European Commission

NATURE-BASED SOLUTIONS LEARNING SCENARIO

Waste Management of The Food Industry – Hazards, Risks and Solutions

Waste Management of The Food Industry – Hazards, Risks and Solutions

European Commission
Directorate-General for Research and Innovation
Healthy Planet – C3 - Climate and Planetary Boundaries
CDMA 03/154
Contact Josefina ENFEDAQUE
Email josefina.enfedaque@ec.europa.eu
RTD-PUBLICATIONS@ec.europa.eu
European Commission
B-1049 Brussels

Manuscript completed in October 2020.
1st edition.

Luxembourg: Publications Office of the European Union, 2020

EUROPEAN COMMISSION

NATURE-BASED SOLUTIONS LEARNING SCENARIO

Waste Management of The Food Industry – Hazards, Risks and Solutions

Irena Ribinskienė

Directorate-General for Research and Innovation

2020 EN

TABLE OF CONTENTS

ABSTRACT

Uncontrolled landfill sites are increasingly being used as a food-waste disposal method. These sites are often source of diseases and unpleasant odours, providing a medium for microorganisms, parasites, and rodents to breed. They can favour the formation of leachates (polluting liquids) that filter though the subsoils contaminating groundwater and surface water. Municipal and industrial landfill sites, particularly those used for food waste also create additional fire hazards and may contribute to climate change through:

- *biodegradable waste fermentation, raising the landfill's temperature, which could promote fires (especially in the warm season);*
- *the biochemical decomposition of organic matter in natural conditions generates flammable gases (CH_4) which could increase the risk of fires and contribute to air pollution with the release of greenhouse gases (GHGs) such as CO_2.*

Teenagers can take action within their daily lives to reduce food waste at school and home and influence their family and extended communities to make behavioural change[1, 2]. In addition, they can also use 21st-century skills such as creativity and innovation to turn an urban challenge, such as food waste, into a solution for their communities' socio-economic development. The project will help them to further develop these key skills.

Composting food waste for biogas production in controlled environments is one alternative to minimising waste that reduces GHGs. Another solution is recycling compost to support sustainable urban food production systems. Both solutions are examples of innovative food waste management that are necessary to solve urban challenges and bring about socio-economic benefits to communities. Food and green waste processed in biological treatment installations (compost, technical compost) can be used as:

- *fertiliser for the revitalisation of farm soils or new urban cultivated areas*
- *an overlay material in a non-hazardous waste landfill in the Alytus region.*

We can focus not only on energy, but also on creating urban gardens or green spaces within the community, on which food waste is used as compost, and thereby, teach students how comprehensive nature-based solutions (NBS) are to tackle urban challenges. We proposed to students to conduct an experiment, in which food waste was converted to compost, and encouraged them to grow some vegetables with it. In this way, we linked the production of natural fertilisers and green energy with food initiatives such as the EU NBS edible cities program.

Keywords

Food Waste, Compost, Fertilisers, Landfills, Urban Farms, Greenhouse Effect

1. Introduction

> *"Nature-based solutions (NBS) are solutions that are inspired and supported by nature, which are cost-effective, simultaneously provide environmental, social and economic benefits and help build resilience. Such solutions bring more, and more diverse, nature and natural features and processes into cities, landscapes, and seascapes, through locally adapted, resource-efficient and systemic interventions. Nature-based solutions must therefore benefit biodiversity and support the delivery of a range of ecosystem services."*
> https://ec.europa.eu/info/research-and-innovation/research-area/environment/nature-based-solutions_en

To use this Learning Scenario more effectively, teachers are encouraged to:

- Check out the list of recent EU publications on Nature-Based solutions

[1] https://www.europarl.europa.eu/news/en/headlines/society/20170505STO73528/food-waste-the-problem-in-the-eu-in-numbers-infographic
[2] see https://www.eurofoodbank.org/en/food-waste

- Read about Nature-based solutions: Transforming cities, enhancing well-being (also available as a PDF)
- Contact local NBS practitioners or scientists working in their area (they can be found through Oppla).
- Use the "Ask Oppla" service to request help in case of any technical/scientific question on NBS.

