



Good food, Good life



# BE AN ACE AT REDUCING WASTE

A Teen's Guide to Solid Waste Management



## NESTLÉ IS WORKING TOWARDS A WASTE-FREE FUTURE



The quality of our environment largely determines the quality of our physical health and well-being, and solid waste management is certainly a pressing concern in environmental health. Let's look at some numbers from a study done by World Bank (2018):

- An estimated 2.0 billion metric tons of waste was generated worldwide in 2018.
- It is estimated that by 2050 — a mere thirty years from now — 3.4 billion metric tons of waste will be generated worldwide.

### OUR COMMITMENT

We at Nestlé believe that we all have a role to play in conserving our natural resources, protecting the environment, and reducing the amount of waste we generate.

Nestlé is deeply committed to making our packaging 100% recyclable or reusable by 2025, as part of our vision that none of our packaging ends up as litter or in landfills. We have also committed to reduce the use of virgin plastic by 1/3 by 2025.

To achieve this, Nestlé has been exploring multiple solutions in three core areas:

- Innovating to develop the **packaging** for the future;
- Helping to increase **collection, recovery and recycling of waste** in an effort to shape a waste-free future;
- Helping to drive **new behaviors and understanding** on the proper management of waste.

### PARTNERING WITH THE NEXT GENERATION

We recognize that we will not achieve our vision alone, so this activity book was developed with the third core area in mind—recognizing the power of the youth to change the future, starting from the choices and habits that you make today.

Through these activities, we hope to partner with you to:

- Think about how we produce and consume products, and its effects on the environment;
- Practice the 3Rs – Reduce, Reuse and Recycle – consistently, and urge others to do the same;
- Be more mindful about the waste we generate, and how to manage that waste properly.

Since a significant amount of solid waste is generated in homes, we hope that these modules will encourage you to take responsibility for proper waste management in your own home and advocate for it in your community. Join us and be a *kasambuhay* for the environment!

**Nestlé Philippines, Inc.**

### Our Panel of Experts and Module Developers

These materials were developed by Nestlé Philippines under the guidance of Corporate Affairs Executive and Head of Nestlé's Plastics Task Force, Misha Rabat, and experts from multiple sectors, with the endorsement of the National Solid Waste Management Commission of the Office of the President. This module is a condensed version of the Solid Waste Management Module created for schools under the Wellness Campus program, in partnership with the Department of Education. Our team of content and material developers included the following:

Commissioner Crispian Lao is the Founding President of the Philippine Alliance for Recycling and Material Sustainability (PARMS) and is the Private Sector Representative from the Recycling Industry Sector of the National Solid Waste Management Commission.

Angela Abaya-Garcia has been developing modules for Nestlé Wellness Campus since 2015. She has a master's degree in Psychology from the Ateneo de Manila University and is pursuing a PhD in Educational Psychology at De La Salle University, where she is also a part-time faculty member of the Br. Andrew Gonzalez College of Education.

Film-maker, author and Komiket Co-Founder Paolo Herras and his creative team at Komiket were engaged to develop cartoon characters and illustrated stories that make our materials more appealing to young learners, helping them visualize the attitudes and behaviors our modules aimed to develop.

Dedet Reyes Panabi has been a writer and editor for over 25 years. She was editor-in-chief of Working Mom Magazine, and worked for digital marketing agencies in Singapore, Canada and Australia.

Completing the team is graphic designer, Jake Ruiz, with more than 10 years of experience in graphic design, as well as 8 years in teaching visual communication.

# TABLE OF CONTENTS



## 4 A CIRCULAR ECONOMY



## 13 ZERO IN ON WASTE



## 16 COMMUNITY SOLUTIONS



## 19 WHAT IS THE RIGHT WAY TO SEGREGATE WASTE?



# A CIRCULAR ECONOMY

## KEY POINTS

- To make many of our everyday products, manufacturers must extract virgin resources from the Earth and process these materials in manufacturing plants. They are then transported and distributed to consumers, requiring products to be packaged in order to maintain their quality as they are being transported.
- Extracting, processing, and transporting natural resources may cause problems for our environment, such as:
  - Pollution of our land, water and air
  - Emission of greenhouse gases into the atmosphere, which can lead to climate change
  - Destruction of animal habitats or disruption of ecosystems
- Renewable resources are those that can be replenished almost as quickly as they are used, such as the sun and wind used for generating energy.

Trees, plants and animals are also renewable resources but need time to replenish, so we need to be careful with how we use these.

- Non-renewable resources are those that take millions of years to regenerate, such as minerals and fossil fuels.

We need to change our mindset about how we use the products that are made from these.

- In a Linear Economy, natural resources are taken and made into products that are used and then disposed as waste. If we do not manage our consumption and waste properly, we risk the availability of non-renewable resources, and generate waste that may further harm our environment.
- We should embrace the concept of a Circular Economy where products are designed to be used again, or built to last. A circular economy aims to recover materials for further use, rather than resorting to extraction of virgin, raw materials.

## OBJECTIVES

**By the end of this lesson, you shall be able to:**

- Explain how the production of various products impacts our natural resources and environment.
- Explain the concepts of a Linear versus a Circular Economy and the advantages of a Circular Economy for our environment.



Everything we use is made from natural resources. Write down 5 things in your room. Do research on how each item is made and what they are made of. List the parts and materials of each item in the second column. Estimate how long you can use it before you need to throw it away. (An example is provided in the first row.)

Object	Parts and Materials	Time of Use
Ballpen	Plastic case and cap Pen tip: brass (an alloy of copper and zinc) Ink: oil and pigments	2 months

Everything we use, their parts and materials, are taken from the Earth. Trees, plants and animals are used to make paper products, food and clothing. Minerals and sand are used to make metal and glass products. Gas, oil and fossil fuels are used to make plastic products.





