INTRODUCTION TO FOOD WASTE

The lesson introduces students to what happens to our food waste and suggests new ways we can think about waste

LESSON OBJECTIVES

Students will be able to:

- Understand what currently happens to the food we throw away
- Understand that almost everything is in limited supply
- Understand the concept of waste as a resource, rather than as a problem

PART 1 – INTRODUCTION

- Begin by splitting pupils into groups of 3-5. Together they will brainstorm ideas for 5 minutes to answer the question: What happens to a banana peel when it is thrown away? Consider the following. Where does it go? How does it get there? What happens to it in the long term?
- Reconvene and share ideas as a class. Ideally some ideas put forward will include or relate to landfill, composting or reusing. Finish the segment by summarising and explaining those options using the first section of the attached 'Introduction to Food Waste' fact sheet. The video may also be used (~2 minutes) to aid in explanation.
- A matching activity can be undertaken by mixing up the bullet pointed pros/cons of the three options. Three headings - landfill, composting, anaerobic digestion - can be written on the board, and students must decide which advantage/disadvantage belongs to each heading.

PART 2 – DISCUSSION

- Introduce the idea of circular economy, using the factsheet, emphasising the idea that whether something is waste depends upon how you view it.
- Ask the students to go back to their groups. Allocate 5 minutes for them to come up with an idea of something they could make out of banana peels. Ideas can be silly or serious, anything from making clothes to making a space rocket.
- Reconvene and allow them to share ideas with the class for 5 minutes.

PART 3 – APPLICATION

- Finally, use the last section of the fact sheet to discuss some actual uses of food waste that have been invented.
- Visit the websites and give students 5 minutes to write 3-4 sentences on which product they thought was the best and why they thought so.
- Now ask the class what they think can be done to change the ways we deal with food waste. Give them two focuses:
    - What can we as citizens do about food waste?
    - What should the government/council do about food waste?

Introduction to Food Waste
Age Range: 13-16 years

SUMMARY OF TASKS

RESOURCES/ EQUIPMENT

- ‘Introduction to food waste’ fact sheet

HOMEWORK/ EXTRA ACTIVITIES

- Find one more use of food waste that has been invented. What food does it use? What product do they make? Is that product available to buy yet?

FACT SHEET: INTRODUCTION TO FOOD WASTE

FACT SHEETS HAVE BEEN DESIGNED FOR TEACHER USE TO AID CREATING OF TEACHING RESOURCES, OR THEY ARE FREE TO BE REPURPOSED FOR STUDENT USE.

PART 1 - WHAT HAPPENS TO OUR FOOD WASTE?

Food waste in our homes may be treated differently depending on what services your local council offers.

Food waste thrown directly into general waste will likely end up in landfill. Here it decomposes gradually with the aid of microorganisms. The matter from the food is mostly converted to pollutant gases like carbon dioxide and methane, which escape into the atmosphere.

A dedicated organic waste bin likely means your food waste goes to either:

1. A large-scale composting facility, where garden waste and food waste are compacted and kept at around 70 Celsius for about 4 weeks, before being spread and matured into fertiliser which is applied to land.

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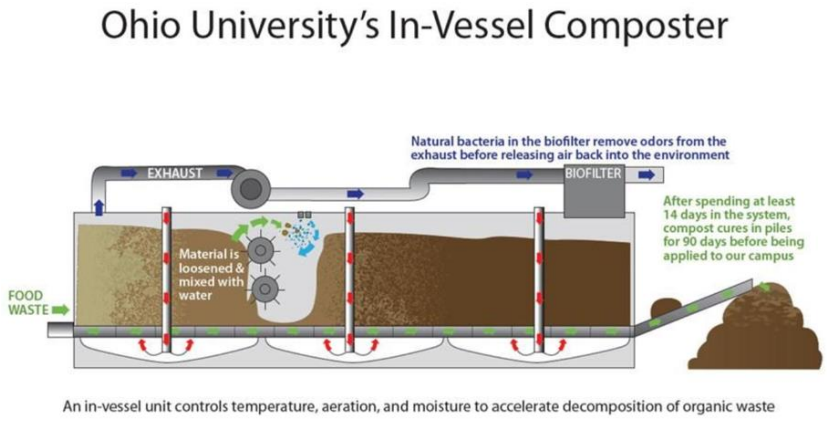
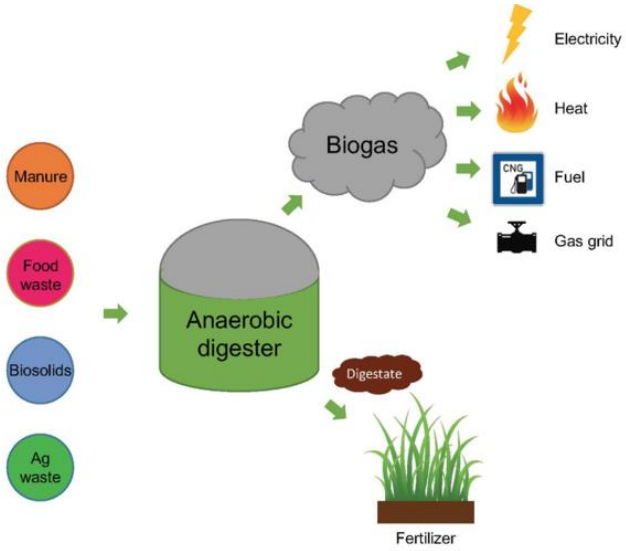