2. Overview

Overview	
Subject	Biology, Chemistry, Physics, Economics
Topic	Economics and Green Jobs: Food and Other Organic Waste – Waste Management of The Food Industry –Hazards, Risks and Solutions; Recycling using urban agriculture
Age of students	16–18 years old
Preparation time	90 min (2 lessons)
Teaching time	405 min (9 lessons of 45m each)
Online teaching material	Methodological material about packaging *Keyword to find alternative videos in other languages: The methodological tool on packaging and packaging waste sets out the main questions and their summaries – Why sort? How do our people sort waste? The strategic objectives of the European Union; How long does packaging break down in nature? Types of packaging. What are they? How to sort correctly? What can't be thrown in secondary raw material containers? Packing path; General labelling requirements for packages; How to change your attitude? Interesting facts; What can be made from recycled waste? Can I live differently with less waste? Make sure you know how to sort waste correctly?* Solutions *Keyword to find alternative videos in other languages: Food waste collection and recycling. Waste management we will offer the best way to deal with waste: to recover, recycle and reuse or extract alternative energy.* Users *Keyword to find alternative videos in other languages: Food waste management habits: towards self- and environmentally beneficial consumption; What determines food waste sorting habits? Effective communication – only at the right time; The beginning is the intention; the end is the habit.*
Offline teaching material	Paper, food product packaging, scissors, pen, computer. Boxes for compost (4 pcs.), natural soil, vegetable (radish) seeds, food waste (banana bark, potato peelings, coffee grounds), water for irrigation, measuring glasses, rulers, paper for descriptions and test results;
NBS resources used	Urban Innovative Actions Lab Edible Cities Project; Euro Food Bank; The Waste Problem in Numbers; Naturvation; Land use and NBS Plans Owls' community food garden, São Paulo: https://oppla.eu/casestudy/20118 Urban Farm Supplyed School Canteens, Managed by the Municipality of Mouans-Sartoux: https://oppla.eu/casestudy/19553 Golden Hill Community Garden, Bristol: https://oppla.eu/casestudy/19195 Additional optional resources: Python and Arduino.

3. Integration into the curriculum

The Learning Scenario topic is related to the national secondary education curriculum: students can integrate knowledge from several sciences, plan and conduct research in the STEM field, analyse and interpret the results obtained, apply mathematical and information knowledge and abilities to process research results, solve problems and explain the influence of human activity on the local environment and the world as a whole.

This LS would be a good option for working from the subject of Mathematics in collaboration with the Biology and Economics teachers. The Biology teacher could be in charge of carrying out the first proposed parts of the LS on seed growth and creation of homemade compost, as well as the discussion of results. The Economics teacher could work on the topics of Circular Economy and Bioeconomy. The Mathematics teacher could see to making a statistical analysis of the food waste produced by a family and also a representation of the food waste in numbers.

4. Aim of the lesson

Students will be able to:

- broaden their knowledge in the STEM field.
- plan and conduct a practical study.
- assess the results of the study and draw conclusions and recommendations for the school community and society.
- analyse the household situation using the data collected.

5. Outcome of the lesson

After carrying out the study – producing compost from food waste and using it for sowing plants and growing seedlings – students will gain knowledge and practical abilities to manage the waste cycle. Not only will the students learn about the negative impact of food waste on the environment, the economy, food security and nutrition, but they will also learn that once broken down and re-introduced into nature, food waste can have a positive impact on communities. From this practical task, they will learn that NBS in urban agriculture and green spaces can contribute to healthier and more sustainable cities and circular economies. After the tracking of food waste have been processed, students will learn to which extent it is a problem in their local environment and how NBS can be applied to promote recycling in cities and create new jobs. By visiting a local biogas production site and discussing urban farming in the context of a sustainable economy, they will learn about the various job opportunities that NBS bring about.

They will also learn how to contribute to reducing climate change, and that separately collected food waste is thermally processed and recycled by extracting biogas. By sorting food waste at home and choosing packaging that is suitable for food in stores, students will learn to manage environmental pollution, reduce climate change, and deploy NBS. "The future of nature is in our hands."

6. Trends

- STEM learning.
- Learning (school community, students, students' parents, JSC Alytus region Waste Management Centre) – ARACT
- practical experience learning.
- civic-awareness and eco-justice pedagogy

7. 21st-century skills

When we deliver on a 21st-century learning experience, students are active participants in constructing knowledge, understandings, and even solutions to real problems in their communities. These experiences often include approaches such as problem-based, project-based learning, extended challenges, work-based learning, and applying immersive technologies. To prepare our young people for this rapidly changing and interconnected world, our education systems must facilitate learning experiences where content knowledge and 21st-century transferable skills are equally valued, and where each student is actively engaged in the learning process.

