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## DIDACTIC GUIDE 2







# Introduction

## What is ZERO WASTE

ZERO WASTE is a Project whose main objective is to promote social inclusion in rural areas in the field of education, using content related with the reduction of food waste. At the same time it is also focused in improving the professional development of the teachers through the creation of gamified educational tools with scientific content.

This guide is one of the tools openly available as part of the development of the project, so any interested person can access its content and learn from it. All the contents of the guide have been based on the methodological principles and scientific content developed by the IA2 expert committee.

Formative contents that are available on the website work as a support for the present guide, but also as a way to be introduced in new teaching methodologies related with gamification. Among these contents, the following can be found:

- Infographics
- Tips to reduce waste
- Eco-design Workshop
- Escapebox
- Online Escaperoom

The ZERO WASTE project is funded by the Erasmus+ programme and developed by a consortium of 6 institutions of Spain, Ireland, Portugal and Romania.

## Justification

According to data provided by the Food and Agriculture Organisation of the United Nations (FAO) in 2011, one third of the food produced globally is lost or wasted every year. At the same time, it is estimated that in 2019, approximately 690 million people in the world will suffer from hunger and almost 3 billion will not be able to afford a healthy diet (which represents over a third of the population).

According to the FAO, if a quarter of the food that is currently lost or wasted was saved, it would be enough to feed 870 million people. However, despite popular belief, this waste is



not exclusive to developed countries, as the figures are very similar in all countries regardless of their income level.

That is why among the Sustainable Development Goals (SDGs) established by the UN, number 12 focuses on responsible production and consumption as a way to reduce this food waste. In that respect, the ZERO WASTE project is aligned with this SDG, with a particular focus on rural areas and adult education as part of the awareness-raising work.

## Objective

This didactic guide is intended to be an approach to the problem of food waste, focusing on secondary school students in rural areas, who traditionally receive a smaller proportion of resources in the educational sphere. This way, the aim is to give tools to education professionals in this field so that they can raise awareness of the need to take action against food waste.

This first guide will study the origin of waste at each step of the food chain, as well as the effects it has on a global level. It will also deal with food loss and the types of spoilage it can suffer and what information to prevent it can be found on the labels of different foods.

As part of the training process proposed by ZERO WASTE, the aim is to use gamification methodologies that facilitate access to knowledge in a fun and innovative way. Among the activities proposed are a variety of educational games adapted to the educational levels of the participating students.



The ZERO WASTE project aims to help reduce food waste, thus collaborating with the implementation of SDG 12, which seeks responsible production and consumption to avoid it.



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## Avoiding waste:

It is important to note that 61% of waste originates from households, 26% from catering and 13% from retail outlets. Furthermore, food waste per capita is relatively similar across all countries, regardless of the average income of the country. Waste can be classified as avoidable and unavoidable, with the former being the most emphasised because it can have the greatest impact.

### In the point of sale

Point-of-sale wastage is the lowest because retailers depend on it to be able to make a profit, so they have to try to predict consumer behaviour in order to distribute as much of their production as possible. This is why when we talk about point-of-sale wastage we say that it has a double component, because on the one hand there is a responsibility on the part of the supplier and on the other hand, on the part of the consumers.

One of the factors that generates greater waste is the increase in the quality offered by the shop (which wastes useful food that does not meet other standards, such as visual or olfactory), which in turn increases the expectations of consumers, who pass up food in conditions that they consider to be insufficiently good.

Factors that can affect wastage during distribution include the following:

- **Food handling** (transport, in-store handling, preservation technology).
- **Vendor quality and safety standards** (recall of products that do not meet certain standards)
- **Marketing strategies** (promotions that encourage impulsive consumption)
- **Aesthetic standards** (which are a major cause of wastage)

### At home

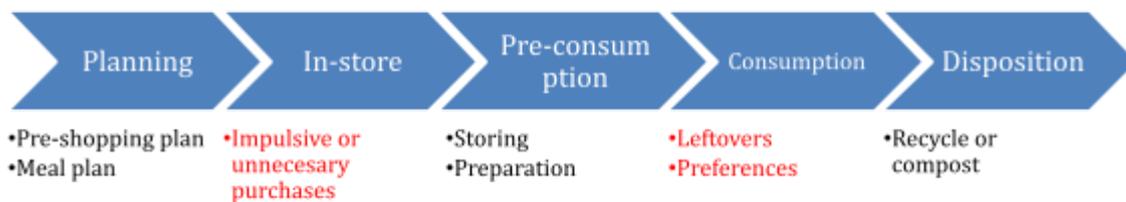
Due to the huge impact they have, it is very important to focus on consumers in reducing food waste. As a way of analysing consumer habits, they can be divided into the following groups:

- Taster
- Food waste generators



- Eco-Friendly
- Price driven
- Reusers

Each of these groups has a number of characteristics, some of which are shared among several of them, that allow a profile of consumption and waste habits to be drawn up. Despite differences in consumption habits, there is a pathway of household food waste that is common to all of them:



Knowing this path is important when designing strategies to avoid food waste, as each of the marked points are moments where action can be taken to reduce it. Those marked in red are factors that contribute to food waste and those marked in black are factors that help to avoid food waste.

Having a shopping plan and a meal plan helps to ensure that the quantities and varieties of food purchased match the needs the consumer has, thereby reducing food waste. When such planning is lacking, however, it tends to generate more waste, mainly driven by impulse or unnecessary purchases.

As with suppliers and distributors, proper storage and preparation of food helps to prevent food waste by increasing the shelf life of products. When prepared in excessive quantities there are often leftovers, which increases the likelihood of waste. If consumers have very specific preferences, the likelihood of food waste also increases.

Finally, it has been found that consumers who separate organic waste from other types of waste tend to waste less food than those who do not, so awareness of recycling can also help to reduce waste.

### Away from home

As in the case of food distribution points, in out-of-home wastage (which includes bars and restaurants) the responsibility is divided between the supplier and the customer. In this



respect, in the case of suppliers, there are certain strategies that help to reduce wastage, such as planning the menu in advance or adapting the size of the portions served according to the tastes and needs of the customer.

There are also strategies to reduce waste once food has been cooked or prepared, such as creating new recipes that make use of it, donating leftover food from the kitchen and offering a bag or box to the customer to take away any leftovers from the portions served.

In terms of customer responsibility, a number of studies have been carried out which have shown a variation in consumer behaviour depending on the type of restaurant in which they eat. Monetary, service and scent incentives (paying according to the quantity served, being able to vary the quantity served and being able to see and smell the dish before ordering) are strategies that help to reduce food waste in this respect.

### Test: What kind of consumer am I?

Indicate your degree of agreement or disagreement with the statements in each of the blocks (1= completely disagree and 5 = completely agree). Then add up the points obtained in each of the blocks to check the type of consumer you are with the table at the end.

QUESTION BLOCK 1		1	2	3	4	5
When I go grocery shopping, I buy more than I planned		<input type="checkbox"/>				
I think food is becoming more expensive		<input type="checkbox"/>				
I don't like to cook		<input type="checkbox"/>				
I don't like to prepare recipes with leftovers		<input type="checkbox"/>				
I like looking at new products in grocery stores		<input type="checkbox"/>				
I try to indulge myself every day		<input type="checkbox"/>				
<b>TOTAL:</b>						



**QUESTION BLOCK 2**

	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
I don't feel bad when I throw food away	<input type="checkbox"/>				
I often have to throw out products from pantry because they are out of date	<input type="checkbox"/>				
I keep leftovers in the fridge but usually become spoiled and I have to throw them away	<input type="checkbox"/>				
At home, I throw out more food than I wish	<input type="checkbox"/>				
At home, I don't have time to cook	<input type="checkbox"/>				
I usually cook more quantity than needed and if there are leftovers, I throw them away	<input type="checkbox"/>				
I buy food online more frequent	<input type="checkbox"/>				

**TOTAL:**

**QUESTION BLOCK 3**

	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
I prefer local products that have grown close to where I live	<input type="checkbox"/>				
I am committed to collaborating with the problems of my community	<input type="checkbox"/>				
I would be prepared to live with less	<input type="checkbox"/>				
Promotions make me waste food	<input type="checkbox"/>				
I follow a Mediterranean and traditional diet	<input type="checkbox"/>				
I prefer to make small and more frequent purchases	<input type="checkbox"/>				

**TOTAL:**

**QUESTION BLOCK 4**

	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
I have reduced the amount spent on food	<input type="checkbox"/>				
When I go on excursions, I take food from home	<input type="checkbox"/>				
I don't like to cook	<input type="checkbox"/>				
I don't like trying new flavours and products	<input type="checkbox"/>				
I think that food is becoming more expensive	<input type="checkbox"/>				

