

3R Guidebook for Schools



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About this Guidebook

Along with the rest of the world, Singapore experiences the effects of climate change. Reducing waste and adopting a Circular Economy approach will directly support our climate mitigation efforts. Towards this end, achieving "Zero Waste Nation" status is a key national priority for Singapore. Everyone has a role to play on our road towards becoming a Zero Waste Nation. Visit <u>www.towardszerowaste.sg</u> for more information.



Aligning with the Zero Waste Nation objective, the 3R Guidebook is produced by the National Environment Agency (NEA) to help schools assess their current waste management practices, and identify opportunities to reduce, reuse and recycle waste materials so as to reduce their waste disposal needs.

Teachers/Staff tasked to promote 3R practices in their organisations can refer to the Guidebook for the planning and implementation of 3R plans.

What can be learnt from this Guide?

This guide is not intended as a "one-size-fits-all" solution to developing the best 3R programme for schools. 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 <u>http://www.nea.gov.sg</u> for more information.



The case for "Zero Waste"

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 currently, 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 at the current rate, there would be a need to build a new incineration plant every seven to 10 years. By 2035, the ash generated from waste incineration may have nowhere to go as Semakau Landfill is projected to run out of space by then. This presents an existential challenge for land-scarce Singapore and compels us to drastically cut the amount of waste we generate to conserve our landfill for as long as possible.



Tuas South Incineration Plant



Semakau Landfill

CHAPTER 1: INTRODUCTION

Strategies for Sustainable Solid Waste Management

Circular Economy Approach

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 livable 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.

Singapore's Zero Waste Masterplan outlines our plans to go further beyond these targets by building up "Three Resiliences" for Singapore - Climate Resilience, Resource Resilience, and Economic Resilience.





In order to achieve this, we have adopted a Circular Economy approach where the value of resources is maximised by keeping them in use for as long as feasible. This would not only conserve Earth's limited, shared resources, extend the lifespan of Semakau Landfill, but also minimise the carbon footprint of our waste management efforts.

Doing so will require measures to be adopted across the entire value chain, from sustainable production and sustainable consumption to sustainable waste and resource management.



CHAPTER 1: INTRODUCTION

Sustainable Production

When companies better manage their resources and reduce the amount of waste generated from conducting their business, both the environment and their bottom line stand to benefit. Some ways include sustainable design, improving resource efficiency and adopting industrial symbiosis where companies use the waste of others as raw materials for its own operations.

Sustainable Consumption

Rising disposable income levels have led to more comfortable lives for our current generation. But as our affluence grows, so does our consumption of goods and services. This in turn generates waste.

To promote a sustainable consumption culture, we need to do more and better with less. This can be achieved by having a 3R or "Reduce, and Reuse and Recycle" mindset, and by shifting towards the use of green products.

Sustainable Waste & Resource Management

Singapore has invested in infrastructure to collect, recycle and turn our waste to energy. Our Waste-to-Energy (WTE) plants, which reduce waste to ash, enable extensive space savings at Singapore's only landfill while recovering energy from waste.

At the same time, we want to reduce the landfilling requirements from any residue from the waste treatment process. This will reduce our carbon footprint from waste incineration and further extend the lifespan of Semakau Landfill.

The role of Singaporeans and schools

We have set our sights on closing the Waste Loop by encouraging Singaporeans to waste less and recycle more.

Schools can play their part by practising sustainable consumption and having a sustainable management through the 3R s – Reduce, Reuse, Recycle

CHAPTER 2: BENEFITS OF REDUCING, REUSING AND RECYCLING to SCHOOLS

What are the 3Rs?

The **3R**s stand for:

- <u>**Reduce**</u> to avoid waste at source so as to minimise the quantity of waste that needs to be treated or disposed of
- <u>Reuse</u> 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



• <u>**Recycle**</u> – 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 Schools

Schools produce significant quantities of waste such as paper and food which provide great potential for waste minimisation and recycling. Practising 3Rs may help to reduce waste disposal costs. However, the importance of practising the 3Rs in schools goes beyond cost savings.

Schools can play an important role in spreading the importance of the 3Rs to the environment. They can also lead by example and help inculcate the values of practicing the 3Rs for life by practicing the 3Rs.

Schools provide a good learning environment to shape habits. With a robust 3R programme in school, students can be more involved in practicing the 3Rs and in turn bring this habit home and to carry on this habit as adults.

