



**3 VOICES
IN GREEN**

SUSTAINABILITY IN ART AND DESIGN

LEGACY OF THE THREE VOICES
IN GREEN PROJECT



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LEGACY OF THE THREE VOICES IN GREEN PROJECT



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ABOUT THIS PUBLICATION

This booklet is a collection of outcomes of the Erasmus+ project *Three Voices in Green*.

It was developed collaboratively by the **TVIG project team** as a **legacy output** — designed to support the continued use and adaptation of the project's results in the years to come.

Main Editors: Mgr.A. Miloslava Svobodová, Mgr. Eva Moravcová, MBA

ABOUT THREE VOICES IN GREEN

Project title:	Trojhlas v zelené (Three Voices in Green)
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Partners:	▪ Państwowe Liceum Sztuk Plastycznych im. Antoniego Kenara w Zakopanem (PL) ▪ Súkromná škola umeleckého priemyslu v Žiline (SK) ▪ Plastia a.s. (CZ) – A Czech company engaged in sustainable design (associated partner)

The main objectives of the project *Three Voices in Green* were to **adapt existing curricula to the evolving needs of the labor market** and to **develop a more comprehensive approach to education in eco-art and sustainable design**, particularly through the integration of **3D printing and virtual reality technologies**.

The project aimed to **introduce participants to broader concepts of sustainable thinking** and to **support them in identifying their own potential for contributing to sustainability** in their personal and professional lives.

Main Project Topics:

Eco-art & Sustainable Thinking

3D Printing & Sustainable Design

Virtual Reality & Design for Sustainability.

DISCLAIMER:

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More information about the Erasmus+ program:

<https://erasmus-plus.ec.europa.eu/> and <https://www.dzs.cz/program/erasmus>.



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ECO-ART & SUSTAINABLE THINKING



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SUSTAINABILITY AND YOU

Sustainable Development Goals, Earth Overshoot Day & Personal Sustainability Plan

TASK 1: DISCUSSION



Look at the pictures. Discuss these questions in pairs or small groups. Use the words below to help you.

- What is harming the environment? Choose three pictures and discuss the threats they show.
- What can people do to protect the environment? Choose three pictures and discuss the ideas they represent.

Vocabulary: **sustainability, environment, renewable energy, landfill, recycling, waste, air/water pollution, endangered animal species, mining, drilling for oil, fossil fuels, deforestation, climate change, exhaust fumes, green transport, global warming, carbon footprint, fast fashion**

TASK 2: SUSTAINABLE DEVELOPMENT GOALS AND WHY THEY MATTER

Fill in the gaps using the correct words. Choose the best option in each case.

The **Sustainable Development Goals (SDGs)** are a set of 17 global goals created by the **United Nations**. They aim to make the world more (1) _____ (equal / equality / equally). The goals include many important targets such as ending (2) _____ (hungry / hunger), fighting (3) _____ (climate / climate change / weather), and ensuring access to clean water for (4) _____ (whole/all).

The SDGs also promote (5) _____ (education / educate / educated), health, and decent work, while protecting the (6) _____ (environment / environmental / environmentally). They support the use of (7) _____ (energy / energise / energetic) from renewable sources and the (8) _____ (reduce / reducing / reduction) of inequality worldwide.

Young people can help by (9) _____ (make / making / to make) better choices in daily life, learning about sustainability, and taking small actions that (10) _____ (makes / made / make) a big difference.

Explore the 17 goals here:  UN Sustainable Development Goals: <https://sdgs.un.org/goals>

- **Choose 3 goals which are most important for you. Compare them with your speaking partner. Why did you choose those three?**

TASK 3: YOUR LIFESTYLE

Discuss in pairs or small groups:

- **Do you think your lifestyle is sustainable? How is it sustainable? What could you change?**



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TASK 4: EARTH OVERSHOOT DAY – WHAT DOES IT MEAN?

What do you think Earth Overshoot Day means?

Look at these options and choose the correct definition for “Earth Overshoot Day”:

- A) The day when people plant the most trees in the world.
- B) The day when humanity has used more natural resources than Earth can renew in one year.
- C) The hottest day recorded each year on Earth.

When do you think Earth Overshoot Day was last year?

Go to the Earth Overshoot Day Homepage: <https://www.overshootday.org/> and check your answer.

Do you think your personal lifestyle moves this day forward or backward?

TASK 5: WHEN IS YOUR EARTH OVERSHOOT DAY?

a) *Go to the Footprint Calculator: <https://www.footprintcalculator.org/>.*

Calculate your personal Earth Overshoot Day.

b) *Record your results:*

→ Your Earth Overshoot Day: _____

How many Earths would we need if everyone lived like you? Number of Earths: _____

c) *Discuss:*

- Are you surprised by your result? Why or why not?
- What could you change in your daily life to improve your result?
- What habits do you already have that help lower your footprint?

TASK 6: HOW CAN I HELP? YOUR PERSONAL SUSTAINABILITY PLAN

Fill in your Personal Sustainability Plan — this is your real action plan!

Need more ideas? Look here: <https://www.un.org/sustainabledevelopment/takeaction/>

Clothes:

I will

Energy:

I will

Food:

I will

Water:

I will

Plastic:

I will

Travel:

I will

Paper:

I will

Other ideas:



TEACHER'S NOTES

TOPICS

Sustainable Development Goals, Earth Overshoot Day & Personal Sustainability Plan

TARGET GROUP

Secondary school students, VET students, age: 15–19

LANGUAGE LEVEL:

B1 (CEFR)

DURATION

2 x 45 minutes

ANSWER KEY

✓ Task 2: **1. equal 2. hunger 3. climate change 4. all 5. education 6. environment 7. energy 8. reduction 9. making 10. make**

✓ Task 4: **B)** The day when humanity has used more natural resources than Earth can renew in one year.

