



# WASTE NOT, WANT NOT!

A teaching guide on food waste and food loss



**Barilla**  
Center  
FOR FOOD  
& NUTRITION



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## **Chapter 1:** **The challenges linked to global nutrition**

This educational module sets out to analyze the subject of food wastage. Throwing food away is not only an ethical problem, a slap in the face for all those suffering from hunger around the world, but it is also a more complex problem deeply rooted in the environment and society as a whole. Indeed, **food wastage** is a **paradox** that runs through the entire food chain, from production to consumption, even in countries where people do not have regular access to food. Against this background, the fight to eradicate poverty and the protection of the environment find common ground on which to develop solutions for a more balanced world.

The production and availability of sufficient quantities of good quality food are essential for our survival but, at the same time, the methods used to achieve this until now are responsible for some of the factors that pose the biggest threats to the health of our planet, such as climate change, loss of biodiversity and land, alterations of the nutrient cycle and pollution (Fassio & Tecco, 2018). Globally, agriculture consumes 70% of the Earth's freshwater and produces and produces up to 37% of the of greenhouse gases emissions, surpassing building heating systems (23%) and transportation (18,5%) (IPCC, 2019).

Today, there are still more than 690 million of hungry people and, in view of a world population that is constantly growing, economic models that suggest boosting food production are deemed obsolete. In fact, these models have been responsible for increasing inequality within and between nations and for encouraging consumer habits and food production methods that are difficult for the planet to sustain. Additionally, if we take a closer look, only half of the cereal crops produced worldwide is actually used for human consumption. More than 40% is actually used to produce biofuels and animal feed. Finally, while we are striving to develop new strategies to make this sector more balanced and sustainable, approximately **1.3 billion tonnes of edible food** (FAO, 2011) **are being wasted every year**, either lost in the production chain or thrown away at the end of the sales chain or directly from our tables. This amounts to a third of global food production, a significant figure which would potentially be sufficient to feed the people in the world who are still hungry today.

Today, the challenge faced by global nutrition is to **begin by revolutionizing the production process**, for instance by making it more sustainable, improving efficiency, producing the same quantities of food with fewer resources and in ways that respect the planet. The energies of the earth are not inexhaustible and so the fight against food wastage becomes key for promoting a fairer, healthier world, because it would mean, first and foremost, not losing the resources used to produce that food. In fact, when we throw food away, we are not only losing the money we spent to buy it, but we are also wasting, among other things, the water and land used to produce it.





## Chapter 1.1: A common policy agenda

The fight against waste is an essential commitment for achieving the Goals of the 2030 Agenda for Sustainable Development: an action plan for people, the planet and prosperity, signed in September 2015 by the governments of 193 member states of the United Nations. The Agenda sets **17 Sustainable Development Goals (SDGs)** which lay out an extensive plan of action covering 169 targets.



In this framework, the phenomenon of food wastage is specifically addressed in Goal 12 “Responsible consumption and production. Ensuring sustainable consumption and production patterns”. For example, target 12.3 clearly specifies “By 2030, to halve per capita global food waste at retail and consumer levels and reduce food losses along production and supply chains, including post-harvest losses”.



However, by putting an end to this problem, we could make a significant contribution to the achievement of other Goals, such as ending poverty (SDG 1) and hunger (SDG 2), improving water resources (SDG 6), paving the way for new businesses and innovations (SDG 9) and more sustainable cities (SDG 11), reducing inequalities between countries (SDG 10), mitigating climate change (SDG 13), as well as improving our health (SDG 3), that of our oceans (SDG 14) and life on Earth (SDG 15).

How can the fight against one problem alone have such a far-reaching impact? Because food wastage is a complex phenomenon encompassing many different issues, starting from the distinction between waste and loss, which will be discussed in more detail below.

## **Chapter 2:** **Food losses and waste**

Not all food waste is the same and, from a technical standpoint, throughout the food chain, from field to fork, there is a tendency to distinguish between food loss and food waste (FAO, 2013).

**Food losses** can be defined as a reduction of the quantity of edible food along the part of the food chain that leads to human consumption. This is the food that is lost before it arrives at the points of sale. The focus is the production system, from cultivation to processing, before the food reaches the places in which it is sold.