# THE STORY OF A DIAPER

Let's look at this process of **TAKING** and **MAKING** in the case of a disposable baby diaper.

1

## EXTRACT RAW MATERIALS

Raw materials are natural resources in pure, untouched form. A disposable baby diaper uses raw materials like wood pulp (for the absorbent inner material) and oil (for the plastic, leak-proof lining). These raw materials need to be extracted from their source.



2

## TRANSPORT RAW MATERIALS

Raw materials are then transported or shipped to facilities where they are manufactured into other materials. Wood pulp is mixed with other components to become soft, white and absorbent. Plastic is molded into thin sheets for lining.



3

## MANUFACTURE THE PRODUCT

Processed materials are brought to yet another facility, where they are put together to form the finished product. The product is also placed inside packaging to keep it clean while it's transported, or stored in warehouses.



4

## DELIVER FINISHED PRODUCT

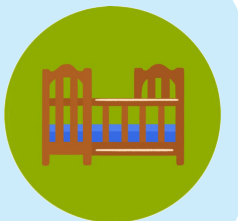
The product is eventually brought to a place where it can be sold, like a supermarket or grocery store.



5

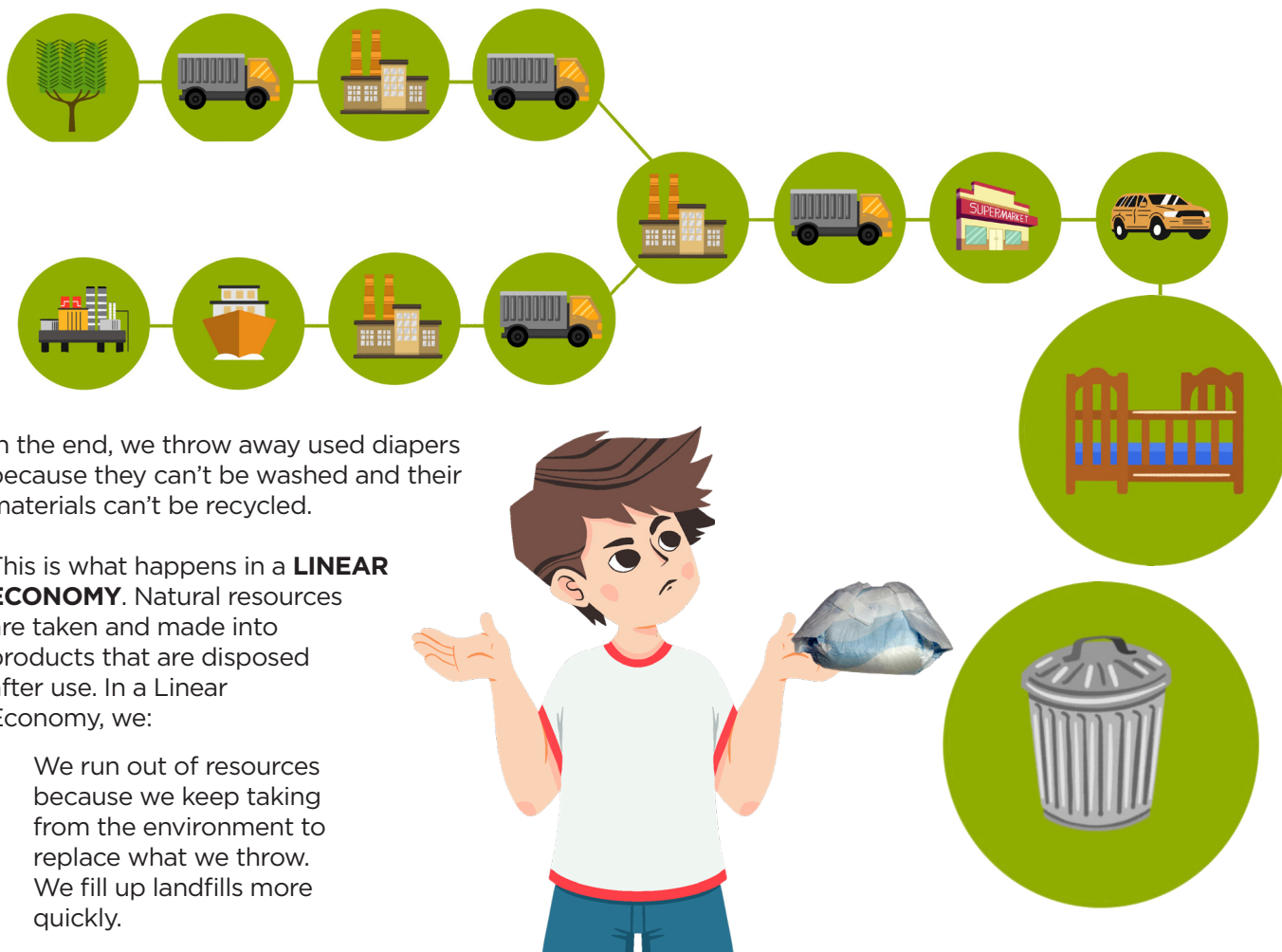
## PURCHASE THE PRODUCT

The people who buy the product then transport it to their homes, where they use it for their babies.