✓ Task 6: **Sample solution:**

Example: My Personal Sustainability Plan

Clothes: I will buy fewer new clothes and choose second-hand or swap with friends.

Energy: I will turn off lights and unplug chargers when I don't use them.

Food: I will eat less meat and try to buy local and seasonal food.

Water: I will take shorter showers and turn off the tap while brushing my teeth.

Plastic: I will use a reusable bottle and bag instead of plastic ones.

Travel: I will walk or take the bus instead of asking for a car ride.

Paper: I will use both sides of paper and print only when really necessary.

Other ideas: I will tell my family about Earth Overshoot Day and show them how to check their footprint online.

SOURCES

AI-generated images: OpenAI. (2025). AI-generated images of environmental and sustainability themes. Generated using ChatGPT and DALL·E by OpenAI, 2025. <https://openai.com/>

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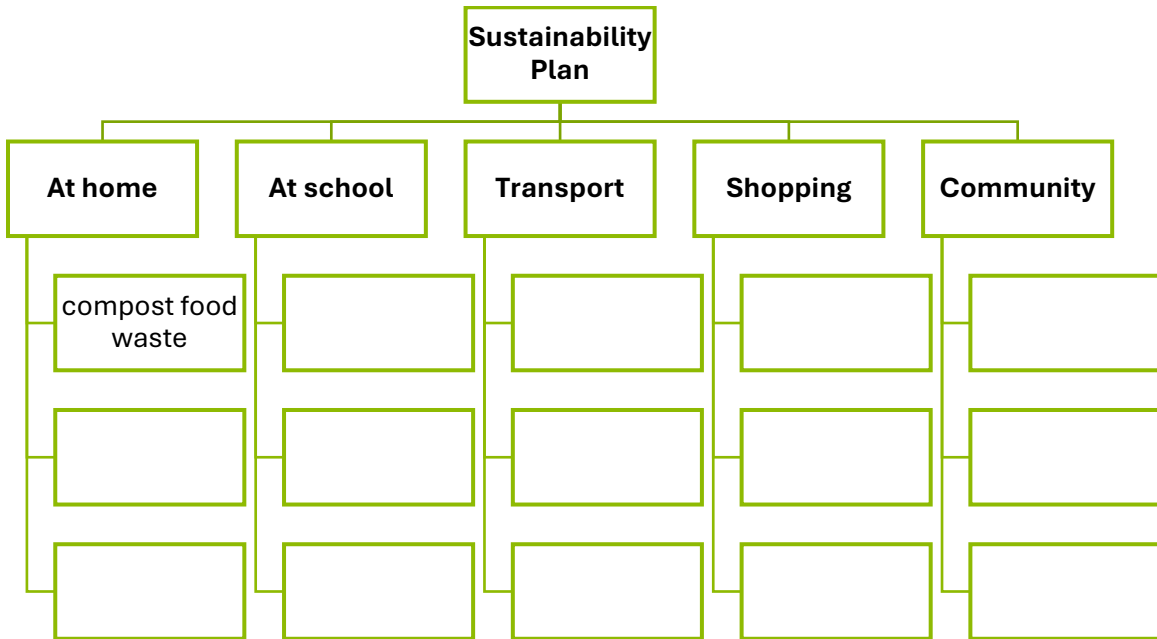
HOW CAN I HELP?

Personal Sustainability Plan, Sustainable Development Goals, Earth Overshoot Day

TASK 1: DIAGRAM: HOW TO BE MORE SUSTAINABLE?

In pairs, complete the diagram below. What might be in a Personal Sustainability Plan?

Use the categories below and add your own ideas. Write at least 2 examples for each.



TASK 2: MATCHING IDEAS

Read about the four people below and their interests. Then match each person to the best initiative.

Write the correct letter (A–D). One initiative is extra.

People

- 1 Anna** wants to meet new people while helping the environment.
- 2 Pavel** likes working with his hands and creating something new.
- 3 Magda** is worried about climate change and wants to act right now.
- 4 Jakub** enjoys spending time outdoors and learning about nature, plants, and trees. He is a gardener.

Initiatives

- A. Join a local Tree Planting Day in the park.
- B. Attend a Workshop on Upcycling Clothes to make new items from old ones.
- C. Sign an online Petition to Reduce Plastic Waste.
- D. Participate in a Community River Clean-up.



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TASK 3: PICTURE DISCUSSION

Look at the picture and discuss in pair:

- 1) What are the people doing?
- 2) What are these people like? What are their values?
- 3) Have you ever taken part in any clean-up or tree planting activities?
Would you like to?



TASK 4: DISCUSSION TASK – PAIR WORK

Your school is planning a Sustainability Week. What could be organized? Here are some ideas:

- School garden project
- Plastic-free cafeteria week
- Art competition using recycled materials
- Bike-to-school challenge
- Guest talk from a local environmental activist

Instructions:

- Talk about each idea and say what you think about it
- Choose two ideas that would work best at your school.

TASK 5: DID YOU KNOW? & WHERE TO READ MORE

Did you know?

Plastic production has increased more than **200 times** since 1950, and only 9% is recycled globally.

Learn more: [UN Environment Programme – Single-use Plastics](https://www.unep.org/resources/report/single-use-plastics-roadmap-sustainability)¹



¹ <https://www.unep.org/resources/report/single-use-plastics-roadmap-sustainability>



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Did you know?

More than **1 million species** are at risk of extinction due to human activity.