**Food waste**, by contrast, occurs at the end of the food chain destined for human consumption. The key focus in this case is the individual, as this is waste that occurs in the household as well as in restaurants and shops, such as supermarkets, or other places in which food is sold.

**In developed countries**, **food waste** occurs mainly at the point of sale and when food passes into the hands of individuals, whereas in **developing countries**, **food loss** occurs mostly during farming and before going on sale, due to drought, natural disasters, poor road systems and lack of storage and refrigeration facilities. Food losses during the harvesting and storage phases lead to loss of income for small farmers and higher prices for poorer consumers, increasing the risks of malnutrition. To get an idea of the figures behind this phenomenon, just think that the food currently lost in Africa could feed 300 million people (FAO, 2011). Strengthening the production chain to prevent these losses is one of the strategies that needs to be implemented in order to combat malnutrition in developing countries and contribute to the achievement of the United Nations 2030 Agenda (SDG 2 Zero Hunger).



## Terminology tips

There are three terms, all simple yet precise and to the point, that clearly explain the three different kinds of food waste. These are:

- **Food Waste**
- **Food Loss**
- **Food Wastage** The third is a more general term used when referring to both food waste and food loss. For example, when we say that 1.3 billion tonnes of food produced for human consumption are disposed of in the world, we use the term wastage.



## **Chapter 2.1:** **The causes of food losses and waste**

Food waste and food loss occur throughout the production chain but their causes are different. This section lists only some of the main problems that contribute to worsening these phenomena.

The main causes of food loss include:

- **Unexpected weather events and natural disasters.** For example, an out-of-season frost can ruin part of the crop, as can a serious drought, where the tools required to manage the shortage of water needed for cultivation are unavailable.
- **Lack of adequate infrastructures, technological and logistic problems.** This is a very wide-ranging category, which includes, for example, the lack of suitable facilities for storing food and maintaining products at the correct storage temperature.
- **Lack of skills, know-how or ability to manage the chain.** This point concerns the entire production line. Being familiar with the potentials and requirements of your product, and understanding the market's demands are fundamental when it comes to minimizing losses.
- **Losses during transportation and inability to access the points of sale.** For example, in Africa it is not uncommon for a producer to be unable to reach the market because there are no roads or means of transport to get there.
- **Non-compliance with safety standards and special market requirements.** For example, only keeping the fruit and vegetables that meet certain aesthetic standards, and discarding those that do not.

The main causes of food waste, generated by households, retailers and restaurants, include:

- **Bad management of expiration dates.** The products should always be displayed in order of expiration date, with the oldest first.
- **Incorrect storage of food.** For example, this happens when foods are exposed to unsuitable temperatures, which can make the product deteriorate more quickly.
- **Incorrect management of stocks and planning the shopping.** Here the focus is on learning to manage the relationship between product quantity and its consumption and only buying what is needed. In this respect, marketing strategies such as "buy two get one free" tend to favour waste, especially for fresh products and those with a shorter shelf life.
- **Lack of knowledge about food and how best to store it.** For example, we often throw away foods that are actually perfectly edible, or confuse their expiration dates ("Use by" rather than "Best Before" dates).
- **Cooking and/or serving too much food.** Learning to control the mechanisms that make us feel hungry and full is essential for our health, and it is just as essential when it comes to preventing food waste. This is why it is important to think carefully about the quantity of food we are consuming.



## Let's learn to read the labels!

The term "Use by" is the date by which a food is safety suitable for consumption, if kept under the correct storage conditions.

"Best Before", on the other hand, indicates a period of storage during which the food keeps its specific properties. However, after that date, the product is still completely safe to eat (given the fact that it has been stored in suitable conditions).





## **Chapter 2.2:** **The impact of food losses and waste**

Globally, one third of the global food production gets lost or wasted. As already explained, this is not merely an ethical and moral issue, but one that has serious environmental, economic and social consequences (FAO, 2011, 2013, 2014, 2015).