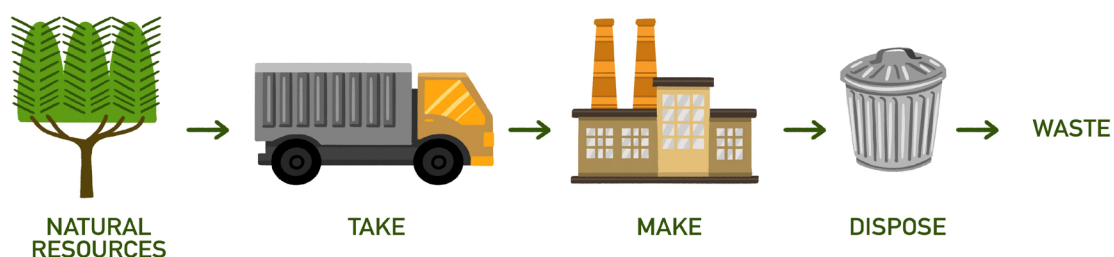


But wood pulp and plastic are not the only natural resources that were used to make a diaper. In this process, the materials were TRANSPORTED several times and were MANUFACTURED in several facilities. Transporting and manufacturing both use up fuel and electricity, release carbon dioxide and other chemicals into the air.

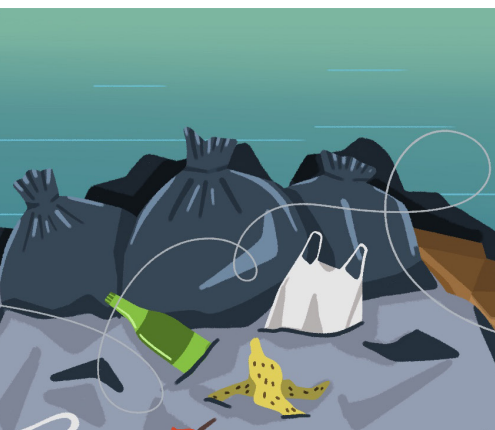
They may also produce chemical wastes, and if these are improperly discarded, they can contaminate our land, water table and waterways.



## LINEAR ECONOMY



Natural resources are taken and made into products that are disposed after their use.



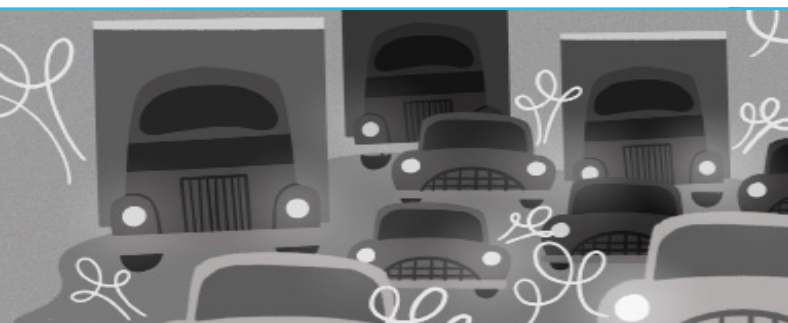
When we **TAKE** from the environment to **MAKE** a product, this has various effects on the environment.

- It uses up natural resources, which may also result in deforestation, destruction of animal habitats or disruption of ecosystems.
- It produces gases and chemical waste that can pollute the land, water, and air.
- It emits greenhouse gases into the atmosphere which can cause global warming and climate change.

Aside from these effects on the environment, we need to remember that not all of our resources are renewable.

**Renewable resources** can be replenished almost as quickly as they are used (ex: sun, wind, water).

**Non-renewable resources** take years to regenerate, such as minerals. If we are not careful about how we use them, we may not have enough for our use in the future.



### DID YOU KNOW?

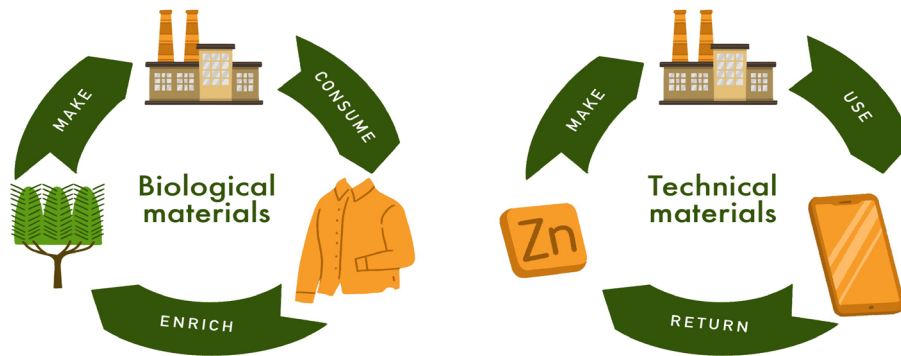
**Global warming** is the increase in the average surface temperature of the Earth. **Climate change** includes global warming and extreme weather conditions like heavy typhoons and droughts.



We need to shift our thinking and behavior toward a **CIRCULAR ECONOMY**. In a Circular Economy, we maximize the use of, and reduce the need for, new raw materials.

Products are designed to last in such a way that we lessen the resources we need to take from the Earth. They are designed so that their components can be reused, repaired, or recycled - and not merely disposed. In a Circular Economy, used materials are recovered for further use.

## CIRCULAR ECONOMY



Products are designed in such a way that we lessen the resources we need to take from the Earth.



To help you understand this concept, let's imagine a typical forest filled with trees and plants.

Insects like grasshoppers and caterpillars eat plants and trees. These insects are eaten, in turn, by small animals such as birds or frogs. Birds or frogs are preyed upon by larger animals, such as snakes. When a snake dies, it decomposes and returns to the ground. Its decomposing body provides nutrients to the soil that allows trees and plants to grow — and the cycle starts all over again.

In the forest, nothing goes to waste. This is similar to what a CIRCULAR ECONOMY aims to achieve.



# THE STORY OF A WATER BOTTLE

Now let's look at the process of making a water bottle.

1

## EXTRACT RAW MATERIALS

In the case of a plastic bottle, the raw material is oil and fossil fuel, and these are extracted from the ground.