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

If your school has an ongoing 3R programme, you may still use this Guidebook as reference. If your school is starting from scratch on the 3R journey, this Guidebook is intended to help you in developing and implementing a successful 3R programme for your school. The following six steps are recommended for successfully implementing a 3R programme in your school:



Step 1: Obtain the Support of Top Management

Management support (e.g. Principal, Vice Principal, or School Management Board) is vital for the success of any 3R Programme as 3R initiatives could require an investment in time, manpower and even funds. It could also entail changes in responsibilities of some staff 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 all staff and students.

Step 2: Form an Environmental Sustainability Team

The next step is for the school to form an Environmental Sustainability Team to oversee the 3R Programme for the school.

The Environmental Sustainability Team should comprise individuals with a passion for protecting the environment and who possesses strong leadership and communication skills. He or she should also be someone who is knowledgeable about the schools' operations, as well as its procurement and waste management procedures.



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 in the school. The objective of a waste audit is to profile the waste types by finding out information on: types of waste, quantity of each waste type, how they are generated, why they are 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 your 3R programme, after its implementation.

How to Conduct a Waste Audit?

A waste audit can be conducted by an <u>external waste auditor engaged by the school or inhouse</u>.

Different types of waste are generated in different parts of a school. Walk through the different areas within the schools on unannounced days of operations to observe existing practices, examine the contents in general waste bins, take stock of any waste reduction efforts that are already in place, and document findings.

Be sure to pay close attention to the areas and operations that tend to generate larger amounts of waste for instance:

- ✓ Canteens (food and packaging waste)
- ✓ Staff room (paper)
- ✓ General Office (paper and print cartridge waste etc.)

Stages of the waste audit:

Create An Audit Checklist

Create a checklist for all waste types generated from each area. Auditing waste in each department separately makes sure that relevant 3R initiatives can be tailored for the respective department if needed.

. Collect Waste Samples

Determine a few days of the week to make unannounced collection of waste samples from all the areas.

To ensure that the waste samples are representative, collect a full week's worth of samples 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 canteen in week 1, from classrooms and offices in week 2 and so on.

Give clear instructions to staff and cleaners who will be doing the waste audit on the locations and types of waste they will be collecting collection process. and how to label the collection bags / bins for identification of waste sources. Supervisors will need to closely supervise the waste sample.

Sample Audit Checklist

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

III. Sort the Waste

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

Analyse the Data and Record the Results

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

The Environmental Sustainability Team can then compile and enter all the data gathered into the checklists, by department, 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 and Implement 3R Practices

Identifying Recyclables

Recyclable wastes that are usually found in schools are listed in the table below. Do note that items sent for recycling should be not have food or liquid residue to prevent contamination. Contamination lowers the value of recyclable materials, and materials that are badly contaminated cannot be recycled at all.

	Paper	Office paper, cardboard boxes/packaging, newspapers, posters and beverage cartons
Common waste	Metal	Used food and beverage aluminium cans and containers, tin and steel cans and containers
types	Glass	Sauce bottles and jars
	Plastic	Mineral water bottles, sauce bottles, detergent bottles, food containers, food and goods packaging
Other waste types	Food	Raw and cooked food waste (excluding used cooking oil)
Guier waste types	E-waste	Photocopier and printer cartridges, electrical and electronic equipment of any kind to be discarded

After analysing the data from the waste audit, the Environmental Sustainability Team should be able to identify opportunities for intervention and develop strategies and procedures for 3R outreach and initiatives to target each waste type.

3R Practices for General Office			
Type of Waste		Practices	
Paper Waste	Reduce	 Set the default printing and photocopying settings throughout the school to "Double-sided". Avoid unnecessary print-outs by emailing soft-copies or faxing directly from the computer. Track and monitor printing and photocopying volumes of each employee. Encourage printing only when necessary and proofreading before printing. 	
	Reuse	 Reuse paper that has been printed only on one side. Reuse boxes to store items, and move equipment and supplies. 	
Others	Reuse	Use ink refillables for markers and pens	
Recycle	Recycle	Provide recycling bins	

3R Practices for Classrooms				
Type of Waste		Practices		
Paper Waste	Reduce	 Supply note pads with limited sheets. Provide soft copy notes instead of printing and supplying students with hardcopy notes where possible Encourage students to use reusable water bottles 		
	Reuse	Use leftover sheets of note pads as scrap paper		
	Recycle	Provide recycling bins		

