TREE
Micro- and project-based learning programme for Teaching ciRcular Economy and Ecological awareness in VET

Funded by the European Union

TRAINING LESSON 1 - Part 2 (Agrifood sector)

Title	○ **The impact of the agrifood industry on environment (Farm-to-fork strategy, Food waste management in businesses)**
Part of the training course referred to in this lesson	○ Part 1 □ General information about sustainability and CE Part 2 Specific Information about: □ Wood sector □ Plastic sector X Agrifood sector
EQF level	Level 2 or Level 3, in case of doing the optional tasks.
Where the lesson was tested	//
General Learning objective(s) according to the Bloom Taxonomy https://cft.vanderbilt.edu/guides-sub-pages/blooms-taxonomy/	X **Create** Produce new or original work (design, assemble, construct, investigate, formulate) X **Evaluate** Justify a stand or decision (appraise, argue, defend, critique, select, support) X **Analyze** Draw connections among ideas (differentiate, organize, relate, compare, distinguish, test, experiment) □ **Apply** Use information in new situations (execute, implement, solve, use, demonstrate, operate) X **Understand** Explain ideas or concepts (classify, discuss, describe, identify, locate, translate) X **Remember** Recall facts and basic concepts (define, duplicate, list, memorize, repeat)
Specific learning objective(s)	• *To understand the problems related to food production and the generated food waste.* • *To understand what types of food waste are generated in different sectors* • *To find the ways to utilize food waste*
Cognitive, socioemotional and	**SDG 2 | Zero Hunger**

behavioural outcomes based on https://www.unesco.de/sites/default/files/2018-08/unesco_education_for_sustainable_development_goals.pdf	Cognitive learning objectives: The learner understands the need for sustainable agriculture to combat hunger and malnutrition worldwide and knows about other strategies to combat hunger, malnutrition and poor diets, involving sustainable agriculture that does not pollute the environment and put human and environmental health in danger. Socio-emotional learning objectives: The learner is able to communicate on the issues and connections between combating hunger and promoting sustainable agriculture and improved nutrition. Behavioural learning objectives: The learner is able to change their production and consumption practices in order to contribute to the combat against hunger and the promotion of sustainable agriculture. **SDG 4 | Quality Education** Cognitive learning objectives: The learner understands the important role of education and lifelong learning opportunities for all (formal, non-formal and informal learning) as main drivers of sustainable development, for improving people's lives and in achieving the SDGs. Socio-emotional learning objectives: The learner is able to recognize the importance of their own skills for improving their life, in particular for employment and entrepreneurship. Behavioural learning objectives: The learner is able to use all opportunities for their own education throughout their life, and to apply the acquired knowledge in everyday situations to promote sustainable development. **SDG 6 | Clean Water and Sanitation** Cognitive learning objectives: The learner understands water as a fundamental condition of life itself, the importance of water quality and quantity, and the causes, effects and consequences of water pollution. Socio-emotional learning objectives: The learner is able to communicate about water pollution via questionable fertilization practices and to create visibility about success stories. Behavioural learning objectives: The learner is able to plan, implement, evaluate and replicate activities that contribute to increasing water quality and safety. **SDG 12 Responsible Consumption and Production** Cognitive learning objectives: The learner understands how individual lifestyle choices influence social, economic and environmental development. Socio-emotional learning objectives: The learner is able to envision sustainable lifestyles.

	The learner is able to feel responsible for the environmental and social impacts of their own individual behaviour as a producer or consumer. Behavioural learning objectives: *The* learner is able to plan, implement and evaluate consumption-related activities using existing sustainability criteria. the learner is able to take on critically on their role as an active stakeholder in the market. **SDG 15 | Life on Land** Cognitive learning objectives: The learner understands the slow regeneration of soil and the multiple threats that are destroying and removing it much faster than it can replenish itself, such as poor farming. Socio-emotional learning objectives: The learner is able to create a vision of a life in harmony with nature via sustainable agricultural practices. Behavioural learning objectives: The learner is able to highlight the importance of soil as our growing material for all food and the importance of remediating our soils.
Green skill(s) addressed	X Creative problem-solving X Forward-thinking X Monitoring skills X Analytical skills ☐ Lean production ☐ Maintenance and repair skills X Pollution prevention ☐ Eco-design ☐ Management skills X Impact quantification X Life-cycle management X Science skills X Waste management X Environmental auditing X Ecosystem management ☐ Other_____
Duration	*20 min.*
Structure and content of the lesson	**INTRODUCTION** Agricultural food production and consumption covers activities from agriculture to food consumption. The constant growth of the population is related to the need for food production. The need for more food, harvested from the same areas, leads to the search for methods to increase yields through the use of chemicals or genetically modified crops. On the other hand, new types of preservatives are being worked on to increase the shelf life of foods. All this leads to the pollution of both the environment and food. Issues in agricultural food production and consumption have significant impacts on the environment and human health, such as soil biodiversity, desertification, water use and pollution, energy, climate change, chemicals, food safety and

biotechnology.