2

## TRANSPORT RAW MATERIALS

The raw material is shipped to a facility where it is made into plastic material. At this point of the process, the raw material is already formed into plastic, but not yet formed into a water bottle.



3

## MANUFACTURE THE PRODUCT

The plastic material is transported yet again to another facility that molds the plastic into the shape of bottles.



4

## ASSEMBLE THE FINISHED PRODUCT

The empty plastic bottles are taken to yet another facility and filled with clean drinking water. The bottled water is then sealed and stored in packaging boxes to protect the contents.



5

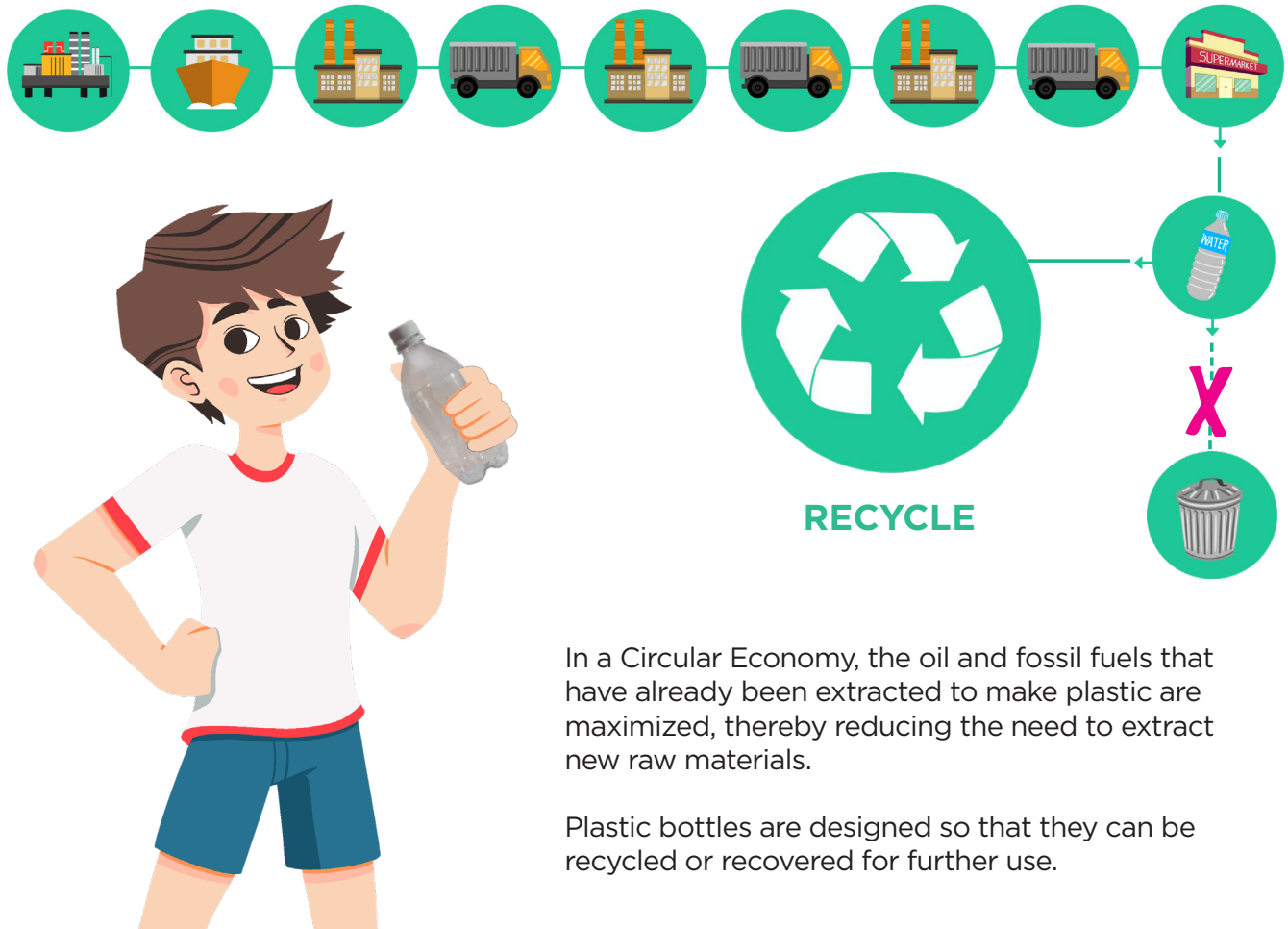
## PURCHASE THE PRODUCT

The bottles are transported yet again, to either a warehouse or to places where they can be sold, such as a supermarket or convenience store. Customers go there to buy the product.



Plastics are made from raw materials like oil and fossil fuel, which are extracted from the ground. The raw materials go through a lot of processing that uses up fuel and energy. Transporting the materials from one manufacturing facility to another also uses up fuel and releases chemicals like carbon dioxide into the air. And after all that, people use them once and then throw them away.

But in a **CIRCULAR ECONOMY** we look for ways to avoid having to extract more oil to make plastic bottles. We gather used plastic bottles and recycle them for future products, rather than simply throwing them away.



In a Circular Economy, the oil and fossil fuels that have already been extracted to make plastic are maximized, thereby reducing the need to extract new raw materials.

Plastic bottles are designed so that they can be recycled or recovered for further use.