3R Practices for Canteens (I)			
Type of Waste		Practices	
Plastic Waste	Reduce	 Use reusable lids, instead of cling wrap, to cover food in coolers and steam tables. Encourage staff and students to bring their own bag, containers and bottles to store takeaway food and drinks 	
Reuse	 Reuse containers for in-house activities, e.g. reuse plastic beverage bottles/containers for keeping small items. 		
	Reduce	• Purchase and cook only what is needed as over- purchasing or cooking can result in spoilage and wastage.	
Food Waste	Reuse (Re- distribution)	 Donate surplus food to local charities and the Food Bank which collects unconsumed food for distribution to the needy. 	
	Recycle	 Set up tray/utensil return area to allow students/staff to segregate food waste. Install a food waste digester to treat food waste on- site. 	





On-site food waste treatment at Kuo Chuan Presbyterian Primary School



On-site food waste treatment at Queenstown Secondary School

3R Practices for Canteens (II)		
Type of Waste		Practices
Packaging Waste	Reduce	 Use dispensers, small containers or dishes for sauces and condiments instead of individually wrapped packages to reduce packaging waste. Buy products with the least distribution packaging.
Paper Waste	Reduce	 Use rags and sponges to wipe spills instead of paper towels.
Others	Reduce	Avoid the use of disposables.Use washable hats and aprons for kitchen staff instead of disposable ones.
	Recycle	Provide recycling bins.



Teachers are encouraged to bring their own containers and canteen vendors charges for disposable food containers for both staff and students at Innova Primary School

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3R Practices for Schools' Events				
Type of Waste		Practices		
Paper Waste	Reduce	 Adopt paperless registration and e-marketing methods. Adopt e-communication methods. Minimise the distribution of hardcopy printouts. If prints-out are necessary, print on both sides. 		
Food Waste	Reduce	 Check with caterer on appropriate quantity of rice or noodles to order, as carbohydrate items are commonly wasted at catered events. 		
Packaging	Reduce	 Avoid giving out plastic bags Avoid the use of plastic bottled water. Provide water dispensers or water jugs and reusable cups. 		
Others	Reduce	 Avoid the use of disposables Avoid elaborate launch mechanisms, stage backdrops, signage, banners, exhibition booths or panels that are high cost and single use. Avoid giving out goodie bags as far as possible. If goodie bags are necessary, select items which are meaningful for the event and functional. 		
	Reuse	Collect lanyards and ID cases at the end of the event for re-use.		
	Recycle	 Co-locate general trash and recycling bins at visible and convenient locations. e.g. at entrance/exit of venue. 		

Step 5: Develop a 3R Programme

The Environmental Sustainability Team can develop a 3R programme for your school including:

- Targeted waste types for waste reduction, reuse and recycling,
- Details of the proposed 3R initiatives for targeted waste types,
- Any potential costs and / or cost savings,
- Estimated quantity of waste reduction (i.e. kg) for each waste type,
- Measurable performance indicators and targets, such as waste reduction or recycling rate,
- Timeline for achieving the targets.

A summary table of the 3R Programme, similar to the one below, can be created for ease of reference for the Environmental Sustainability Team.

Waste Type	Area	Proposed 3R option (reduce/ reuse/recycle)	Waste reduction/ reuse/recycling goal (kg)	Estimated costs/ savings	Start date	End date	Status

Summary of 3R Programme

Setting up Recycling Infrastructure

Evaluate the existing recycling infrastructure if any and ensure that a comprehensive and convenient network of recycling bins are set up to facilitate recycling for staff and students. Recycling bins should be easily distinguished from refuse bins. Recycling bins should be clearly labelled.

• Segregated VS 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.

MOE schools served by the Public Waste Collectors are provided with blue commingled recycling bins.

The recyclables collection system and the bin infrastructure within the school should be aligned to prevent confusion for the users, and recyclables from segregated bins should not be collected in commingled form so as not to erode users' confidence of the recycling system.



Segregated bins, each for 1 waste stream only



Commingled bin for multiple waste streams

Step 6: Implement and Improve the 3R Programme

For a successful implementation of the 3R Programme, the following are necessary:

Responsibilities and Resources

The Environmental IC or Environmental Sustainability Team should ensure that the various initiatives are carried out according to schedule.