Learn more: [Nature crisis: Humans 'threaten 1m species with extinction'](#)²

TEACHER'S NOTES

TOPICS

Personal Sustainability Plan, Sustainable Development Goals, Earth Overshoot Day

TARGET GROUP

Secondary school students, VET students, age: 15–19

LANGUAGE LEVEL:

B1 (CEFR)

DURATION

1 x 45 minutes

ANSWER KEY

✓ Task 1: suggested answers

At home: compost food waste, save water, turn off unused lights, grow your own vegetables, use energy-efficient appliances, repair instead of replace

At school: recycle paper, use both sides of paper, start a green club, organize a clothes swap, set up a recycling station, invite guest speakers on sustainability

Transport: walk or cycle, use public transport, carpool with friends, plan routes to reduce travel, use electric scooters, avoid unnecessary trips

Shopping: buy local products, bring reusable bags, choose eco-friendly items, avoid single-use plastics, buy second-hand clothes, check product sustainability labels

Community: join clean-up events, plant trees, volunteer for environmental projects, start a community garden, run a sustainability workshop, organize a swap market

✓ Task 2: 1 D 2 B 3 C 4 A

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² <https://www.bbc.com/news/science-environment-48169783>



PERSONAL SUSTAINABILITY PLAN BOOKMARK



How can I help?

clothes

energy

food

water

plastic

travel

paper

other ideas



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ARTISTS AND SUSTAINABILITY

Artists focused on sustainability

TASK 1: DISCUSSION – LAND ART & ROBERT SMITHSON



Robert Smithson: Spiral Jetty (1970)

a) Look at this artwork and discuss:

- What message do you think the artist wants to give about nature and the environment?
- Does his work protect nature or change it?
- Is using nature to make art a good or bad thing? Why?

b) Go online and fill in the blanks:

Land art is a type of art made with natural materials like rocks, sand, earth, and water. It started in the _____ (1) (time period) and became popular in the United States and other countries. Many land artworks are created far away from cities and are often very large.

One famous land artist is Robert Smithson. He was born in _____ (2) (year) and died in 1973. His most famous work is called the Spiral Jetty. It is a huge spiral shape made with mud, salt, and black rocks.

Smithson built Spiral Jetty in the year _____ (3) (year). It is located in the state of _____ (4) (place), on the shore of the _____ (5) (name of lake). The spiral is about _____ (6) (distance) long and 4.6 meters wide.

Because the lake's water level changes, sometimes the Spiral Jetty is underwater and sometimes it is dry. Smithson also made a short film to show how the work was made.

Land art often makes people think about the Earth and nature. Some say it helped start more interest in the ecological movement.

TASK 2: CONTEMPORARY ARTISTS: RENZO PIANO

a) Read a short text about a famous architect and his work:

RENZO PIANO (1937-)

Renzo Piano is one of the world's most respected architects, known for designing innovative buildings that work with nature, not against it. Born in Genoa, Italy, in 1937, Piano has spent his career blending modern architecture with environmental care.

California Academy of Sciences (2000–2008), San Francisco

In the heart of **Golden Gate Park**, Piano redesigned the California Academy of Sciences after an earthquake damaged the old buildings. But this wasn't just a repair job — he created a building that feels like a part of the landscape.



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- The roof is a living garden, covered with native plants and small hills that look like they grow naturally from the park.
- There are solar panels on top, and the roof helps with temperature control, saving energy.
- The building houses a museum, planetarium, aquarium, and rainforest dome — all under one 1.5-hectare green roof.
- Circular windows let in natural light, reducing the need for electric lights during the day.

The Biosphere (1985–2001), Old Port of Genoa

Back in his hometown, Renzo Piano helped transform the Old Port of Genoa from an industrial zone into a cultural destination. One highlight is the Biosfera — a futuristic glass sphere floating near the aquarium.

- The Biosphere acts like a mini tropical forest inside a glass bubble.
- It holds rare plants, butterflies, and small animals, maintained by a careful balance of light and climate.
- The design allows visitors to be completely surrounded by nature, with panoramic views of the sea and sky.



California Academy of Sciences in San Francisco (2000–2008) | The Biosphere in the Old Port of Genoa (1985–2001)

b) Are these statements True (T) or False (F)?

- 1) Renzo Piano was born in Genoa, Italy, in 1937.
- 2) The California Academy of Sciences was built on a completely new site in Los Angeles.
- 3) The roof of the California Academy of Sciences includes native plants and solar panels.
- 4) The Biosphere in Genoa is a traditional concrete museum building.
- 5) Visitors inside the Biosphere can enjoy views of the sea and sky.

TASK 3: CONTEMPORARY ARTISTS: EL ANATSUI, JULIE PEPPITO AND OTHERS

Go to these two websites: <https://elanatsui.art/biography>; <https://www.juliepeppito.com/about> and fill in the table:

Category	El Anatsui	Julie Peppito
Year or place of birth		
Where they live/work		
What kind of art they make		
Materials they use		
One interesting fact		

TASK 4: FIND YOUR OWN ARTIST!

Now go online and find one more artist whose work connects to sustainability or the environment.



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TEACHER'S NOTES

TOPICS

Artists and Sustainability, Land Art, Robert Smithson, Renzo Piano, El Anatsui, Julie Peppito

TARGET GROUP

Secondary school students, VET students, age: 15–19

LANGUAGE LEVEL:

B1 (CEFR)

DURATION

2 x 45 minutes

ANSWER KEY

✓ Task 1:

a) Spiral Jetty: Details: Located in the Great Salt Lake, Utah, this iconic earthwork is made from mud, salt crystals, and basalt rocks arranged in a 1,500-foot-long spiral. Robert Smithson's Spiral Jetty is more than just an arrangement of rocks in a spiral; it's a profound statement about **time, entropy, nature, and human perception**. At its core, Smithson was exploring the idea that **art doesn't have to be permanent or confined to museums — it can exist in nature, change with it, and even disappear**.

b) 1960s 2. 1938 3. 1970 4. Utah 5. Great Salt Lake 6. 460 meters

✓ Task 2 b):

1 True; 2 False – It was redesigned in San Francisco's Golden Gate Park, not built in Los Angeles; 3 True; 4 False – The Biosphere is a futuristic glass sphere, not a concrete museum; 5 True