## Appliances in a Circular Economy



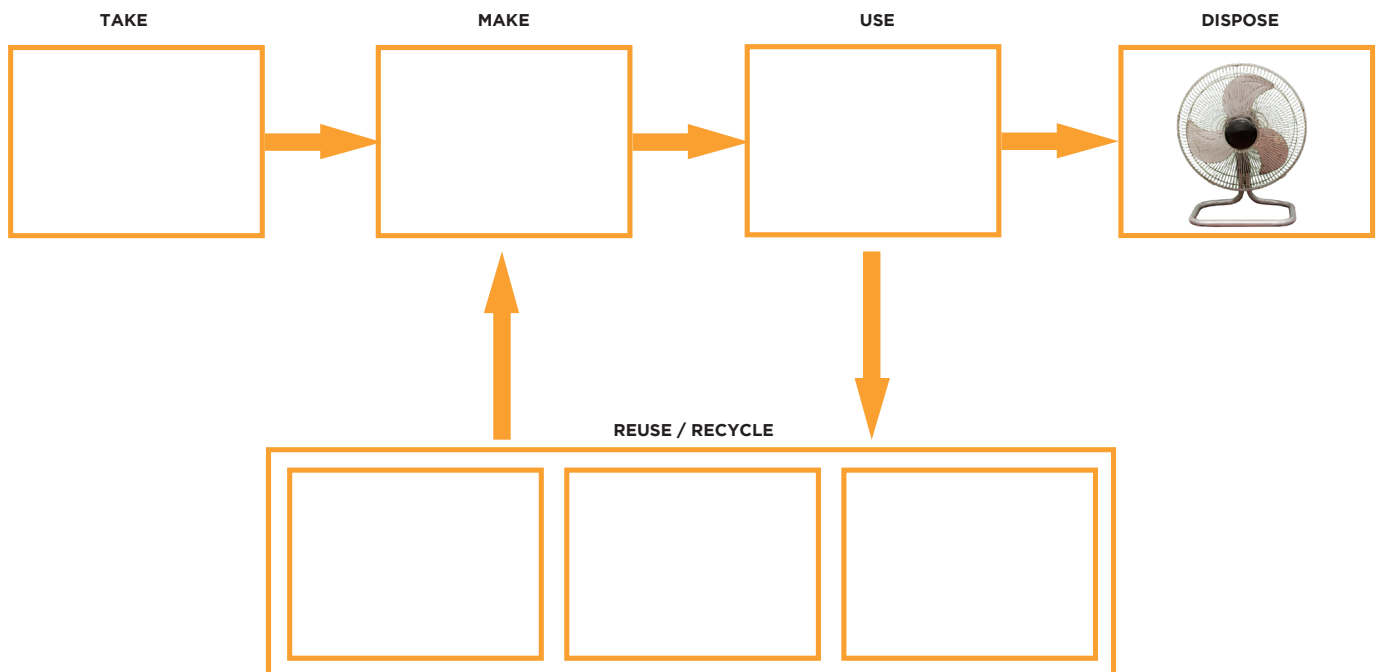
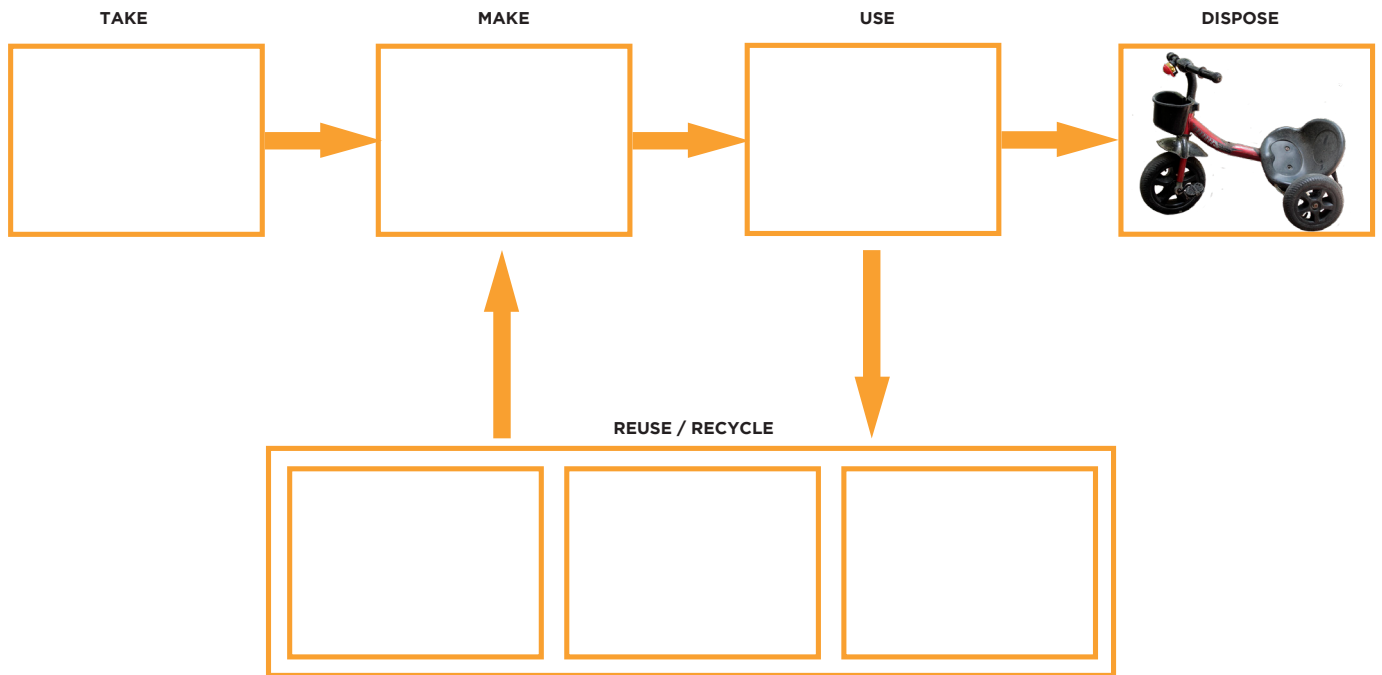
Household appliances are often made of metal and plastic parts. In a Linear Economy, these appliances would most likely end up in a garbage dump. In a Circular Economy, the manufacturer makes sure that:

- The different components can be easily replaced or repaired;
- Parts that can't be replaced or repaired can be made of compostable or recyclable materials;
- There is a way to retrieve old appliances for disassembly, and segregate parts for decomposition or recycling.