Education and Promotion



3R initiatives should be well communicated to all stakeholders, i.e. staff, management and students, to gain their support. They should be clear about the goals and objectives of the 3R Programme to ensure its success.

The following communication measures could be used for creating awareness and promoting participation:

 Conduct briefing for all staff on 3R initiatives and how they can participate (e.g. 3R tips, location of recycling bins, how not to contaminate the recyclables, etc.) – for new staff, this should be part of an orientation programme Make the 3R Programme (implementation schedule with goals) easily accessible through intranet or via notices/posters at prominent staff locations Display reminder notices at strategic locations, e.g. poster/e-message to encourage staff to reduce paper waste printing or photocopying areas, posters to remind staff to reduce paper waste printing or photocopying areas, posters to remind staff to reduce food waste at canteens Make 3R tips available to staff through the intranet and emails Share and update 3R initiatives and waste reduction results periodically with staff 	Staff	Students
	 Conduct briefing for all staff on 3R initiatives and how they can participate (e.g. 3R tips, location of recycling bins, how not to contaminate the recyclables, etc.) – for new staff, this should be part of an orientation programme Make the 3R Programme (implementation schedule with goals) easily accessible through intranet or via notices/posters at prominent staff locations Display reminder notices at strategic locations, e.g. poster/e-message to encourage staff to reduce paper waste printing or photocopying areas, posters to remind staff to reduce food waste at canteens Make 3R tips available to staff through the intranet and emails Share and update 3R initiatives and waste reduction results periodically with staff 	 Inform students of the nearest recycling bins Display reminder notices at strategic locations, e.g. poster/e-message to encourage students to reduce paper waste printing or photocopying areas, posters to remind students to reduce food waste at canteens

<u>3R Outreach in Schools</u>



Dissemination of information on 3Rs to staff through email and students pledging to protect the environment online at St. Anthony's Primary School



Assembly talk on Year towards Zero Waste Campaign by Environment Champions and Environment Champions engaging the students in washing the recyclables before depositing in the recycling bins at Mee Toh School

Monitoring, Evaluation and Improvement

- Obtain monthly waste and recycling tonnage reports (this could be requested from the collector/s) to monitor waste reduction and recycling performances against the targets set
- Maintain records of waste disposal fees and recycling collection fees/revenue to calculate monthly cost savings in the form of reduced disposal costs and/or revenue obtained from the sale of recyclable items
- Work with collectors to place recycling bins at strategic locations within the schools
- Conduct routine inspections of recycling bins to identify sources of contamination and misuse, if any. If contamination levels are high, engage staff and students through various avenues to inform them of what cannot be thrown into the recycling bin.
- Encourage staff and students to provide feedback or ideas to improve the school's 3R practices
- Conduct annual reviews of the 3R Programme this includes a waste audit to identify new 3R opportunities, making changes to initiatives if needed and setting higher waste reduction/recycling targets

Useful Resources for the Environmental Sustainability Team

Zero Waste Masterplan maps out Singapore's key strategies to build a sustainable, resource-efficient and climate- resilient nation.	https://www.towardszerowaste.sg/zero -waste-masterplan/
myENV mobile app provides information on the Locations of collection points for electronic waste, used lamps and 2 nd 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.	NEA
Information on 3Rs:	
Information on the recycling process	https://www.nea.gov.sg/our- services/waste-management/3r- programmes-and-resources/types-of- recyclables-and-recycling-processes
Video on What happens to the recyclables after they are collected from the blue trucks	https://www.youtube.com/watch?v=gB Jo6VyN0R8&feature=emb_title
List of recyclables	https://www.nea.gov.sg/docs/default- source/our-services/waste- management/list-of-items-that-are- recyclable-and-not.pdf

Useful Resources for the Environmental Sustainability Team





Useful Resources for the Environmental Sustainability Team

Information on food waste:	
Love Your Food @ Schools: Food Waste Reduction and Recycling Resource Kit	https://www.cgs.gov.sg/docs/default- source/resources/nea-a4-lyf17a-2019- resource-kit_v9.pdf
Video on Food waste reduction	https://www.youtube.com/watch?v=bs mZzYD11_4
Food Waste Reduction Collaterals:	
Food Waste Reduction Posters	https://www.cgs.gov.sg/docs/default- source/resources/9303_nea_a2_4type.pdf
<text><text></text></text>	English-malay