**TOTAL:**

QUESTION BLOCK 5		1	2	3	4	5
Before throwing food away, I think about it a lot		<input type="checkbox"/>				
I prefer to make large and less frequent purchases		<input type="checkbox"/>				
I like to try new recipes with the leftovers I have in the fridge		<input type="checkbox"/>				
I try to save the leftovers to cook other dishes		<input type="checkbox"/>				
More a more I look for offers in food		<input type="checkbox"/>				
<b>TOTAL:</b>						

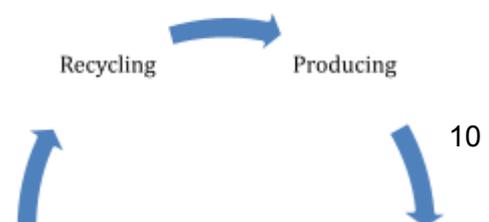
To find out which type of consumer you are, you need to check in which block you have the highest score. Then consult the table below. You can be a combination of several consumer types.

If the score is higher than...	You can be considered...
18 points in question block 1	Taster
21 points in question block 2	Food waste generators
18 points in question block 3	Eco-Friendly
15 points in question block 4	Price driven
15 points in question block 5	Reusers

## Strategies to avoid waste

Given that food waste exists at all stages of the food chain, strategies to address it should also be targeted at each stage. To increase their effectiveness, these strategies should be aimed at collaboration between the actors involved in each of the phases, which will allow for the creation of a circular economy system, in which resources can be reused at different stages.

### The role of companies





Processing industries are responsible for 19% of food waste. To reduce this, they should improve the coordination of downstream businesses using some of the following strategies:

- Improve packaging by making it more understandable in terms of expiry dates, instructions for use, or shape it in a way that allows for better exploitation.
- Improve consumer education on how to make better use of products.
- Forecast food needs to avoid wastage of perishable food.
- Use specific software to avoid storing more than necessary.
- Remanufacture products with production errors.
- Converting waste into raw material, in collaboration with other businesses.

Although food waste in wholesale, distribution and retail companies is less than 5%, retailers have a strong influence on the rest of the chain. They could change the current trends by following these guidelines:

- Optimise product planning and stocking to meet demand.
- Focus on ensuring that surpluses are not generated before production or find a new use for them if they have already been produced.
- Optimise transport and delivery.
- Work together with suppliers to coordinate deliveries.
- Train your workers in specific courses on food waste.
- Invest in technology to reduce excess inventory.
- Simplify labelling.
- Sell visually less attractive products at a lower price or find new uses for them.
- Package products appropriately.
- Collaborate with local food banks.



## The role of hospitality industry

La industria hotelera es responsable del 12% de desperdicio de alimentos a lo largo de la cadena de suministro. Las acciones que pueden seguir para reducir este desperdicio son muchas y muy variadas:

- Medir cuántos alimentos se desperdician y adecuar las raciones en consecuencia.
- Invertir en tecnología para poder prever las necesidades de manera más precisa.
- Planificar menús cuidadosamente y cambiarlos a menudo.
- Formar a los trabajadores para que sepan transmitir a los clientes la cantidad de comida en las raciones.
- Almacenar la comida de forma adecuada.
- Usar un mismo alimento en diferentes comidas.
- Usar productos de temporada.
- Asegurar que la comida está correctamente etiquetada para adecuarse a las fechas de consumo.
- Controlar el inventario.
- Pasar de cocinar por lotes a cocinar por comandas.
- Planear cómo usar los excedentes de comida.
- Crear compost.
- Reciclar todos los envoltorios.
- Utilizar productos reutilizables (servilletas, cubertería...)
- Donar el exceso de alimentos.
- Hacer ofertas y descuentos para evitar que los alimentos se deterioren.

## The role of consumers

In this part we can distinguish between individual and collective actions. Individual actions are crucial as 60% of food waste occurs at household level. In addition, consumer attitudes



towards food waste have a strong influence on the hotel industry and retailers. Some proposed changes are:

- Adopt healthier diets with less processed products.
- Plan meals to buy only what is necessary.
- Store food properly.
- Monitor the use-by dates of products and act accordingly with "use by" and "best before" labels.
- Use leftovers from meals (whether from home or restaurants).
- Buy local, seasonal produce.
- Share or donate food that would otherwise go to waste.

Collective actions such as food banks, soup kitchens and shelters provide assistance as well as help reduce hunger. In developed countries, food banks help reduce food insecurity and inequality.