✓ Task 3)

Category	El Anatsui	Julie Peppito
Year and Place of Birth	Born in 1944 in Anyako, Ghana	Born in 1970 in Tulsa, Oklahoma, USA
Artistic Focus	Renowned for transforming discarded materials, especially bottle caps, into large-scale sculptures that explore themes of memory, history, and identity.	Creates sculptures, tapestries, and installations that address environmental concerns and human connections, often using salvaged materials.
Materials Used	Utilizes materials like aluminum bottle caps, copper wire, wood, and clay to craft intricate installations.	Employs reclaimed objects, embroidery, fabric paint, and various mixed media elements in her artworks.
Interesting Facts	- Served as a professor at the University of Nigeria, Nsukka for over four decades. - Featured in Time magazine's 100 most influential people in 2023.	- Based in Brooklyn, NY, she integrates activism into her art, highlighting issues like consumerism and environmental degradation.



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SOURCES

AI-generated images: OpenAI. (2025). AI-generated images of environmental and sustainability themes. Generated using ChatGPT and DALL·E by OpenAI, 2025. <https://openai.com/>

Images:

By Sculpture: Robert Smithson 1938-1973 Image: Søren Harward at en.wikipedia - Transferred from en.wikipedia to Commons., Public Domain, <https://commons.wikimedia.org/w/index.php?curid=2155549>

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By Christine Zenino from Chicago, US - La Bolla di Renzo Piano; Porto Antico Genoa, CC BY 2.0, <https://en.wikipedia.org/w/index.php?curid=77453887>

By Dennis G. Jarvis - California-06239 - California Academy of Sciences, CC BY-SA 2.0, <https://commons.wikimedia.org/w/index.php?curid=66982739>

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ARTISTS AND SUSTAINABILITY

Set of presentations created by students of:

Střední uměleckoprůmyslová škola Jihlava-Helenín (CZ)

Państwowe Liceum Sztuk Plastycznych im. Antoniego Kenara w Zakopanem (PL)

Súkromná škola umeleckého priemyslu v Žiline (SK)

LIST OF ARTISTS

- Aurora Robson
- Duke Riley
- Hundertwasser
- Illelund
- Jessie French
- Julie Peppito
- Kennedy Yanko
- Maria Medina-Schechter
- Marina Debris x3
- Michael Reynolds
- Olafur Eliasson
- Ptolemy Elrington
- Rebecca Louise Law
- Renzo Piano
- Ruth Asawa
- Sandra Junele
- Song Dong
- Ursula von Rydingsvard
- Władysław Hasior
- Zac Freeman

ACCESSIBLE FROM:

<https://tinyurl.com/tvigASP>



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VIDEO TUTORIAL OF THE MOKULITO TECHNIQUE

MOKULITO VIDEO TUTORIAL

Created by students and teachers of:

Państwowe Liceum Sztuk Plastycznych im. Antoniego Kenara w Zakopanem (PL)

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SUSTAINABLE ART TECHNIQUES:

ASPECTS OF SUSTAINABILITY IN ART

INTRODUCTION

Sustainable art refers to the creation and practice of art in ways that are environmentally conscious, socially responsible, and economically viable. Artists play a critical role in reflecting and shaping cultural values, and through sustainable practices, they can contribute meaningfully to climate action, ethical production, and community resilience.

Sustainability in art goes beyond the materials used — it includes the processes, the lifecycle of the artwork, the message it carries, and its overall impact on the environment and society.

KEY ASPECTS OF SUSTAINABILITY IN ART

1. ECO-FRIENDLY MATERIALS

- Recycled and Reclaimed Materials: Use of second-hand items like paper, metal, fabric, and wood.
- Natural and Non-Toxic Pigments: Plant-based dyes and mineral pigments.
- Biodegradable Substrates: Hemp paper, bamboo canvas, and organic textiles.

2. LOW-IMPACT PRODUCTION

- Energy-Efficient Processes: Manual techniques and reduced energy use.
- Water Conservation: Use of dry media and recycling water.
- Digital Art: Reduces physical waste.

3. WASTE MINIMIZATION

- Zero-Waste Studios: Reuse of all materials.
- Upcycling: Creating art from waste.
- Limited Editions: Fewer, high-quality pieces.

4. COMMUNITY AND CULTURAL SUSTAINABILITY

- Collaborative Projects: Community involvement in art.
- Indigenous Practices: Sustainable traditional techniques.
- Social Commentary: Awareness through art.

SUSTAINABLE ART TECHNIQUES BY MEDIUM

PAINTING

- Natural Pigments and Binders: Turmeric, indigo, beet juice, clay.
- Eco-Paint Brands: Earth Safe Finishes, Natural Earth Paints.
- Canvas Alternatives: Organic cotton, recycled cardboard, reclaimed wood panels.



SCULPTURE

- Found Object Sculpture: Repurposed appliances, plastics, driftwood.
- Clay and Ceramics: Locally sourced clay, low-fire kilns.
- Eco-Resins: Plant-based or biodegradable alternatives to epoxy.

TEXTILE ART

- Natural Fibers: Wool, cotton, flax, bamboo with plant-based dyes.
- Mending and Repair: Boro, Sashiko as visible, meaningful repair.
- Tapestries: Made from upcycled or scrap fabrics.

PRINTMAKING

- Water-Based Inks: Safer and less toxic.
- Hand Tools: Reduced electricity use.
- Recycled Paper: Made from post-consumer or agricultural waste.

INSTALLATION ART

- Ephemeral Installations: Made from natural, biodegradable materials.
- Site-Specific Environmental Art: Designed to blend into and respect natural spaces.

LIFE CYCLE THINKING IN ART

Sustainable artists often consider the entire lifecycle of their work:

Stage	Sustainable Considerations
Design	Will this piece promote environmental awareness?
Materials	Are they locally sourced, renewable, or recycled?
Production	How much energy and water is used?
Display	Can it be exhibited without excessive lighting or transport?
Afterlife	Can the piece be reused, recycled, or biodegraded?