An in-vessel unit controls temperature, aeration, and moisture to accelerate decomposition of organic waste

Source: https://issuu.com/sustainableou/docs/fy13_report_final/42

2. An anaerobic digester. Microorganisms in the absence of oxygen break down the matter in a large tank, releasing flammable gases like methane, which can be captured from the tank and burned to generate electricity. The remaining material is used as fertiliser.



Source: https://ohioline.osu.edu/factsheet/fabe-6611

These are summarised in this video: https://www.youtube.com/watch?v=XAOTOsHNRSg

There are advantages and disadvantages to each.
Landfill:

- Simple and easy solution and is historically cheap, although new taxes are changing that.
- Uses up land space and contaminates the surrounding soil and water.
- It is an eyesore and can produce foul odours that disturb nearby communities.
- Treatment of polluted water, called leachate, is an added cost which continues long after the site closes.

Composting:

- Makes use of the waste and fits best with a circular economy.
- Waste is used instead of being destroyed or buried.

- The product is recirculated into farm land to help create new food, which can then be recycled again, creating a cycle of nutrients that reduces the need for external input, like chemical fertiliser, made from crude oil-derived chemicals, a resource that cannot be renewed.
- Increased running costs compared to other options, but also avoids the growing taxes that other options have.
- It takes months from when something is thrown out for it to become useful. It is not totally efficient, some gases like methane and carbon dioxide are released from the process.

Anaerobic digestion:

- Relatively fast way to deal with waste.
- Requires additional costs to accommodate this kind of controlled waste degradation.
- The gas produced is called biogas and can be used to generate electricity.
- Some nutrients are not returned to the soil and instead make gases. Although methane is burned rather than released, meaning energy is generated and pollution is reduced.

PART 2 – WHAT HAPPENS IN THE CIRCULAR ECONOMY?

The Ellen Macarthur Foundation[1] summarises it in 3 points. Design out waste and pollution, keep products and materials in use, and regenerate natural systems.

Designing out waste and pollution means undesirable waste that is normally thrown away should be used to make something useful instead of going to waste. New processes should be designed so that the waste they produce can be made useful.

Keeping products and materials in use means reducing our dependence on new items and materials. At some point earth's natural material resources will be used up, all we will have is whatever is circulating in society already, we should therefore maximise the longevity of what we have now.

Regeneration of natural systems means allowing the natural processes, that have kept the planet stable for millions of years, to continue, unaffected by our consumption. For example, plants grow in the soil using the dead material of the plants that grew there before them. Removal of plants without replacing them (e.g. for crops) degrades that ecosystem. This is similar to the water cycle or carbon cycle.

Under this model, nothing is to be considered 'waste'. All items have some value to be found, because if left unused they disturb the balance in this cycle. For businesses, this might mean you can obtain two products, for example, orange juice as your main product, and then a secondary product like fertiliser from the peel that you would have thrown away. I.e. there is value in the waste.

PART 3 – WHAT HAS BEEN MADE FROM WASTE?

[1] https://www.ellenmacarthurfoundation.org/circular-economy/what-is-the-circular-economy

Scientists in Nigeria have used banana peel to make citric acid. This is a useful chemical that has applications as a dietary supplement, and in making medicines and cosmetics.[2]

A company in Scotland called CuanTec is using waste langoustine shells to make plastic food packaging. The shells are inedible and usually thrown away. The substance also has a natural anti-microbial activity to help keep food fresh.[3]

A company called Circular Systems make textile fibres for clothing from unused parts of crops such as pineapple leaves, banana tree, rice straw, oil seed hemp and flax and cane bagasse. [4]

[2] Agric. Biol. J. North America, 4 (2013), pp. 384-387
[3] https://www.cuantec.com/
[4] https://www.circular-systems.com/about