8. Activities

Name of activity	Procedure	Time
Composting (biochemistry)	The problem in question: food waste generated in the kitchen, leads to a high level of litter in landfills and causes global problems. When working in groups, the students prepared 4 different boxes of compost: 1) control box, 2) compost from banana bark, 3) compost from potato peelings, 4) compost from coffee grounds. Left for 2 weeks for composting, periodically watering and loosening.[3]	45 min.
Sowing of seeds and growing of sprouts	Potential for urban gardening and agriculture: In the boxes of different compost prepared, the students seeded an equal amount of radish seeds. Seedlings grew for 2 weeks, periodically being watered.	2 – 3 months
Discussion of results, formulation of conclusions and recommendations	Students analyse the results of the study: calculate the number of germinated seeds, assess the quality of sprouted growth, formulate conclusions and recommendations for the community, ecological area and climate zone.	45 min.
Tour to the waste management centre in your city or nearby Biogas centre as an example (physics)	Students learn that separately collected food waste is heat-treated and recycled by extracting biogas. Biogas produced in a co-generator after the anaerobic treatment is used to produce electricity and heat. Some heat-treated food waste can be composted. This process can bring about new jobs and green energy. Excursion Excursion video	90 min.
Discussion on sorting food waste	The disposal of waste into the overall waste stream, combined with other mixed waste, is also an inappropriate method of treatment: under the influence of moisture and bacteria, food waste decomposes and releases methane gas.	45 min.
Electric power generation	A gas collection system is installed in the waste management centre non-hazardous waste landfill site and a collector is built. The gas from the biological treatment plants in the tunnels and the fermentation-percolate reservoir is used as a fuel which produces electricity for its own needs and heat for the technological process. The gas collected from the landfill is placed in a generator of biological treatment plants to produce electricity which is sold to electrical grids. Waste management system	45 min.
Practical work "labelling of food packaging"	Students learn that food packaging is divided according to various criteria: by purpose, by composition, by frequency of use, according to the material from which the packaging is made. They also found out about the negative environmental impact of	45 min.

[3] As an extra activity, students could measure the pH in a solution of compost and water, as one of the most important criteria for compost quality is the acidity of the compost. Proper compost pH is a prerequisite for proper plant growth. Microorganisms that break down organic matter into simpler ones that are assimilated by plants feel best at pH 6.3-6.8. While the pH becomes strongly alkaline, plants find it difficult to absorb iron and manganese, making them less resistant to various diseases. Plants can only absorb substances dissolved in water, the solubility of which depends on the acidity (pH) value of the compost. In order to obtain more accurate measurement results, an indirect determination of the acidity of the compost is required. The solution and the pH meter or indicator sheet are used for the measurement. To determine the acidity (pH) of the soil, it is necessary to take 10-20 g of soil from the compost a few centimetres deep and pour it into a 100-200 ml container and add water. Close the container tightly and shake well. After 5 minutes, when the sample has stabilised, immerse one strip of indicator paper in the solution which has stabilised on the surface. Then pull out the strip and compare its colour with the added scale. The colour on the scale will show the soil pH. When using a pH meter, it should be used by immersing it in a container with the solution and waiting for the measurement results to stabilise. Only then can the pH be recorded.

Name of activity	Procedure	Time
	food packaging, their real benefits for nature, are encouraged to change their daily shopping habits.	
Discussion of the results, conclusions	Food waste harms the environment, the economy, food security controls and nutrition. In the future food shortage and its cost will only increase without further reductions in CO_2 and other greenhouse gas emissions. By making bags from recycled waste (as compared to the production of primary raw materials), we are looking for solutions to contribute to mitigating climate change by using nature as a solution. Such creative processing of food waste is an example of NBS that reduce GHG in the circular economy and contribute to job creation.	45 min.
Survey (economics)	Every day, week, month, and year, every person estimates food waste and compares it with food waste in the canteen. The problem is named. See Annex 1 for the suggested table to be used by the students. It can also be downloaded independently from here in English or Lithuanian.	45 min.
Processed survey data	Every day, week, month, and year, every person estimates food waste and compares it with food waste in the canteen. Trying to name the problem.	45 min.
Summary	For example, from the author's school it was found that: Household food waste at weekends increases for 1 person as much as on average in the canteen on weekdays. It is recommended to finish this activity with a debate in which: • Students identify the problem and suggest solutions. (see example from author's school in Annex 2) • Share the recommendations with the school community. The organisers of the debate may guide with "the right to purchase food must not become an excessive mania, only a balanced way of supplementing the energy sources of the human body". International sources on the topic: EU Policy Actions in the EU	45 min.
Optional	If time permits, two additional topics can be addressed in class: • Problem solving methods (see Annex 3 for more information) • Circular economy and waste reduction (see Annex 4 for more information) If time permits, another activity can be organised: • Design/prototype a "recycling plant" with the compost from organic waste, in order to test if they are able to produce enough gas/energy to inflate a balloon or to switch on a LED	