## MAKE IT CIRCLE

1. Identify the major components of a bicycle and an electric fan.
2. Think of how they will be discarded in a Take, Make and Dispose model.
3. In the space below, describe how they can be reused and recycled in a Circular model.







# ZERO IN ON WASTE

## OBJECTIVES

**By the end of this lesson, you shall be able to:**

- Explain how we can protect our natural resources and environment by avoiding or reducing waste, and prioritizing use of products that can be recycled or reused.
- State the importance of practicing the 3Rs: Reduce, Reuse and Recycle.
- Give examples of how to practice the 3Rs.

Ultimately our goal is to control the amount of natural resources that we need to take from the environment and minimize the amount of waste we generate.

### Waste Management Hierarchy



**Avoiding waste should be our priority.**

If we cannot avoid waste, then we should practice the 3R's of **Reduce**, **Reuse** and **Recycle** to save our environment and lessen the waste that ends up in a landfill.





## REDUCE

Purchasing only what we need helps to lessen the number of things that eventually end up as waste. Ask yourself:

- Do I really need this item?
- Can I borrow this instead?
- Will it just end up as waste?

Buying in bulk also reduces waste. It takes longer to use up a product that we buy in bulk and this reduces the amount of packaging that is used up.



## REUSE

Look for ways that items can be used over and over instead of just throwing them away. Ask yourself:

- Can I donate this item?
- Can I find reusable alternatives to disposable items?
- Can an old item be repurposed?



## RECYCLE

Recycling plants can turn waste into usable materials. Sort your waste and give recyclable items to a junk shop or your *basurero*, who can send it to recyclers for you.

- Clean, dry newspaper can be recycled to paper.
- Plastic can be processed into fabrics, bottles, and new plastic items.
- Glass can be processed into new glass bottles and jars.
- Metal is remelted to make new items.

## DID YOU KNOW?

Products come in different forms of packaging, which plays a big role in a product's quality and safety. Packaging:

- Protects the inner contents from getting wet or being exposed to elements that can affect its quality or cause spoilage.
- Prevents contamination from germs and bacteria that could make you sick.
- Protects the product while it is stored and transported, especially if the factory is far away from the places where it is sold.
- Gives important information about ingredients, calories, nutritional value that can help you make better food choices and avoid food that you're allergic to.

**So you see, packaging is necessary, but we can opt for packaging that is recyclable or reusable.**



## LET'S TRY THIS!

### CARE FOR THE EARTH CHALLENGE

Here are nine challenges to show you care for the environment! How many can you do in one week? For each challenge you accomplish, describe what you did or how you did it in the space provided.

<b>Segregate your waste</b>	<b>Show your parents three ways to reduce the waste you generate at home</b>	<b>Reuse a water jug for three days straight</b>
<b>Take an item that you were about to throw away and turn it into something useful</b>	<b>Use less paper or plastic bags</b>	<b>Reduce food waste</b>
<b>Donate an item instead of throwing it away</b>	<b>Recycle an item</b>	<b>Use less paper</b>

## LET'S BE MINDFUL

How mindful are you about managing waste? Answer the questions below to find out.

		YES	NO	Don't Know
1	Does your family use a separate container for each type of waste? (i.e. compostable, non-recyclable, recyclable and special waste)			
2	Does your family consistently set aside recyclable materials to be turned over to a recycling center or materials recovery facility?			
3	Does your family make a consistent effort to prepare waste items for collection, such as: <ul style="list-style-type: none"> <li>cutting or folding items (such as boxes or steel) to save space</li> <li>separating broken glass, by color, in sturdy containers</li> <li>separating white paper from colored paper</li> <li>cleaning and drying items that have potential for recycling, such as used beverage cartons or food cans</li> </ul> (If you answer NO to any one of the above bullet points, then your response for the entire item should be NO.)			
4	Do you know where the collected waste is taken for final disposal when it leaves your neighborhood?			
5	Do you know whether the final disposal of your barangay's waste is environmentally safe and sustainable?			



# COMMUNITY SOLUTIONS

## KEY POINTS

- Waste can be classified as biodegradable and non-biodegradable.
- Biodegradable waste are those that can be broken down by microorganisms naturally, such as leftover food, paper waste, or plant waste. Biodegradable waste can be used as compost for gardens or to feed animals.
- Non-biodegradable waste cannot be broken down by microorganisms, and these can stay on the earth for thousands of years. Non-biodegradable waste can be further segregated into the following categories, which also is the basis for their proper disposal.
  - Recyclable waste includes plastic, dry paper, metal, glass. These are sent to recycling centers for further processing.
  - Residual waste pertains to items that have been soiled by food scraps or oil, and these may or may not be further processed for recycling. Residual waste that do not have the potential to be recycled are to be segregated for transport to a sanitary landfill.

- Special waste pertains to items which require special handling or treatment in a particular facility:
  - Hazardous waste that contain toxic materials or chemicals
  - Healthcare waste that contain infected materials and require special handling.
  - Bulky waste that require special hauling arrangements due to their size and physical attributes.
- Republic Act No. 9003, also known as the Ecological Solid Waste Management Act of 2000, describes the responsibilities of each city/municipality, barangay and household in protecting public health and environment through solid waste avoidance and volume reduction, and proper segregation, collection, transport, storage, treatment and disposal.