DIGITAL TOOLS FOR SUSTAINABILITY

- Digital Illustration & Animation: Tools like Procreate, Adobe Fresco, and Blender reduce the need for physical supplies.
- AR/VR Exhibitions: Virtual galleries lower carbon emissions from travel and shipping.
- NFTs with a Conscience: Platforms such as Tezos and Algorand use energy-efficient proof-of-stake blockchains.

ARTISTS LEADING THE SUSTAINABLE MOVEMENT

El Anatsui (Ghana/Nigeria): Creates large-scale tapestries from bottle caps and scrap metal.



Artist El Anatsui in front of one of his bottle cap tapestries, newly installed at the ROM. (Brian Boyle // Royal Ontario Museum)

Andy Goldsworthy (UK): Known for natural installations using leaves, stones, and ice.



Andy Goldsworthy with an installation in San Francisco, tentatively titled *Earth Wall*. Photograph by *The Chronicle's Sam Whiting*.



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Agnes Denes (USA): Famous for 'Wheatfield—A Confrontation' combining agriculture and urban environments.



Agnes Denes "Living Pyramid" Photograph by Denis Ryan Kelly Jr

Aurora Robson (Canada/USA): Converts plastic waste into intricate sculptures and installations.



Aurora Robson at work. Courtesy of the artist / news.artnet.com

FINAL THOUGHTS

- Sustainable art is not just a creative trend — it's an ethical imperative. Through careful choices in materials, methods, and messaging, artists contribute to a culture of sustainability. Art has always been a powerful force for change, and in addressing today's ecological and social challenges, it becomes even more vital. By embracing sustainable practices, artists advocate for a better future while continuing to inspire and transform.



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SOURCES

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PET FELT

RECYCLED MATERIAL

PET – WHAT’S THAT?

Polyethylene terephthalate (PET) is a plastic belonging to the polyester family which has been widely used in recent years as food packaging.



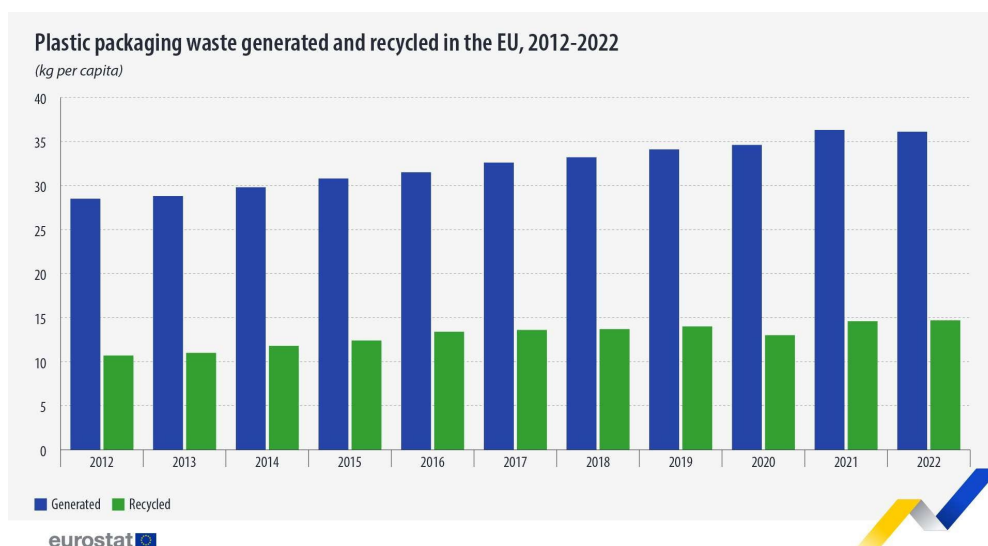
BOTTLES INVASION

More than 430 million tons of plastic are now produced globally each year twice as much as at

Twenty years ago and six times more than in the early 1980s. Across the European Union, more than 50

Million tons of plastic are used each year. About 40 percent of that is bottles. Half of that is collected, but only a third is recycled.

In 2021, each person living in the EU generated on average 36.1 kg of plastic packaging waste. The total amount of plastic waste generated in the EU in 2021 was 16.13 million tonnes. Around 6.56 million tonnes of plastic waste was recycled.



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WHAT WE CAN GET BY RECYCLING?

- New plastic bottles,
- Clothing and fabrics
- **PET felt**
- Fiberfill for insulation and bedding
- Strapping for packaging
- Construction materials.

POLYESTER FIBER - HOW IT'S MADE?

To create a polyester fiber we have to:

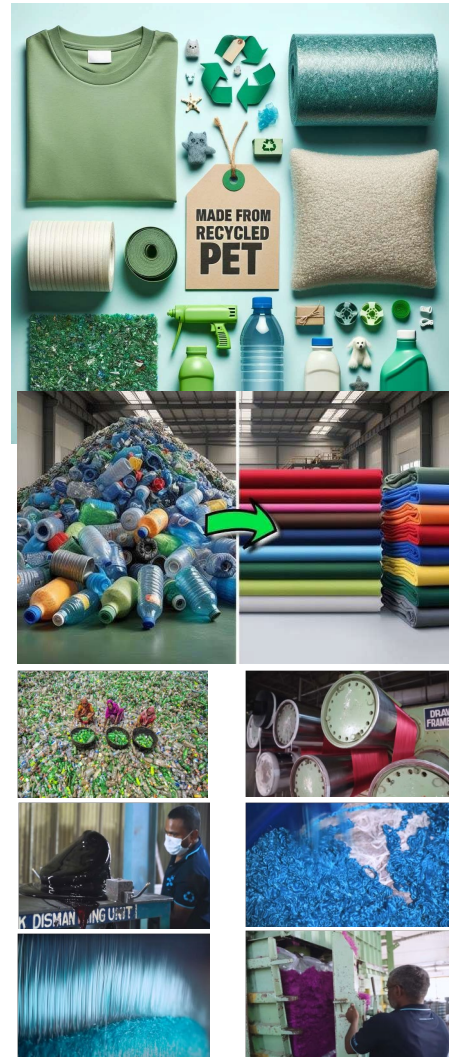
- Collecting
- Sorting
- Secondary sorting and hot washing
- Melting, dope dyeing, and stretching PET fibers
- Drawing, crimping, cut down and baling fibers
- Turning fibers into yarn or pressing it to PET felt

PET FELT

PET felt is a versatile material made from recycled plastic bottles, specifically polyethylene terephthalate (PET).