9. Assessment

Formative Assessment: The following questions can be asked to students:

- What have I learned? Have I learned new things?
- What did you see/dislike about the research, what would you do differently?
- What will I do with what I have learned?

10. Student feedback

- Students felt it was meaningful to work independently and creatively on this project.

- They thought there was an appropriate choice of methods, tools, materials to support their work performance.
- They were able to apply their content knowledge from scientific literature and data comparison to analyse and solve a real-world problem.
- They learned how creativity, coupled with knowledge from their chosen school subjects, could be used to tackle real-world challenges in their community.

11. Teacher's remarks

- Students see the project process, from development to dissemination of results, as a way to develop their problem-solving skills and contribute to disaster risk reduction (mainly fires) in their communities.
- The project had an enduring value, continuity, relation to the life of the students and their local environment (significance of results and their use in the social environment, etc.).
- There was an appropriate use of materials, tools, devices, and information sources to tackle the challenge and NBS from different and triangulating perspectives.
- The diversity of learners within a class creates a wonderful opportunity to share knowledge and enrich the classroom and learning experience through different expertise. Furthermore, the 21st-century skills state that learners experience learning across the curriculum, which means that the same topic can be analysed from different perspectives and disciplines.

Alytus Jotvingiai Gymnasium hosted a debate "Food waste at home – a personal matter or an ecological bomb?" Students debated food waste and possible solutions to curb excessive food purchases and people's responsibility for disposing of them. Information about the debate "Food waste at home - a personal matter or an ecological bomb?", Which took place in Alytus Jotvingiai Gymnasium, was placed in the regional newspaper of Alytus City Municipality (see Regional press article).

Annex 1: Food waste tracking sheet

1. Task

Do a research in your household.

Investigate and document how much food waste is thrown away in a week.

Type of waste								
Food waste and produced waste – g and kg	into composting							
	Into container							
	into food waste container (the green one)							
	Other							

How many members does your household have?
Where do you live?
Describe all the issues that you have faced while doing this task.

2. Task

Do a research in the canteen.

Investigate and document how much food waste is thrown away in a week.

Type of waste							
Food waste and produced waste – g and kg							

Annex 2: Food waste management solutions

Example of solutions to food waste management from author's school debate

One of the solutions is composted food waste. Unsorted, biodegradable food materials, in landfills, are the source of greenhouse methane and other gases, polluting the soil, primer and water. One of the solutions for processing food waste simply is to compost. It is a practical solution that allows you to avoid the resulting waste and fertilise the land by reintroducing nutrients into the soil cycle, improving its quality, so we proposed to the students to conduct a test, during which this food waste was transformed into compost, and in the course of it, we planted vegetable seeds and we grew seedlings. In this way, we checked which food waste is the most effective for plant growth, we learnt on how compost is used to reduce the amount of food waste in landfills, and on how efficient and useful recyclable waste is. (Chemistry teacher methodologist Zita Sakalauskiene, expert Biology teacher Rasa Zubrickiene, Biology teacher Laima Petkevičienė).

A further solution is the mechanical and biological treatment of food waste and the use of process biogas to produce electricity. Our students and teachers visited the JSC Alytus region waste management centre, found out about the sorting and processing of food waste, researched the selection of food packaging. We learned about how mechanical sorting equipment reduces landfill waste, groundwater, and soil pollution, as well as recycles and uses energy to generate most of the biodegradable waste in the region (around 75%). We understood how biodegradable waste is processed in mechanical and biological waste treatment plants, including separately collected food waste. Biogas produced during the anaerobic treatment is used for the cogeneration of electricity and heat. Waste processed in biological treatment installations (compost, technical compost) is used as a fertiliser or for the rejuvenation of areas or as an overlay material in a non-hazardous waste landfill of the Alytus region. In installations, biodegradable waste is processed by a dry anaerobic process, and the final product is compost and electricity, which is used for the operation of the equipment itself and the excess is sold to the electrical grids. (Physics teacher methodologist Irena Ribinskiene).