## OBJECTIVES

### By the end of this lesson, you shall be able to:

- Define what is meant by waste and classify different types of waste.
- Identify the proper means of disposal for different types of waste.
- Explain why proper waste disposal is important to our health and well-being.
- Describe responsibilities of each city/municipality, barangay and household under the Ecological Solid Waste Management Act of 2000 (Republic Act 9003).
- Teach and encourage family members, neighbors, and the community to segregate waste properly.



Reducing, reusing and recycling items can make a big difference in lowering the waste we generate — but we still have to think of responsible ways to manage whatever waste is left. Here are some alternatives to putting them in landfills.

Waste treatments can help minimize the space that waste occupies, remove toxic effects, and use waste to generate energy. This includes:

### Pyrolysis

Waste materials are exposed to very high heat with little or no oxygen. This controls emissions and produces a liquid that can be upgraded to fuel. It is an alternative energy source to non-renewable resources like oil and coal.

### Co-Processing

Cement factories place waste in kilns as a substitute for coal for energy generation.

### Waste-to-Energy

Waste is thermally treated to generate heat to run steam turbines to generate electricity.



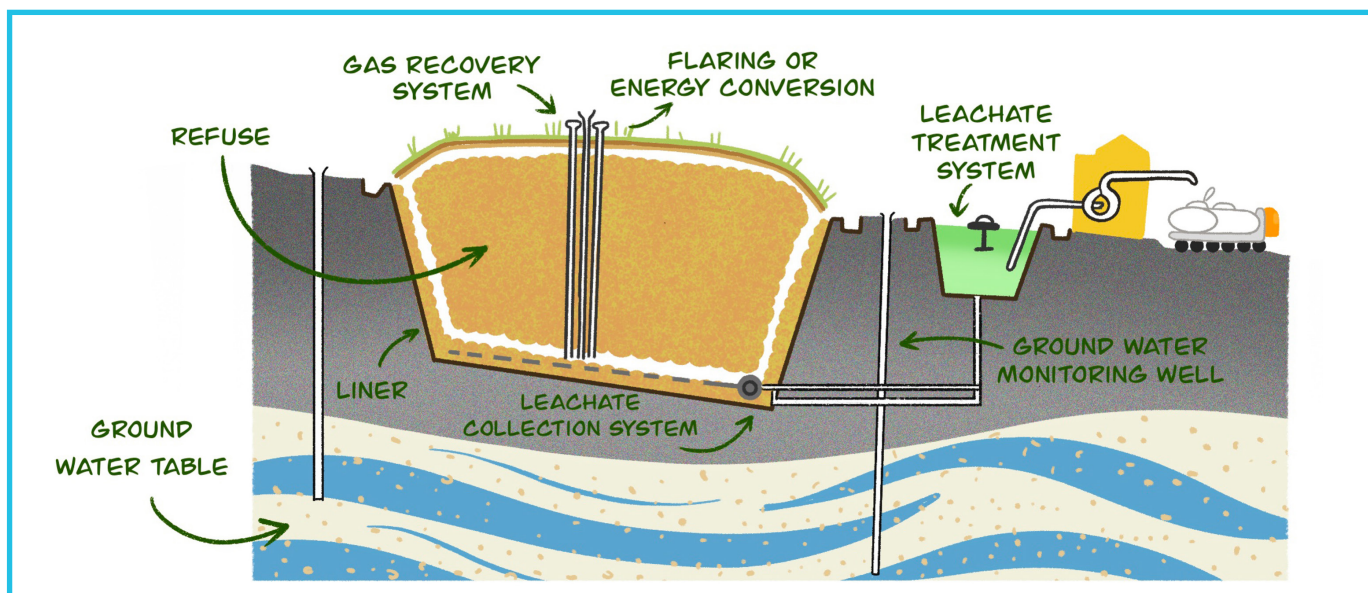
#### DID YOU KNOW?

The World Bank estimates that by 2025, solid waste being produced by Philippine cities will go up by 77,776 tons per day.<sup>1</sup>

According to the National Solid Waste Management Commission (NSWMC), 52% of this waste is biodegradable, and 28% is recyclable.<sup>2</sup> Segregating waste can help minimize the amount of trash that goes into landfills!

<sup>1</sup>World Bank. (2012). What a Waste: A Global Review of Solid Waste Management.

<sup>2</sup>Senate Economic Planning Office. (2017). Solid Wastes at a Glance.



The last resort is waste disposal in **sanitary landfills**. The Philippines lacks available and acceptable land for disposing our waste, and 70% of our waste (as of 2019) was illegally disposed on open and controlled dumpsites. Open dumpsites pose health risks, such as:

- Affecting the water table where we get our drinking water
- Polluting waterways
- Causing accidents like trash slides
- Producing methane gas

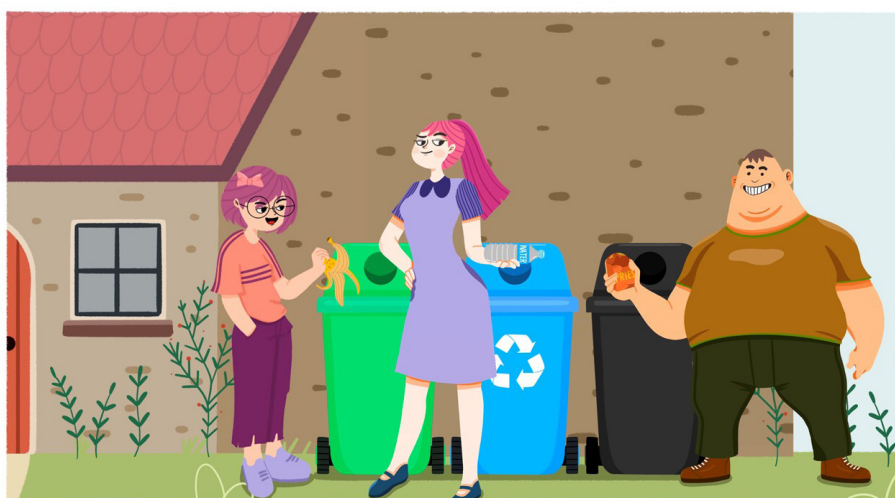
## TRASH TO TREASURE

When properly harnessed, methane gas can be used as fuel, and can produce electricity and heat.