It's known for its soft texture, sound-dampening properties, and eco-friendliness due to being made from recycled materials.

PET felt is also lightweight, durable, and can be easily cut and shaped.



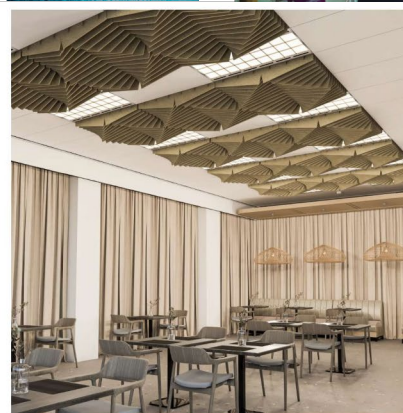
SKIN

acoustic furniture fronts



SCREEN

acoustic partition

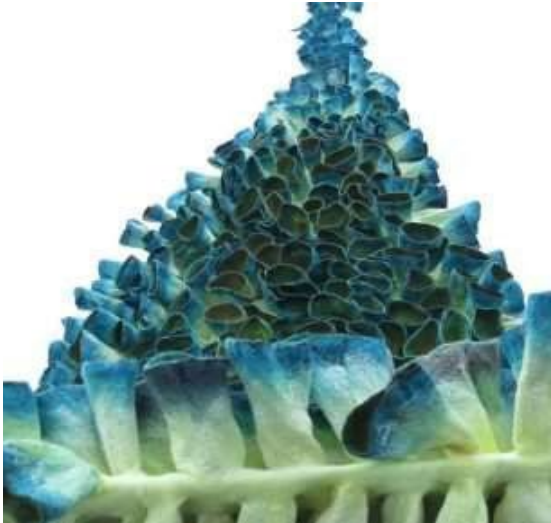


GRID

raster acoustic ceiling

PET FELT ART WORKS

PET felt can be a good material for art works, especially for wall art, sculptures, and other decorative pieces. Its versatility, vibrant colors, and sound-absorbing properties make it an appealing choice for artists and designers.



Marjolein Dallinga,



Terumi Ohta



Lindsey Thomas



Elizabeth Armstrong

SOURCES :

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3D PRINTING & SUSTAINABLE DESIGN



RECYCLING AND WISHCYCLING

WHAT IS WISHCYCLING

🚫 What Is Wishcycling?

Wishcycling is when people put items into the recycling bin that **can't actually be recycled**, usually out of **good intentions** or **confusion**.

🧠 Why Does It Happen?

People often:

See a **recycling symbol** and assume the item is recyclable

Think items that *look recyclable* (like greasy pizza boxes or plastic tubs) must be accepted

Don't realize that **dirty items**, like peanut butter jars with food still inside, **contaminate** the recycling

⚠️ Why Is It a Problem?

Wishcycling can:

✖ **Contaminate whole batches** of recyclables

⚙ **Damage machines** in recycling facilities

💰 **Increase costs** and cause **processing delays**

🚫 **Lead to fines** or even **suspension of recycling services**

✅ What Can You Do?

🏠 **Check your local recycling rules** — not all areas accept the same materials

❓ **When in doubt, leave it out!**³

THE SCALE AND SERIOUSNESS OF THE WISHCYCLING PROBLEM

🗑 **Nearly 20%** of items in household recycling bins end up in **landfills** due to **wishcycling**, according to waste company **Biffa**.

🚫 What Are People Throwing In?

Many people mistakenly recycle:

🦷 **Toothpaste tubes** ☕ **Coffee cups** 🥗 **Salad bags** ...and other **non-recyclable items**

⚠️ Even Good Items Can Be Wasted

Even **recyclable materials** (like plastic containers or paper) can be **ruined** if they are:

🍽 Covered in food or grease 💧 Wet or filled with liquid

🗑 Why It Matters? Wishcycling causes:

➖ **More waste** sent to landfill

⚙ **Disruption in recycling centers**

💰 **Higher processing costs**

🔄 **Lost chances to reuse materials**⁴

³ Farnsworth, T. (2020, December 6). *What is wish-cycling and why does it matter?* Recycle Nation.

<https://recyclenation.com/2020/12/what-is-wish-cycling-and-why-does-it-matter>

⁴ Gatten, E. (2022, October 20). *How 'wish-cycling' sees a fifth of recyclable items contaminated.* The Telegraph.

<https://www.telegraph.co.uk/news/2022/10/20/how-wish-cycling-sees-fifth-recyclable-items-end-landfill/>



THE SCALE OF THE WISHCYCLING PROBLEM (UK, 2016–2020)

- ▲ **Contamination is rising:**
2016 average contamination rate: **13.4%**
2020 average contamination rate: **17%**
Projected to reach **nearly 25% by 2030** without intervention
- 🗑️ **Sources of contamination (2020):**
6.5% from *recyclable items placed in the wrong bin*
10.4% from *non-recyclable items*
- ! **Common wishcycled items:**
Toothpaste tubes
Coffee cups
Salad bags
Contaminated food packaging (e.g. greasy pizza boxes)
- 📋 **Biffa's recommendations:**
Stop wishcycling – only recycle what is accepted in your area
Pre-cycle – rinse food containers before recycling
Check resin codes – plastics labeled 1, 2, 4, or 5 are generally recyclable
Use proper drop-off centers for electricals and special materials
- ✖️ **Barriers to effective recycling:**
Confusing labeling
Inconsistent rules across councils
Lack of public education
- 📄 **Proposed solutions:**
EPR (Extended Producer Responsibility)
Standardized kerbside collections (from 2024)⁵

WHAT'S THE DIFFERENCE BETWEEN RECYCLING AND UPCYCLING?