**Environmental impacts.** Food production requires the use of precious resources for our planet, primarily land and water. It has been estimated that total annual food wastage (1.3 billion tonnes) is equivalent to wasting 250 km<sup>3</sup> of water (a quantity equal to the annual flow of the Volga River in Russia, or three times the volume of water in Lake Geneva, in Switzerland) and 1.4 billion hectares of farmland, which corresponds to approximately 30% of the agricultural surface area used globally. At the same time, it is important to remember that food wastage produces 3.3 billion tonnes of CO<sub>2</sub>eq emitted into our atmosphere. In this sense, if food wastage were a country, it would rank as the world's third top greenhouse gas emitter after China and the United States.

**Economic impacts.** Globally, the full economic cost of food wastage has been estimated to be 2.6 trillion US dollars per year. This figure includes 1 trillion dollars in purely economic costs (mainly due to the value of the products lost), 700 billion in environmental costs (for example through greenhouse gas emissions and loss of land, water and biodiversity) and 900 billion in social costs (such as shortage of food for people's livelihoods, damage to health or the risk of conflicts).

**Social impacts.** The impacts of food wastage are mainly linked to the right to food, i.e. food security. This means having physical, social and economic access to sufficient quantities of food to meet people's dietary needs and cultural preferences. Theoretically, the quantity of food wasted every year could be used to feed the people suffering from hunger today (more than 690 million). Therefore, reducing food wastage is one of the major objectives for achieving Goal 2 of the 2030 Agenda - Zero Hunger. For instance, it has been estimated that the Middle East and North Africa, where hunger is a daily problem in many regions, import 36 million tonnes of wheat per year, yet they also waste 16 million tonnes every year. And that's not all: approximately 20% of the grains, 50% of the fruit and vegetables, 16% of the meat and 27% of the fish and seafood in this area is lost or wasted. These are significant figures, and tackling them could help improve the nutritional profile of the population, with positive impacts on public health and the economy.



## Terminology tips

In Italian, the term “sicurezza alimentare” has several meanings, which include both the concept of global availability of food as well as the health aspect. In English, the terms used are more precise and differentiate between:

**Food security:** this refers to the availability of enough food to meet people’s dietary needs, that is, a situation in which everyone has equal access to a sufficient quantity of affordable food;

**Food safety:** this refers instead to the food we eat daily, that is, the safety of the food we consume and any risks it may pose to our health and the environment, which are constantly assessed



# FIGHT FOOD WASTE

PROTECT THE PLANET



EVERY YEAR **WE WASTE 1/3 OF ALL THE FOOD**  
PRODUCED GLOBALLY

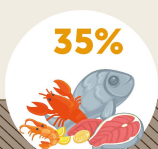
1.3 BN TONNES OF FOOD



FRUIT & VEGETABLES



CEREALS



FISH



MEAT



DAIRY PRODUCTS

I VALORI PERCENTUALI SONO RIFERITI ALLO SPRECO ALIMENTARE ALL'INTERNO DELLE SINGOLE CATEGORIE DI CIBO INDICATE

Source: FAO, 2011, 2015

## TWO MAIN ASPECTS



**FOOD LOST**  
THROUGH  
AGRICULTURE,  
TRANSPORT  
AND FOOD  
PRODUCTION

**FOOD  
LOSS**

**FOOD  
WASTE**

**FOOD WASTED**  
DURING SALE AND  
CONSUMPTION,  
IN AND OUTSIDE  
THE HOUSEHOLD



## THAT CAUSE SERIOUS CONSEQUENCES



**ENVIRONMENTAL  
IMPACT**

3.3 BILLION TONNES OF CO<sub>2</sub>EQ  
PRODUCED PER YEAR



**SOCIAL  
IMPACT**

REDUCING FOOD WASTE  
AND LOSS IS PIVOTAL  
TO REACH THE GOAL  
"ZERO HUNGER"



**ECONOMIC  
IMPACT**

2,640 BILLION DOLLARS  
INCLUDING ECONOMIC  
(1,000 BN), SOCIAL (940 BN)  
AND ENVIRONMENTAL  
(700 BN) VALUE

Fonte: FAO, 2013, 2014



## Food waste in Italy and in the rest of the world

### Chapter 3: Food waste in Italy and in the rest of the world

According to the data of the Food Sustainability Index 2018<sup>1</sup>, France, Argentina and Luxembourg are the top three high-income countries to have taken tangible steps towards reducing food waste and loss.