A sanitary landfill is carefully designed to prevent chemicals and unsafe substances from contaminating the surrounding soil and water, and the water table beneath it.

In these landfills, layers of garbage are alternated with layers of soil. This controls odors, allows the garbage to decompose more rapidly, and also helps keep the piles stable to prevent erosion and trash slides.

When a landfill is full, it is sealed and covered with a thick layer of clay soil. It is left to settle for a very long time—roughly 20 to 30 years—and once it has been evaluated as safe, the land is converted back into a park or open space for recreation.



This is why it is so important for us to segregate our waste properly at home. This simple step makes it easier for waste materials to go to the right recycling facility, or be properly treated before being sent to a landfill.

# WHAT IS THE RIGHT WAY TO SEGREGATE WASTE?

## ALWAYS separate BIODEGRADABLE WASTE.

This includes **kitchen waste** like leftovers, vegetable peelings, and **garden waste** like dried leaves, grass, plant stems and branches.

Biodegradable waste can be used for animal feed or composting for fertilizer. If you do not have a pet, you can give it to a neighbour who does.

Each barangay is also supposed to collect food waste and biodegradables for composting.

Not separating biodegradable waste will contaminate the non-biodegradable waste, making it unsuitable for recycling.

## HOW MUCH DO YOU THROW?

Want to know how much food waste you generate? Try this:

Place your food waste in an empty tub after every meal. Once you fill up a tub, you may dispose its contents, but keep track of how many tubs you fill up in a week. Ask your friends to do the same and analyze how much food waste you all could potentially generate in a week, a month, or even a year.

Challenge each other to reduce your food waste and measure your progress.



### Kitchen Waste or Food Waste



### Garden Waste



## Segregate the different kinds of NON-BIODEGRADABLE WASTE.

Non-biodegradable waste do not decompose. There are three kinds: **recyclable**, **residual** and **special**.

### Recyclable



### Residual



### Special



## Give recyclable waste to junk shops, *bote-dyaryo* or recycling centers.

Prepare them beforehand so they can be recycled properly.

- Make sure newspapers are not soiled.
- Rinse and dry glass, plastics and metals so they are clean when they are picked up.
- If glass is broken, place in a sturdy container so the pieces don't injure trash collectors.
- Try not to mix different colors of glass.

## DID YOU KNOW?

When recyclable waste like plastic comes in contact with kitchen waste, it's harder to reuse or recycle them. ALWAYS segregate your "wet" and "dry" trash.



### Clean up residual wastes.

These are items such as sachets and used beverage cartons. Some paper mills are equipped to recycle beverage cartons. There are a number of recycling facilities as well that can take in sachets and turn them into different products like bricks. Find out if there is one near where you live so you can separate these items for recycling.

Just cut any beverage carton or packs open, empty contents, rinse and dry. Any straws should be pushed back in the pack before handing these boxes over to be recycled.

Sachets should be clean and dry before sending these to collection points or recycling facilities.



### Dispose of special waste properly.

There are three sub-categories of special, non-biodegradable waste. The first is **hazardous waste**. These should not be thrown away with other wastes because they contain toxic materials and must be registered with the Department of Environment and Natural Resources in order to obtain the necessary permits for their disposal.

The two other kinds of special waste are **healthcare** waste and **bulky** waste. These also need special hauling and handling.



## REPUBLIC ACT 9003: ECOLOGICAL SOLID WASTE MANAGEMENT ACT OF 2000

- Each household is responsible for sorting and segregating their waste, selling recyclables directly to recycling centers, or making sure that recyclables are retrieved.
- Each household should use separate and appropriately marked containers for compostable, recyclable, residual and special waste.
- Each household is encouraged to do their own composting, or make sure that compostable materials are separated for the barangay to retrieve.
- Each barangay is responsible for forming a committee that will ensure that biodegradable/ compostable and recyclable waste is segregated and properly collected.
- Each barangay must establish a Materials Recovery Facility to retrieve recyclables that can be sold to recycling centers.
- Each barangay must also have facilities for composting.
- It is the city or municipality's responsibility that all residual and special waste is collected transported, treated or disposed in a way that protects the public's health and the environment.



## WHAT DID WE LEARN?

Identify examples of each category of waste. Note down important guidelines for managing each kind of waste.

Category of Waste	Examples	Important Guidelines for Managing Waste
<b>Biodegradable</b>		
Food / Kitchen Waste		
Yard Waste		
<b>Non-Biodegradable</b>		
Recyclable		
Residual		
<b>Special</b>		
Hazardous		
Healthcare		
Bulky		

## LET'S TRY THIS!



Can you and your family take the Waste-Free Challenge? For one day, go through an entire day without throwing away any trash in any trash can.

Take note of opportunities when you were able to avoid throwing something away. Remember what you were doing, and how you were able to think of a way to reduce/reuse/recycle. At the end of the day, discuss as a family:

- Was it easy to accomplish a waste-free day?
- If yes, what were your strategies for avoiding waste?
- What difficulties did you experience?

Brainstorm how you can work together to reduce waste and properly dispose of it.

## CHALLENGE YOUR FRIENDS

Gather a group of friends and see who can correctly list the most number of items for each waste category:

- Biodegradable
- Recyclable
- Residual
- Special - Hazardous
- Special - Healthcare
- Special - Bulky