## **The role of institutions**



Reducing food loss and waste requires a great deal of collaboration between many people along the food chain. Therefore, public, private, NGO and civil institutions are key players in raising awareness, providing technical assistance and targets for reducing waste. Among the actions that institutions can take to work in this direction are the following:

- Raising awareness of food waste along the supply chain through information campaigns.
- Regulatory framework at national or international level and initiatives on labelling and food safety.
- Price-based control instruments with positive and negative incentives to include the social cost of food waste.
- Cooperation between public authorities, exchange associations and food banks to implement logistical and technological solutions.
- Investment in the development of municipal infrastructure to manage food waste.

### **Workshop: Reusing recipes (Eco-designed recipes)**

Workshop to raise awareness of the need to reduce the food waste generated when cooking and how to propose recipes that reuse these food leftovers. The workshop is divided into two parts: examples of leftovers and ways to reuse them in new recipes and analysis of the leftovers that the participants have generated and proposals for recipes. The workshop can be extended to include a day in which all participants make recipes using the leftovers mentioned during the session and bring a sample of the results for the rest of the participants to try.

#### **Examples of leftovers:**

- **Roast chicken:** It is quite common that when eating roast chicken, parts of it are left over and that small pieces of meat remain stuck to the bone without being used. Several different recipes can be made with this chicken:
  - o **Chicken soup:** Gather all the leftovers and pour over a litre or litre and a half of water. Add half an onion, half a leek and a chopped carrot. Leave to boil for an hour and then strain.



- o **Croquettes:** These can be made even after the soup, as the meat will have separated more from the bone and will be easy to pull apart. Just add the chicken to the milk until the milk has absorbed the flavour well. Once this has happened, add flour little by little until the right texture is achieved. When it is ready, leave to cool and then shape into croquettes and bread them. When finished, we can fry them directly or freeze them for another day.
- o There are also more elaborate recipes that can be made with these leftovers, such as a **chicken spread** (using cheese) or a **pasta sauce**.
- **Stale bread:** Stale bread is a food that is often thrown straight into the bin despite the many uses it can still have:
  - o **Breadcrumbs:** This is the easiest way to use stale bread. All you need to do is grind it with a blender or grater.
  - o **Migas:** To make migas we need the stale bread in small pieces, peppers, bacon, onion and garlic. Fry the peppers and bacon. Once they are done, separate them and add the garlic to the oil with the bread. Stir until the bread is golden brown (about 20 minutes is usually enough). When this happens, add the bacon and peppers that we had separated, mix for a couple of minutes and you have it.
- **Potato peelings:** When we make a recipe with potatoes, it is quite common to peel them before cooking them, although it is not really necessary, as they are also edible (and the same applies to the peelings of many other fruits and vegetables). One important thing to keep in mind is that they need to be cleaned thoroughly before use.
  - o **Potato chips:** Just by frying the skins we could have tasty chips, but if we want to give them more flavour, we can coat them with egg and flour before frying them, as if we were making a tempura.

### **Proposals from participants:**

In this second part, using the examples seen in the previous part, the participants propose new recipes using the most common leftovers in their homes. To do so, this activity is divided into two parts: Analysis of what leftovers they normally have and proposals for how to use them.

- **Analysis of leftovers:** In this phase, participants will share the type of waste they normally generate at home. The educator will write them down on the blackboard so that they are all noted. The following questions can be used to guide the workshop:



- o What foods do they cook most often, do they use all the food, do they leave leftovers, and do they leave any leftovers?
- o Does anyone already make recipes using their leftovers?
- o What do you think of the sample recipes?
- **Suggestions for recipes using the leftovers they have.** Using all the ingredients listed on the blackboard in the previous phase, ideas for recipes that can be made with them are shared. The following questions can be used to guide this phase:
  - o What recipes have been made with these ingredients, and can any be adapted to be made with leftovers?
  - o Brainstorm on what can be made with each other's leftovers
  - o Can several people's leftovers be combined in a single recipe? (For example, making chicken meatballs with stale bread).
- **(Optional phase) Leftovers recipe competition**

In this phase, the participants can test their ability to make recipes that are tasty, interesting and eco-designed. In order to run the competition, it is best to set up a scoring system for the dishes brought by the participants, so that everyone can evaluate all the dishes. In case of very large groups, participants can be divided into smaller groups to make the recipe, in order to avoid cooking large amounts of food (which could lead to food waste).

The recommended judging criteria are as follows:

- o Taste (How good is it)
- o Appearance (Presentation on the plate)
- o Food use (How well does it make use of leftovers?)