On the other hand, among high-income countries again, Israel, Malta and the Arab Emirates are those that need to take the most significant steps to tackle this problem, especially in terms of food loss.

In this panorama, **Italy** stands as one of the top performing countries, ranked 18th out of the 35 high income countries analyzed and 13th in Europe. Italy has clearly made a major effort in this challenging area, especially politically, with the introduction of the “Gadda” law (Law 166 of 2016), essentially aimed at reducing waste and, at the same time, promoting the redistribution of surplus and unused goods for social solidarity initiatives, sending them to people in need. According to the Fondazione Banco Alimentare, a non-profit organization that collects surplus foods and redistributes it to charities, during the first year after the law came into effect, (October 2016 - September 2017), the donations of surplus food it received from large-scale retailers increased by 21.4% and, to date, positive and constant increases continue to be recorded. But a lot more still needs to be done, especially by individual consumers, given that **every Italian citizen wastes approximately 65 kg of food per year**, mainly in fresh products, bread, fruit and vegetables, packaged products and cold meat.

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1. The Food Sustainability Index is a quantitative and qualitative tool that ranks the performances of 67 countries based on the sustainability of their food system and their income. The end result is not a true ranking but a general overview of the food sustainability of the analyzed countries, calculated based on three pillars: food waste, sustainable agriculture and nutritional challenges. The countries considered by the Index account for over 90% of our global GDP and 4/5 of the world population. The Food Sustainability Index was developed by the Barilla Center for Food & Nutrition (BCFN) in collaboration with The Economist Intelligence Unit. The 2018 edition mainly focuses on the best practices in the field of food sustainability which contribute to the fulfilment of the 17 Sustainable Development Goals.



## **Chapter 4:** **The solutions for stopping wastage**

There are many initiatives all over the world launched by institutions, public and private organizations and individuals to limit food waste and loss. Some examples of how various categories are tackling the different aspects of the problem are presented below.

### **Fighting food wastage**

The first actions that come to mind are the **direct distribution of food surpluses** by profit and non-profit organizations. In most cases these are associations that recover edible food from industry, retailers or the restaurant trade and redistribute it to organizations that help needy or socially disadvantaged people. One example of this kind of organization in Italy is Banco Alimentare. Last Minute Market is another organization that operates in a similar way, putting large-scale retailers into contact with the organizations who benefit from the donations, without handing the products directly.

Another category of initiatives involves the **development of digital technologies** for preventing wastage. One well-known example of this is the use of electronic labels by large-scale retailers (for instance using Radio-Frequency Identification - RFID labels) that enable the food temperature to be monitored remotely, thereby avoiding unnecessary waste. Other examples include the use of smart sensors for measuring the type and quantity of waste in restaurants, enabling the owners to take prompt and targeted anti-waste action. One such case is that of Winnow, a startup that has introduced a system for mapping, quantifying and analyzing waste during the food preparation stage. We should also mention all the **apps** that let people know about the availability of surplus food in real-time (for example, using a smartphone), allowing citizens to play their part too.

Finally, **raising people's awareness** is another important strategy that needs to be implemented. In Spain, for example, the Ministry of Agriculture, Food and the Environment has launched a series of communication campaigns addressed to both individuals and the restaurant trade, emphasizing the importance of the problem and offering a set of tips and practical ideas for addressing it. The initiative involves a series of actions, including educational programmes in schools, the design of assessment tools for consumers and the companies in the food industry, and best practice guidelines for food management. In Italy, the city of Milan sets an excellent example, with its pledge to reduce food wastage by 50% by 2030. To attain this goal, the Food Policy office is coordinating a wide range of actions, including some dedicated to raising public awareness, and specifically that of young people. One example of this is the educational campaign "Io non spreco" (I don't waste), run in collaboration with the local education authority and the environmental organization Legambiente, where the children from the participating primary schools are given a washable "snack bag" to encourage them to take home any non-perishable products they have not consumed at lunchtime (bread, fruit, puddings etc.).