At the same time, in recent years, more and more attention has been paid to the problem related to the waste generated by these two huge industries.

TOPIC 1 FARM TO FORK STRATEGY

Video introduction

https://audiovisual.ec.europa.eu/en/video/I-196217?&lg=INT

In 2050, the world will have 10 billion mouths to feed (Alessandro Caprini, 2022). At the same time, we will face the greatest environmental, climate and health challenges in human history. How will we feed the future world population without further depleting our planet? How do we ensure access to sufficient, safe and nutritious food for all? And how do we keep food available as part of a fair supply chain? These are all big issues to address. The European Commission's Farm to Fork (F2F) strategy aims to accelerate our transition to a fair, healthy and sustainable food system. The F2F Strategy was launched on 20 May 2020 and is part of the European Green Deal, which is a roadmap to guide the European Union (EU) towards becoming the first climate neutral region by 2050. The F2F Strategy is a comprehensive 10-year strategy, aimed at addressing the challenges of producing and consuming our food in a fair and sustainable way, reconciling what we eat with the capacity of our planet.

According to the strategy, our food systems must be redesigned. The problem stems from the fact that food systems today account for almost a third of global greenhouse gas emissions, consume large amounts of natural resources, lead to biodiversity loss and negative health impacts (both under- and over-nutrition) and do not allow for equitable economic returns and livelihoods for all participants, particularly primary producers. (European Commission)

The Farm to Fork Strategy aims to accelerate our transition to a sustainable food system that must:

• have a neutral or positive impact on the environment

• help mitigate climate change and adapt to its impacts

• reverse the loss of biodiversity

• ensure food security, nutrition and public health by making sure that everyone has access to sufficient, safe, nutritious and sustainable food

• preserve food affordability while generating fairer economic returns, promoting the competitiveness of the EU supply sector and promoting fair trade

TOPIC 2 - FOOD WASTE IN HOSPITALITY

According to the United Nations Food and Agriculture Organization (FAO), the amount of food thrown away daily in the world is one third of the total food produced for consumption, which is approximately 1.3 billion tons of food per year. This information is even more important if one considers the fact that in 2018 there were more than 820 million hungry people in the world (Natasa Kilibarda et al. 2019). Food waste is not only a complex ethical problem for humans, but it is also an environmental problem. It has been confirmed that food waste leads to increased emissions of harmful gases and to the loss of water and soil, which subsequently disrupts biodiversity. Food waste affects climate change because every stage of food production, from the production of fertilizers to the transportation of the produced food, cannot take place without the use of fossil fuels (petroleum). In addition, when disposed of in a landfill, food decomposes under anaerobic conditions, followed by the emission of the greenhouse gas, methane.

Food service businesses in the hospitality sector include hotels, restaurants, cafes, bars, sandwich shops and similar businesses providing takeout and/or on-site dining. Food waste generated in the hospitality sector can be divided into two categories depending on whether it is generated before or after the food is consumed. Pre-consumer food waste occurs during procurement and storage of purchased raw materials (storage/purchasing waste), then during food preparation (preparation waste) and food supply (resulting from overproduction). Post-consumer waste refers to the leftover food on the plate itself and is defined as food purchased by a consumer and subsequently not consumed

The largest amount of excess food comes from eating at a buffet.

In order to behave responsibly and reduce food waste in the hotel business, the following activities should be optimized:

- food delivery;
- inventory management;
- portion control
- serving meals to guests
- increasing consumer awareness of the negative effects of food waste
- food leftover management (give leftovers to animals, prepare and sort leftovers for employees, donate food to public kitchens and similar institutions);
- disposal — ensure that all final food waste is used in aerobic composting.

TOPIC 3 FOOD WASTE IN THE COMMERCIAL NETWORK

Supermarkets are partly to blame for the global food waste disaster. Confusion about the meaning of food safety dates results in a large amount of edible food being thrown away. Few of us fully understand the difference

between sell by, use by and best before dates.

Sell dates are intended for supermarkets only. It shows them when a food should be removed from sale.

Use by dates are usually added to perishable foods such as meat and fish. This means that the food must be eaten by this date, as it may prove harmful to health after this date.

