philosophy rooted in doing more with less, IKEA aims to make all of its home furnishing products from renewable, recyclable or recycled materials.

3R Practices

Reduce and reuse efforts

Since 2013, IKEA has stopped providing disposable bags to shoppers. To encourage shoppers to make the switch to reusables, IKEA sells reusable bags with lifetime warranty at affordable prices. IKEA has also replaced the provision of disposable containers with reusable ones for take-away meals at its café from 2016, and has stopped the provision of drinking straws at its restaurants.

Reusable containers sold for takeaway food.



Food waste is weighed and categorised according to pre-defined type of waste (e.g. chicken wings). Information captured in the system is generated in a waste report.

Food waste is reduced using a food waste monitoring programme called Waste Watcher. The programme was launched in August 2017, where two weighing scales are provided at the backend of the restaurant and bistro. Food waste items are categorised, and the amount measured so that the various types of food being disposed of can be tracked. Since its implementation, IKEA Alexandra has achieved 27% reduction in its food waste.

In order to reduce the amount of paper used, IKEA's office printers are set to double-sided printing, and an ID-card is required to trigger print jobs. This not only allows IKEA to track its printing consumption, it also allows staff to cancel print jobs. Unprinted jobs are automatically deleted overnight.

Education and recycling activities

In 2016, as part of efforts to raise awareness of the need to reduce and recycle waste, IKEA organised visits to Semakau Landfill and a recycling plant for its staff as well as home delivery and cleaning service partners. IKEA believes that everyone plays a part in developing a sustainable business, therefore, the topic of sustainable practices is integrated into all areas of its compulsory onboarding programme for new staff. Its delivery partners are also encouraged to segregate recyclables, such as packaging and metal parts left over from furniture assembly operations, using the recycling bins provided. These daily backend operations have contributed to IKEA Tampines' recycling rate of close to 70%.

Packaging material is segregated for recycling. Image shows cardboard compactor where cardboard boxes are placed and compressed for recycling.

3R solutions and ideas that households can adopt to save resources and reduce waste are displayed around its home showroom, such as small recycling bins, as well as inspirations and solutions on recycling/food waste reduction.

In addition, IKEA has a wrapping station for customers to use the old newspaper and carton boxes contributed by the community to wrap their purchases. To encourage the habit of recycling from young, children who bring old newspapers for the wrapping station are rewarded with *Smålish dållars*. These credits can be used for selected merchandise, among other *Småles* benefits. Recycling bins are also provided for customers to bring their old light bulbs to the store.

IKEA's wrapping and recycling station provides old newspapers for customers to wrap their purchases in, as well as used cardboard boxes for them to carry their purchases home.

CHAPTER 5: CASE STUDIES

Community and staff engagement

Internally, IKEA communicates recycling goals and status updates to staff through various platforms such as its online Co-worker Diary, Sustainability board and management reports. The increased awareness has brought about environmentally-friendly behavioural changes. For example, IKEA staff now actively segregate their recyclables from general waste and bring along their own food containers to avoid using disposables.

IKEA also has a bargain corner, where imperfect but still usable furniture and items are sold at discounted prices to reduce the amount of waste disposed of.

Shoppers can purchase imperfect furniture, display articles and discontinued pieces at discounted prices at IKEA's bargain corner.

Case Study – Jem

The management at Jem has put in place several waste minimisation initiatives targeted at their tenants, shoppers and staff, as it recognises that development of the shopper's experience should not be at the expense of the environment.

3R Practices

Reduce and recycling initiatives

The mall has an on-site food waste digester which treats food waste and generates non-potable water as a by-product. Since the installation of the digester in 2013, the mall has diverted 3,000 tonnes of food waste from incineration.

Non-disposable cups are provided in the office to reduce the amount of waste generated. Paper usage in the office is monitored to prevent any unnecessary printing. Staff are required to use their staff card for printing for accountability purposes.

To make it easy for tenants to recycle, Jem arranges for recyclables to be collected from tenants twice a day. Christmas decorations are also reused for other festive seasons such as the Chinese New Year.

Recycling event for shoppers

Together with their waste management partner, Jem organised a recycling event in 2019 for shoppers to donate their used clothes, paper and plastics. Used clothes were manually sorted between wearable and non-wearable textiles. Wearable textile was donated to a non-profit organisation while non-wearable textiles were reused as cleaning material by the waste collection company.

Apart from providing strategically-placed recycling bins within the mall premises, an e-waste and toner recycling point is provided in Courts to encourage shoppers to bring their e-waste and empty ink toners for recycling.

E-waste and recycling point located within Jem.

CHAPTER 5: CASE STUDIES

Tenant engagement

For tenants to have a deeper understanding of Singapore's waste and recycling industry, trips to their waste management partner's paper and plastic sorting plant were organised.

Data of the general waste disposed of by each tenant is logged daily to facilitate a waste trending study. The study allowed Jem to identify partners who can recycle more. Individual tenants are also engaged to increase their awareness of the amount of waste they generate and the items that are suitable for recycling. Educational posters on recycling are also provided to tenants.