### Tackling food losses

One of the main problems associated with food loss concerns the **post-harvest phase**. In this context, different players are simultaneously working on a range of fronts:

- engaging companies that can provide product storage/preservation technologies;
- locating support to put farmers in contact with the markets;
- increasing access to funding;
- offering new tools for measuring and tracking food losses.

For example, in Uganda, the Louis Dreyfus Foundation, with headquarters in the United States, is funding the creation of a laboratory for testing the best large-scale food storage and preservation solutions to minimize post-harvest food loss in the region. The programme includes training workshops to teach farmers the best strategies for harvesting, threshing, drying and storing their crops and organizes the distribution of tools to help people store food correctly.

### The role of the circular economy

The circular economy model is a paradigm of regenerative economic and social development in which waste, energy and other materials are fed back into the production chain. It has huge potential for tackling both food waste and food loss. One of the actions that can be performed in this sense is regenerating materials and adding value to by-products. Some examples of these practices include: Orange Fiber, an Italian company that has patented and produces sustainable fabrics from the by-products of citrus fruits; Funghi Espresso, a startup farm that cultivates mushrooms using coffee grounds; Toast Ale, which produces an award-winning beer made with leftover breads; and RiceHouse, which creates new eco-sustainable construction materials from the waste produced by rice growing.



## Tips for “waste-free” shopping

- Think carefully when you do your grocery shopping; before buying food check what you really need; make a list and stick to it; and remember that wasting food means wasting money and the planet’s resources.
- When you are cooking, keep an eye on your quantities and only cook what you can eat.
- Read the labels carefully: always check the ‘use before’ dates.
- When storing food in the fridge, put the food with the shortest shelf life at the front and store what you are not likely to eat soon in the freezer.
- Recipes against food waste: don’t bin leftovers and food waste, you can use them to create new creative dishes.
- Fresh, seasonal products: try to always buy straight from the producers.
- Bought too much food? Share it with your neighbours or invite friends for a meal.
- At the restaurant: ask to take your leftovers home in a bag, if possible.
- “Best before...” means that food can still be eaten after the given date, if it has been stored correctly. Check it carefully before binning it.





## Class assignments

### 1. Food waste versus food loss: spot the differences

**Suggested target:** Primary school.

**General objective:** To know the quantity of food wasted today in the world and understand the difference between food waste and food loss.

**Preparation:** Go over the subject of food losses and waste (Chapter 2).

**Material:** A blank poster, coloured felt-tip pens, materials for making a collage.

**Assignment:** Having explained to the class how much food is currently wasted in the world every day and having looked together at the different types of wastage and the various causes, divide the class into two groups. The first group will create a graphic representation of the concept of food waste on the poster (they must clearly show the places in which most of the waste occurs, i.e. shops, restaurants, households). The other half of the class will create an illustration of the concept of food loss (they must clearly show the places in which food loss most commonly occurs, i.e. fields, industries, transport). When the poster has been completed, ask a student representative for each group to explain the work of their group. At the end of the activity, we suggest putting up the poster in the classroom as a reminder of what the students have learned.

**Homework:** ask the students to think up a strategy for reducing food wastage at home. Then, collect all the ideas in the class and use them to create a list of suggestions to put up on the wall.





## 2. How much food do we waste?

**Suggested target:** Primary school.

**General objective:** To understand how much edible food is wasted in Italian households and understand the impact this has on the family economy and on the environment.

**Preparation:** Go over the subject of food wastage, the basic rules for preventing wastage (e.g. learning to read food labels) (Chapters 2 and 4, Box with tips for waste-free shopping) and the figures for food wastage in Italy (Chapter 3).

**Material:** Create a food wastage diary as shown in the example. In this case, the key items are shown but the children should be encouraged to personalize/decorate the table to get them more engaged in the task. In the category "What has been thrown away?", details are important, so also include scraps like fruit skins or peels. A4 sheets of paper and coloured felt-tip pens/crayons.