♻️ **Recycling** means breaking down used materials (like plastic or paper) and turning them into new products
Example: melting plastic bottles to make new plastic bottles.

🔵 **Upcycling** is even better! It means turning old materials into something more valuable than before.
Example: turning used plastic into high-quality fuel or carbon nanotubes (used in electronics, airplanes, or even medical tools).

Why Is Upcycling Important?

- Most plastic recycling is expensive and produces low-quality materials.
- Upcycling can turn plastic and organic waste (like food scraps or garden waste) into useful and valuable products.
- Scientists in Australia found a new method to upcycle plastic using biochar (a type of charcoal) to make:
 - 🌱 Clean fuel
 - ⚙️ Carbon nanotubes for industry
 - 🌱 Better soil and cleaner environments.⁶

⁵ Hughes, G. (2022, October 25). *Nearly a fifth of waste unrecyclable due to contamination*. Environment Journal. <https://environmentjournal.online/waste-recycling/nearly-a-fifth-of-waste-unrecyclable-due-to-contamination/>

⁶ RMIT University. (2021, September 29). From recycling to upcycling: A smarter way of dealing with plastic. *ScienceDaily*. Retrieved August 12, 2025 from www.sciencedaily.com/releases/2021/09/210929094218.htm



WHAT CAN AND CAN'T BE RECYCLED

Material	☑ Can Be Recycled	✗ Cannot Be Recycled	📝 Notes / Tips
Paper & Cardboard	Newspapers, magazines, flattened cardboard, cereal boxes, junk mail	Dirty/takeout containers with food stuck on, laminated gift wrap	Pizza boxes can be recycled if food scraps are removed
Plastics	Bottles (with caps), jugs, some containers (check local rules)	Plastic utensils, plastic wrap, sandwich bags, styrofoam, compostable plastics	Look for recycling codes #1, 2, 4, 5 – check local guidelines
Glass	Food and beverage bottles and jars (all colors)	Broken glass, mirrors, ceramics	Remove metal lids and caps before recycling
Aluminum	Cans, clean foil	Dirty foil, aerosol cans	Don't crush cans in single-stream systems
Batteries	Lead-acid batteries (automotive), rechargeable batteries (via drop-off)	Do NOT put any batteries in curbside bins	Use special collection events or return programs
Electronics	Phones, laptops, TVs (at proper e-waste facilities)	—	Erase personal data before disposal
Food Waste	—	All food in trash or recycling bin	Compost instead, if possible
Yard Waste	—	In recycling bin	Compost at home or through a yard collection service
Used Motor Oil	—	In trash or down the drain	Take to auto shops or oil recycling centers
Household Hazardous Waste	Paints, solvents, thermometers, cleaners (via special programs)	Trash bin, drain, or regular recycling	Use drop-off or collection events only
Tires	Recycled at garages or tire centers	Never abandon	May be accepted during collection events
Clothing & Shoes	Gently used items (donated or textile recycling)	Dirty or damaged items (unless accepted)	Check with charities or recycling retailers
Dirty Diapers	—	NEVER recyclable	Flush waste in toilet, then dispose in trash ⁷

⁷ U.S. Environmental Protection Agency. (2025, May 20). *How do I recycle common recyclables?*
<https://www.epa.gov/recycle/how-do-i-recycle-common-recyclables>



OTHER PROBLEMS WITH RECYCLING: WHY DON'T WE JUST MAKE EVERYTHING FROM RECYCLED PLASTIC

Even though we have **tons of plastic waste**, most products are still made from **new (virgin) plastic**, not recycled plastic. Why? Here are the main reasons:

-  **Oil is cheap**
New plastic is made from oil. Because oil is cheap, making new plastic is often **cheaper** than recycling old plastic.
-  **Brands want perfection**
Recycled plastic can look a little different or feel slightly off. Even small changes in color or texture make companies avoid using it.
-  **Recycling is hard work**
Different plastics need to be cleaned, sorted, and processed differently. Some can't be recycled at all (like PVC). This makes it complicated and expensive.
-  **Companies don't feel the benefit**
Using recycled materials helps the environment but doesn't always save money. So some companies skip it.
-  **Technology isn't perfect yet**
Scientists are working on better ways to recycle plastic using **chemical recycling**, but it's still too expensive for everyday use.
-  **Consumers aren't asking for it**
Many people don't understand recycling rules or don't want to pay more for recycled products. If buyers don't care, companies don't either.⁸

WHERE SHOULD IT GO?

Find your local drop-off points for waste and unwanted items:

Czech one:  [Kam s ním? – Waste disposal map \(CZ\): https://www.kamsnim.cz/browse/all](https://www.kamsnim.cz/browse/all)



MORE FACTS

European Environment Agency – Waste and Recycling

An in-depth overview of waste generation, recycling trends, and circular economy progress across EU member states, supported by data, indicators, and environmental reporting.