To ensure that all tenants comply with the mall's environmental sustainability initiatives, new tenants are briefed on waste management procedures prior to the commencement of their operations. They are required to segregate recyclables to facilitate the back-end collection. Segregated and clearly labelled recycling bins are made available at the bin centre to enable tenants to deposit their recyclables easily. A collection point for used lamps and bulbs is also available. F&B tenants are additionally provided with a food waste bin so that they can segregate their food waste from general waste for treatment at the food waste digester.

Recycling bins are strategically located next to lifts within the mall.

Case Study – The Shoppes at Marina Bay Sands

The Shoppes at Marina Bay Sands has close to 800,000 square feet of retail space and 270 boutiques and restaurants. Through consistent tenant engagement efforts, The Shoppes at Marina Bay Sands has shown that waste minimisation and recycling are feasible practices within a mall's operations.

Under Marina Bay Sands' property-wide Sands ECO360 global sustainability programme, The Shoppes ensures that its carbon footprint and overall environmental impact arising from its operations are minimised. Marina Bay Sands not only has a green committee, but also has put in place a dedicated Waste Management and Recycling Taskforce consisting of 15 members from different departments. They are responsible for communicating and executing waste management and recycling initiatives across the organisation, including engagement with tenants at The Shoppes.

Waste reduction efforts

The Shoppes engages its management office staff in its mall-wide effort to reduce waste. For example, all staff are encouraged to use their own cutlery and takeaway containers for personal meals to reduce the use of disposables. The mall also conducts annual waste audits to determine the amount and types of solid waste being disposed of across all tenants. This has allowed The Shoppes to uncover opportunities to reduce waste in specific areas, such as glass containers from F&B outlets and cardboard boxes from retail stores. It also allows the mall to identify F&B outlets that generate higher volumes of food waste, and focus its food waste management efforts on these tenants.

Treatment of food waste

Marina Bay Sands has in place a property-wide food waste management strategy, which includes the hygienic donation of excess food to charity. It also has five food digesters to treat food waste generated on its premises. Each digester can treat up to one tonne of food waste per day. Overall, the food waste digesters – combined with other food waste management initiatives – have enabled Marina Bay Sands to divert 521 tonnes of food waste in 2016.

Food waste being emptied into a food waste digester at Marina Bay Sands.

CHAPTER 5: CASE STUDIES

Eco-certifications

The Shoppes at Marina Bay Sands also encourages its tenants to operate more sustainably by providing funding and advisory services in waste management. This helps tenants to undergo self-improvement and audit processes that will enable them to obtain eco-certifications. The Eco-F&B certification for restaurants teaches operators how to reduce their carbon footprint, through measures such as the tracking of food wastage and proper segregation of recyclables from general waste to increase recycling rates.

Under the Eco-Shop certification programme, tenants are provided with recycling bins and encouraged to track their waste. Staff are also trained on 3R practices to facilitate better waste management. As of 2017, eight restaurants and 15 stores at The Shoppes have been certified Eco-F&B and Eco-Shop respectively.

The mall management office at The Shoppes has also been certified Eco-Office since 2015, due to the many 3R initiatives in place. For example, to reduce plastic waste, plastic water dispensers are replaced with dispensers connected directly to water points, 100% FSC-certified paper is used for office printing, and the amount of paper purchased and recycled is tracked to reduce the amount of paper waste generated.

Annual reuse and recycle activities

A wide range of activities are carried out to motivate tenants to reduce and recycle waste regularly, such as competitions to recognise and reward tenants for recycling. This is done through the tracking of recycled waste over a period of time.

Since 2015, tenants have been required to follow the mall's "Green Leases" policy with a tenant fit-out manual which includes green construction guidelines. These guidelines state that key materials, such as hoarding and construction waste, must be reused and recycled. The mall arranges for a recycler/collector to collect tenants' hoarding and construction material at the delivery dock, and the contractor reports the amount of hoarding recycled. Over 20 tonnes of hoarding were recycled in 2017.

Co-location of recycling bins with general waste bins at the mall.

The waste disposal rate at the mall has been constantly decreasing as a result of combined waste minimisation and recycling initiatives – such as the placement of recycling bins beside general waste bins to make recycling convenient for members of the public.

Beyond engaging tenants, The Shoppes also successfully roped in its mall management staff to minimise waste generated. All personal bins in the mall office were replaced with shared recycling and general waste bins, and a staff green corner was made available to educate staff on sustainability. In addition, the recyclables collected from the office are weighed every week to ensure accountability.

Case Study – Kiehl's Since 1851 (Singapore)

Kiehl's Since 1851, a skin and hair care retailer, maximises the use of recycled materials and minimises the amount of material used in its packaging and in-store items.

Its paper bags and newsletters are made of recycled paper, tote bags made from recycled plastics, and recycling bins from recycled wood. By using recycled material, Kiehl's is able to minimise the amount of new resources used. Kiehl's products also do not come with unnecessary packaging. By 2020, Kiehl's is committed to ensure that all its product packaging will be made with at least 30% post-consumer recycled materials.