Day	What has been thrown away?	Why has it not been recycled?
e.g. Thursday	e.g. a mandarin orange	e.g. because it was mouldy and had gone rotten

**Assignment:** At school the teacher tells the class how much food is wasted today in the world, defining food wastage and explaining its main causes.

For a more engaging introduction, teachers can read the story "**fast food for fish**"<sup>2</sup>, taken from the second book of fables by Gunter Pauli (for a free copy of the story or a copy of the book, follow the instructions on the website: [noilciboilpianeta.it](http://noilciboilpianeta.it)). Once the students have all seen how much food is wasted today in Italy, the teacher asks them to create a food wastage diary (see the example in the table). For a week, the students must monitor how much food their family wastes. The objective of this activity is to raise their awareness of how many and which foods are wasted the most. At the end, the diaries should not be read out to the class, to respect the students' privacy. The teacher checks that the task has been completed and organizes a discussion with the students on the solutions that can be found to eliminate food wastage at home. At the teacher's discretion, the list of ideas about how to prevent food wastage can be transformed into a small memo (on an A4 sheet of paper) which each student can take home to help their family.

2. The protagonists are two seagulls who are discussing the subject of food wastage, as they observe what is happening on the nearby cruise ships. The fable was written to raise public awareness about this paradox: on the one hand there are people who don't have regular access to food and on the other there are people who waste food and create pollution (in this case polluting the seas) with their uneaten food.



### 3. Journalists against food wastage

**Suggested target:** Lower secondary school.

**General objective:** To understand how much edible food is wasted and lost in Italy and the impact of this on the family economy and on the environment.

**Preparation:** Go over the subject of food waste and food loss (Chapter 2) and the figures on food wastage in Italy (Chapter 3).

**Assignment:** At school the teacher tells the class how much food is wasted today in the world, defining food wastage, describing its main causes and indicating how much food is binned in Italy. Having finished explaining this to the class, the teacher sets the students homework. They must pretend to be journalists (this can be an individual exercise, or be performed in small groups) from an Italian newspaper, or an English newspaper **if the teacher wants the class to do an exercise in a foreign language.**

The students' objective is to investigate how much and what types of food are wasted most in Italy (or in a foreign country if the exercise is in another language) and identify the economic, environmental and social implications, then write a news article on this subject. A good article should meet the following parameters:

- Cite the sources you used for the figures on wastage;
- Add images not subject to copyright;
- Organize the contents effectively. From a language standpoint, the texts must be clear, concise and straight to the point. A good article will have an introduction that grabs the reader's attention and an ending that conveys a clear message.

At the end, the texts written can be read aloud in class, encouraging the other students to make comments and provide constructive feedback. The teacher may introduce a scoring system for selecting the top three articles.



#### 4. Food wastage and Sustainable Development Goals (SDGs)

**Suggested target:** Secondary school.

**General objective:** To understand how much edible food is wasted in the world, through both waste and loss, and understand the impact of this on the economy and on the environment. To know about the Sustainable Development Goals and learn how the fight to eradicate wastage can help us to fulfil them.

**Preparation:** Go over the subject of food waste and food loss and the figures on food wastage in Italy and the rest of the world (Chapters 2 and 3). Knowing the Sustainable Development Goals (SDGs) and how they relate to waste (Chapter 1) and the solutions that can be applied to reduce the phenomenon (Chapter 4).

**Assignment:** Having explained to the class how much food is wasted today in the world, and once the class has viewed all the different types of waste and the various causes of this phenomenon, the teacher defines the Sustainable Development Goals (SDGs) of the United Nations<sup>3</sup> and explains in general terms, how fighting waste can help towards their achievement. After this explanation in the classroom, the teacher sets the students homework which can also be done in small groups. They must research the Sustainable Development Goals and identify those that could benefit most from the fight to eradicate wastage, by carefully reading the various key points (targets) of each Goal (SDG). Each association must be motivated and supported by data.