Annex 3: Problem solving methods.

Actions to address climate change are already happening all around us. The multifaceted nature of solutions and adaptations offer many avenues for us exploring these topics in the classroom.

Although human-caused climate change is a global problem, its root cause lies in the sum of our actions.

Types of actions to reduce climate change can take many forms, such as emissions avoidance, land-use changes, or sequestration of greenhouse gases.

The scale of actions can range from an individual to a community.

Climate and energy policies are currently being crafted by various nations and communities.

Actions can be spurred by policy, economic incentives, a sense of environmental or social responsibility, or a combination of each of these.

LEARNING OUTCOME:

The design of the activities will meet projected learning outcomes: food systems and climate impacts by having students complete a variety of activities. Our responses to climate change touch on many disciplines: earth science, biology, human health, engineering, technology and economics. One pedagogic technique that is particularly effective is having students take a quantitative approach to discovering the scale of the problem and thus the scale of potential solutions.

Annex 4: Circular economy and waste reduction

One pedagogic technique that is particularly effective is having students take a quantitative approach discovering the scale of the problem, and thus the scale of potential solutions. Middle School students will learn the basics of climate science and the factors contributing to this. They can begin to think about ways that they will be able to reduce their own impacts. They can also understand how actions and decisions can be made at many scales – at home, in school, in communities. Case studies from other countries can be used to engage students' interest in other cultures. Role-playing activities can appeal to a variety of learning styles and can encourage students to immerse themselves into a scenario that is outside of their everyday experience.

THE CIRCULAR ECONOMY

The circular economy is a renewable system in which the costs, emissions and energy losses of resources and waste are reduced through proper management and integration into a closed chain of energy and materials. The circular economy ensures the sustainable use of resources and extends resources' life cycle, eliminating waste and creating positive value for both the economy and the environment in general. We have reviewed the main stages of the circular economy: Raw Material; Designing; Production; Distribution; Secondary use; Collection; Recycling – secondary raw materials – final waste – consequences. All products and services have an impact on the environment around us: from extracting primary raw materials needed for production to their distribution, use and disposal. This includes the use of energy and resources, soil, air and water pollution, and greenhouse gas emissions. The lifecycle approach includes all stages of a product's existence to identify where improvements can be made to reduce environmental impact and resource consumption. The main goal is to avoid actions that transfer negative effects from one stage to another. Lifecycle analysis have shown that it is at times more beneficial for the environment to replace an old thing with a new one (despite the waste generated) that consumes less energy. **Circular economy**

COLLECTION AND RECYCLING

In the circular economy, recyclable materials are returned to the economic cycle as new raw materials. These secondary raw materials can be sold and transported in the same way as primary raw materials from traditional extraction sources. We as consumers therefore need to sort waste, because if it is properly sorted, it will reach waste recycling plants more quickly and it will be properly adapted. An example of responsible consumption: "Zero waste - "Without waste") is the 21st-century movements for the sole purpose of consuming recyclable or self-degrading materials.

WASTE REDUCTION – PREVENTION

Getting to know the raw materials around us or created by us and adapting their use to each of our lifestyles has made a significant contribution to reducing waste.

REUSE OF WASTE – SORTING

We sort waste –- Companies industrially process waste into raw materials – Raw materials are used in the production of a new product; How We Feel About Food Waste

LANDFILLING

Landfilling is the oldest form of waste management and the least desirable option due to the many potential negative consequences. The most serious of these are the production and emission of the greenhouse gas methane (the comparative impact of methane on climate change over a 100-year period is 25 times that of carbon dioxide). Methane can accumulate in landfills and even cause explosions. In addition to methane, the disposal of biodegradable waste can lead to the release of chemicals, such as heavy metals, into the environment with the filtrate. This liquid can contaminate local ground and surface water and soil, which could pose a risk to public health and the environment.

USE OF WASTE FOR ENERGY

The term "waste-to-energy or energy-from-waste" applies to power plants that generate energy (STEM and/or electricity) from waste incineration. The incineration method is especially popular in our city with limited land area. Incineration is carried out on both an individual and an industrial scale.

Ultimately, if students are encouraged to understand solutions, they will be able to evaluate choices based on multiple factors and weight advantages and trade-offs. Critical thinking is essential for

making informed decisions and solving complex problems – skills that all students will need as engaged citizens.