Kiehls' product packaging is made with post-consumer recycled material.

<u>Raising awareness</u>

Refresher training is conducted for sales staff to ensure that they are kept up to date with the retailer's sustainability initiatives. The retailer also trains its staff to segregate recyclables, such as cardboard boxes and product packaging, for recycling at the malls in which they are located.

To encourage staff to reduce the use of disposables, reusable tumblers, cups and cutlery sets are given during training sessions. Store events and activities include teaching participating shoppers to reuse Kiehl's empty bottles and jars as decorative items such as flower vases.

Since 2017, Kiehl's staff have been attending the annual Sustainability Week organised by parent company L'Oréal, where they learn tips on how to implement sustainability practices at work and how to use office materials to create items such as name card holders.

CHAPTER 5: CASE STUDIES

Recycle and Be Rewarded Programme

Kiehl's Recycle and Be Rewarded programme rewards customers with stamps for returning used Kiehl's containers for recycling, or for using Kiehl's tote bag in place of a paper bag while shopping at their stores. The accumulated stamps can then be redeemed for gifts. Its membership portal also enables customers to view and keep track of the number of containers that they have recycled, as well as the incentives that they are eligible for.

To expand its sustainability outreach, Kiehl's programme is shared on its website, through electronic direct mailers (EDMs) and text messages. For example, EDMs on recycling used packaging are sent to new Kiehl's members two to three months after they join the loyalty programme as this is the estimated time that customers take to finish using their products. Posts on sustainability are made on platforms such as Instagram and Facebook every month.

A recycling bin is placed near the cashier counter at every store for greater visibility. This created opportunities for the salesperson to invite customers to bring back used Kiehl's containers for recycling. In 2018 alone, the retailer collected 96,512 used containers, almost double the number of containers collected in 2017.

An in-store signage display on the Recycle & Be Rewarded programme to raise customer awareness.

Recycle & Be Rewarded bin placed in-store for customers to bring their empty Kiehl's bottles for recycling.

CHECKLIST

STEP 1: REVIEW THE CURRENT SYSTEM

CHECK	NOTES
☐ Establish the location boundaries of the project and tenants involved	
☐ Review the current waste collection arrangement - Do existing systems (e.g. operations including cleaning & solid waste disposal) handle waste management effectively? - What elements in the current waste collection arrangement can be revised to increase effectiveness and efficiency?	
☐ Determine the types of waste to be recycled	
☐ Conduct waste audit	
☐ Types and locations of current rubbish/recycling bins	
☐ Feedback from tenants, cleaners and waste contractors on the current waste collection arrangement	

STEP 2: DESIGN A NEW SYSTEM

CHECK	NOTES
☐ Draw up a detailed project plan - How will operational procedures be revised or developed to cater for the planned 3R programme?	
☐ Are tenants, cleaners and waste collection contractors involved in the proposed 3R programme? ☐ Are tenants given an incentive to reduce/reuse/recycle their waste? ☐ Does the management give their full support for the planned 3R programme?	
☐ Set targets and objectives	
Deployment of recycling bins ☐ Bin design (lids/openings) ☐ Bin placement ☐ Bin label ☐ Bin volume ☐ Number of bins ☐ Collection frequency ☐ Differentiation of recycling bins from general refuse bins	
☐ Continued cooperation between bin supplier, waste collection contractor and tenants	

CHECKLIST

STEP 3: IMPLEMENTING THE SYSTEM

CHECK	NOTES
☐ Set up a communications plan - Have the priorities been identified for the target audience? - What are the messages to be communicated?	
☐ Mutual understanding of the roles and responsibilities of tenants, cleaners and waste contractors who will execute and deliver the planned 3R programme	
Promotion of the new infrastructure through ☐ Website ☐ Media releases ☐ Posters ☐ Social media ☐ Mall events ☐ Mall directory	
☐ Ensure that all stakeholders are engaged on the planned 3R programme	

STEP 4: MONITORING AND MAINTAINING THE NEW SYSTEM

CHECK	NOTES
☐ Review the implemented 3R programme - Have the waste reduction and recycling objective and targets been met? - Do the contracts with tenants, cleaners and waste recyclables collectors meet the expectations for monitoring and reporting waste and recyclables?	
☐ Waste and recyclables reporting system in place	
☐ Conduct waste audit after implementation of the 3R programme	
☐ Regular maintenance of the recycling bins	
☐ Training of new staff and retraining of existing ones	
☐ Provide an open channel for communication and feedback among all stakeholders	

For More Information

More information can be found at:

- www.nea.gov.sg/3r
- this QR code

- myENV mobile app

Locations of collection points for electronic waste, used lamps and 2nd hand goods, as well as Cash-for-Trash stations – where recyclables can be exchanged for cash – can be found on the myENV mobile app for mobile devices.

They can also be viewed on OneMap. For OneMap, visit https://www.onemap.sg and select Themes → Environment →[layer, e.g. Cash For Trash]