For example, SDG 14: Life under water. *"Fishing subsidies are contributing to the rapid extinction of many species of fish and hindering initiatives geared to save and restore the global fish reserves and the jobs connected with these, causing the fishing industries of the oceans to produce 50 billion American dollars less than their potential"* yet, at the same time, approximately 35% of the world's fish and seafood is lost every year. 8% of all fish caught are thrown back into the sea when often already dead or in a critical condition

(Source: <http://www.fao.org/save-food/resources/keyfindings/infographics/fish/en/>). Once the students have completed their research, they discuss the main results in the classroom and, as an additional activity, could create a poster summarizing their findings.



## Glossary

**Biodiversity:** this refers to the extraordinary variety of plants and animals that live in nature, interacting with one another in their natural habitats and in the ecosystems. Biodiversity is not a fixed value, because the quantity of plant or animal species in the environment can rise or fall over time due to various factors that can be natural and/or anthropic (caused by man).

**CO<sub>2</sub> equivalent:** a unit of measure that expresses the impact on global warming of a certain quantity of greenhouse gases compared with the same quantity of carbon dioxide (CO<sub>2</sub>).

**Circular economy:** a general term used to describe an economy that is restorative and regenerative by design. In a circular economy there are two types of material cycles: biological cycles, where materials are designed to feed back into the biosphere, and technical cycles, designed to recover and restore materials, without entering into the biosphere.

**Greenhouse gases:** gases present in the atmosphere which tend to trap heat coming from the earth's surface, the atmosphere and the clouds and so prevent it from escaping into space. They act like the glass panels of a greenhouse and indeed this is where they get their name from. These gases can be natural or anthropic (produced by man).

**SDGs:** The United Nations Sustainable Development Goals, or SDGs, are a series of 17 Goals designed for the future of international development, which set the agenda for an extensive plan of action involving 169 targets. The Sustainable Development Goals replaced the Millennium Development Goals or MDGs at the end of 2015 and were signed by the 193 member states of the United Nations for the period 2015-2030. Unlike the MDGs, the SDGs are conceived to apply to all the countries in the world and they remind us that sustainable development is a universal objective.

**Food loss:** this is food which is lost before it arrives at the points of sale. Food loss can be defined as a reduction of the quantity of edible food along the part of the food chain that leads to human consumption. The focus is the production system, from cultivation to processing, before the food reaches the places in which it is sold.



**Global warming:** climate phenomenon consisting of a general increase in the average temperature of the Earth's surface and in particular that of the waters in the oceans and the atmosphere around our planet.

Global warming is naturally caused by the sun's rays but human actions have contributed to its acceleration, especially due to greenhouse gases.

**Food waste:** this occurs at the end of the food chain intended for human consumption. The key focus in this case is the individual, as this kind of waste occurs in the household, but also in restaurants and shops, such as supermarkets, or other places where food is sold.

**Food security:** the availability of enough food to meet people's dietary needs, in other words a situation in which everyone has equal access to a sufficient quantity of affordable food.

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## AFTERWORD

The Barilla Center for Food & Nutrition Foundation (BCFN) analyzes the complexity of current agri-food systems and, through a variety of initiatives, fosters change towards healthier and more sustainable lifestyles in order to achieve the Goals set by the United Nations 2030 Agenda for Sustainable Development (SDGs). With its scientific research and public initiatives, the BCFN Foundation promotes an open dialogue between science and society, both nationally and internationally. It addresses today's major food related issues with a multidisciplinary approach and from the environmental, economic and social perspective, to secure the wellbeing and health of people and the planet.

### Advisory Board

Million Belay, Barbara Buchner, Danielle Nierenberg, Livia Pomodoro, Gabriele Riccardi, Camillo Ricordi, Gerry Salole, Riccardo Valentini, Stefano Zamagni.

**SDSN Mediterranean** is the regional hub of the United Nations Sustainable Development Solutions Network that promotes the 2030 Agenda and the Sustainable Development Goals (SDGs) in Mediterranean countries through research, innovation and new educational methods and is coordinated by the University of Siena.

The role of SDSN Mediterranean includes many activities such as: mobilizing the relevant bodies, coordinating the activities of the network, disseminating the regional and global initiatives, also among policy-makers, the private sector and NGOs, promoting initiatives that offer regional and global solutions, such as the creation of close-knit communities of young academics with a strong awareness of the main challenges posed by sustainable development.

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