BEST BEFORE -Fruits and vegetables usually have an expiration date. This date is the date before which the food is best. It will still be safe to eat after that date, it just might be a little soft or brown. Best-before-fresh dates are based on the supermarkets' best guess of optimal freshness or taste. If an expired carrot looks good to eat, then it is good to eat!

We would say that fruits and vegetables do not need a date. Consumers' own judgment is much better.

TOPIC 4 FOOD WASTE MANAGEMENT

If there is an unavoidable surplus of food, the best option is to redistribute it to people in need. Supermarkets can and do donate to food banks. But food banks have a limited time to turn in overripe produce before it spoils. Another option is to redistribute surplus food from supermarkets to charities and community groups.

Reducing the price of products with an expiration date or fruit and vegetables with a bad appearance.

Once the waste is generated and if it cannot be redistributed, changing it to get a second application is the next best option. One option is to extract some compounds: fats and proteins can be separated from meat and fat residues by ecarization plants and then used for animal feed. In the case of fat, it can also be used to make fuel, soap and other products.

Essential oils, fragrances and colorings can also be extracted from vegetables and fruits.

Another option is anaerobic digestion, a biological process in which organic waste is broken down by naturally occurring bacteria in the absence of oxygen to produce biogas. Biogas, mainly methane, can be used to generate fuel, heat or electricity, or it can be fed into the gas grid.

Solid waste that has not been converted into biogas, called biomass, can be used as fertilizer. Unlike anaerobic digestion, composting is a process in which microorganisms break down organic waste with the help of oxygen. The resulting product is a nutrient-rich soil improver called compost. Composting can be done on an industrial level and in households.

Conclusion

	Agricultural food production and consumption have significant impacts on the environment and human health. In recent years emphasis has been placed on the problem of waste generated by these huge industries. The European Commission launched the Farm to Fork (F2F) strategy, which addresses the challenges of producing and consuming our food in a fair and sustainable way, reconciling what we eat with the capacity of our planet. To achieve that we need to take measures in different sectors to prevent the waste of food – redistribution, second application, anaerobic digestion, biomass, composting.
References	Alessandro Caprini, June 20, 2022, SDSN - EU's Farm to Fork Strategy: What's the future of Europe's ambition to transform food and land use, at home and beyond? https://www.unsdsn.org/sdsn-and-eesc-host-eu-policy-workshop-farm-to-fork-how-to-make-it-work European Commission, Food Safety, Horizontal topics, Farm to Fork strategy https://food.ec.europa.eu/horizontal-topics/farm-fork-strategy_en Natasa Kilibarda, Filip Djokovic, Radmila Suzic, 2019, Food waste management — reducing and managing food waste in hospitality https://pdfs.semanticscholar.org/70d3/2ae680ce8ee9dec6c9996ad4caf41898769a.pdf?_ga=2.11669364.1121586168.1666546089-1633415854.1666546089 Guillermo Garcia-Garcia, Elliot Woolley, and Shahin Rahimifard, June 2015, A Framework for a More Efficient Approach to Food Waste Management https://pdfs.semanticscholar.org/768a/fef641bd207145be382a454041fe0713f79c.pdf Sarah Nolet, 2022, What Our Supermarkets Can (and Should) Do About Food Waste https://www.ecoandbeyond.co/articles/supermarket-food-waste/
Interactive questions for R3	1 - What is the name of the European Commission's Strategy, which aims to accelerate our transition to a fair, healthy and environmentally friendly food system. **"Farm to Fork"** "Sustainable Food System" "Farm to Waste" 2 - Which of the food delivery methods generates the most waste in the hospitality industry - serving individual portions **- buffet meals** - takeaway food

	3 – What is the correct definition of Sell by dates? - **Intended for supermarkets only. It shows them when a product should be removed from sale.** - The food must be eaten by this date as it may prove harmful to health after that.
Keywords	Food waste, composting, shelf life
Questions for reflection	1. What steps can you take to reduce the amount of food you throw away? 2. What else do you think supermarkets should do to solve the food waste problem?
Additional resources	ClimateScience - Solve Climate Change, 2021, Food Waste: The Hidden Cost of the Food We Throw Out IN ClimateScience #9 https://www.youtube.com/watch?v=ishA6kry8nc TED - Tristram Stuart, 2012, The global food waste scandal https://www.youtube.com/watch?v=cWC_zDdF74s CBC News: The National, 2018, Canadians get creative in solving food waste problem (1) Canadians get creative in solving food waste problem - YouTube56jk
Icons & related info for the hints of the PowerPoint presentation	 This hint is used to indicate that there's a link to other websites with additional information.  This is used within the PPT to indicate that something important is written/ to invite the reader to pay attention to essential information.  This hint indicates a question/task for reflection.
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