Getting in touch with the EU

IN PERSON
All over the European Union there are hundreds of Europe Direct information centres.
You can find the address of the centre nearest you at: https://europa.eu/european-union/contact_en

ON THE PHONE OR BY EMAIL
Europe Direct is a service that answers your questions about the European Union.
You can contact this service:
– by freephone: 00 800 6 7 8 9 10 11 (certain operators may charge for these calls),
– at the following standard number: +32 22999696, or
– by email via: https://europa.eu/european-union/contact_en

Finding information about the EU

ONLINE
Information about the European Union in all the official languages of the EU is available on the Europa website at: https://europa.eu/european-union/index_en

EU PUBLICATIONS
You can download or order free and priced EU publications from:
https://op.europa.eu/en/publications. Multiple copies of free publications may be obtained by contacting Europe Direct or your local information centre (see https://europa.eu/european-union/contact_en)

EU LAW AND RELATED DOCUMENTS
For access to legal information from the EU, including all EU law since 1952 in all the official language versions, go to EUR-Lex at: http://eur-lex.europa.eu

OPEN DATA FROM THE EU
The EU Open Data Portal (http://data.europa.eu/euodp/en) provides access to datasets from the EU. Data can be downloaded and reused for free, for both commercial and non-commercial purposes.

About the NBS project

The NBS project is initiated and funded by the European Commission Directorate-General for Research and Innovation and coordinated by PPMI, in collaboration with European Schoolnet (EUN). PPMI (www.ppmi.lt/en) is a leading European research and policy analysis centre, aiming to help public sector and civil society leaders from around the world, presenting evidence in a way that is simple, clear and ready to use. European Schoolnet (www.eun.org) is the network of 34 European Ministries of Education, based in Brussels. EUN aims to bring innovation in teaching and learning to its key stakeholders: Ministries of Education, schools, teachers, researchers, and industry partners. Find out more about nature-based solutions: https://ec.europa.eu/research/environment/index.cfm?pg=nbs and all the NBS Learning Scenarios created in this project as well as the overall reports can be found at http://www.scientix.eu/pilots/nbs-project

The NBS project pilot has also been supported by the STE(A)M Partnerships programme of Scientix, funded from the European Union's H2020 research and innovation programme – project Scientix 4 (Grant Agreement N. 101000063), coordinated by European Schoolnet (EUN). The content of the document is the sole responsibility of the organizer and it does not represent the opinion of the European Commission (EC), and the EC is not responsible for any use that might be made of information contained.

Uncontrolled landfill sites are increasingly being used as a food-waste disposal method. These sites are often source of diseases and unpleasant odours, providing a medium for microorganisms, parasites, and rodents to breed. They can favour the formation of leachates (polluting liquids) that filter though the subsoils contaminating groundwater and surface water. Municipal and industrial landfill sites, particularly those used for food waste also create additional fire hazards and may contribute to climate change through:

- biodegradable waste fermentation, raising the landfill's temperature, which could promote fires (especially in the warm season);
- the biochemical decomposition of organic matter in natural conditions generates flammable gases (CH4) which could increase the risk of fires and contribute to air pollution with the release of greenhouse gases (GHGs) such as CO2.

Teenagers can take action within their daily lives to reduce food waste at school and home and influence their family and extended communities to make behavioural change. In addition, they can also use 21st-century skills such as creativity and innovation to turn an urban challenge, such as food waste, into a solution for their communities' socio-economic development. The project will help them to further develop these key skills.

Composting food waste for biogas production in controlled environments is one alternative to minimising waste that reduces GHGs. Another solution is recycling compost to support sustainable urban food production systems. Both solutions are examples of innovative food waste management that are necessary to solve urban challenges and bring about socio-economic benefits to communities. Food and green waste processed in biological treatment installations (compost, technical compost) can be used as:

- fertiliser for the revitalisation of farm soils or new urban cultivated areas
- an overlay material in a non-hazardous waste landfill in the Alytus region.

We can focus not only on energy, but also on creating urban gardens or green spaces within the community, on which food waste is used as compost, and thereby, teach students how comprehensive nature-based solutions (NBS) are to tackle urban challenges. We proposed to students to conduct an experiment, in which food waste was converted to compost, and encouraged them to grow some vegetables with it. In this way, we linked the production of natural fertilisers and green energy with food initiatives such as the EU NBS edible cities program.

Studies and reports

Publications Office
of the European Union