<https://www.eea.europa.eu/en/topics/in-depth/waste-and-recycling>

European Commission – Waste and Recycling

The official portal of the European Commission detailing EU waste legislation, strategic frameworks, and policy instruments that guide waste prevention, recycling, and resource efficiency.

https://environment.ec.europa.eu/topics/waste-and-recycling_en



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⁸ Rogers, K. (2017, July 12). *Why don't we just make everything out of recycled plastic?* VICE. <https://www.vice.com/en/article/why-dont-we-just-make-everything-out-of-recycled-plastic>



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PRODUCT AUTOPSY

TASK 1: PRODUCTS DISCUSSION



Look at the four products in the picture: an umbrella, a disposable coffee cup, a pair of earrings, and a sneaker.

Discuss these questions in pairs or small groups.

- 1) What **materials** can you **identify** in each product?
- 2) Which of these products would be **easy to recycle**? Why?
- 3) Which product is the **hardest to recycle or dispose of properly**?

Word bank:

Plastic | Paper | Cardboard |
Glass | Ceramic | Wood |
Rubber | Leather | Cotton |
Wool | Polyester | Nylon |
Foam | Silicone | Acrylic |
Bioplastic | Composite (a mix
of different materials glued or
fused together) | Metal |
Aluminum | Steel | Copper

TASK 2: WISHCYCLING: WHAT DOES IT MEAN?

Look at the word "wishcycling". What do you think it means?

- A) Recycling something because you *wish* or *hope* it can be recycled, even if it actually can't.
- B) A cycling race to raise money with the wish to save the planet.
- C) A trend that more and more people wish to recycle.

TASK 3: READING: WHAT IS WISHCYCLING

Read the text, check your answer from task 2 and answer the following question:

- 1) Why is wishcycling causing problems?
- 2) What is the correct meaning of wishcycling in your own words?

What is Wishcycling?

Wishcycling is when people put things in the recycling bin that cannot actually be recycled. They do this because they hope the items can be recycled — even if they're not sure.

People often wishcycle paper coffee cups, greasy pizza boxes, plastic bags, or containers that are dirty. These materials may have a recycling symbol, but not all areas have the equipment to recycle them. For example, a peanut butter jar must be cleaned properly. If it still has food inside, it cannot be recycled.

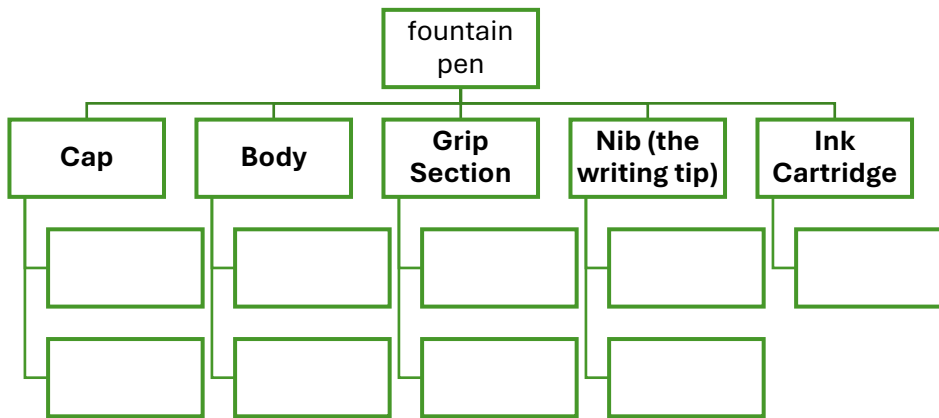
Wishcycling is a problem because it can damage machines, cost more money, and make other clean recyclables useless. If something in the bin is dirty or made of mixed materials (like plastic and metal together), the whole batch might need to be thrown away.

That's why it's important to always check local recycling rules. If you're not sure, it's better to leave it out than to wishcycle.



TASK 4: PRODUCT AUTOPSY: FOUNTAIN PEN

Look at the fountain pen in the picture. What materials can you find there? Complete the diagram



TASK 5: RECYCLE OR NOT? QUIZ

Choose the **best answer** for each question.

- | | | |
|---|--|--|
| 1. Plastic bags
a) YES
b) NO | 8. Shredded paper
a) YES
b) NO | 15. Pizza box in compost bin (greasy part)
a) YES
b) NO |
| 2. Plastic films/wrap
a) YES
b) NO | 9. Whole sheet of paper (not shredded)
a) YES
b) NO | 16. Electronics (e.g., old phone)
a) YES
b) NO |
| 3. Styrofoam coffee cups
a) YES
b) NO | 10. Broken drinking glass
a) YES
b) NO | 17. Household hazardous waste
a) YES
b) NO |
| 4. Styrofoam packaging
a) YES
b) NO | 11. Ceramic mug or plate
a) YES
b) NO | 18. Batteries (hazardous waste)
a) YES
b) NO |
| 5. Clean cardboard box
a) YES
b) NO | 12. Glass mirror
a) YES
b) NO | 19. Bulky waste (e.g., sofa)
a) YES
b) NO |
| 6. Greasy pizza box – whole box
a) YES
b) NO | 13. Glass bottle (unbroken)
a) YES
b) NO | 20. Clean cardboard from packaging
a) YES
b) NO |
| 7. Greasy pizza box – clean part only
a) YES
b) NO | 14. Polystyrene foam food box
a) YES
b) NO | |

TEACHER'S NOTES

TOPICS

Product material analysis, Recycling, Wishcycling

TARGET GROUP

Secondary school students, VET students, age: 15–19

LANGUAGE LEVEL:

B1 (CEFR)

DURATION

1 x 45 minutes

ANSWER KEY

✓ Task 1:

1) What materials can you identify in each product?

- **Umbrella:** metal, plastic, nylon, rubber
- **Disposable coffee cup:** paper, plastic, cardboard (sleeve), plastic (lid), wax or plastic lining
- **Earrings:** metal, plastic, wood, fabric
- **Sneaker:** rubber, foam, fabric, glue, metal (eyelets)

2) Which of these products would be easy to recycle? Why?

- Earrings (if one material only, e.g. metal or wood),
- Coffee cup parts (sleeve or lid, if clean and separated),
- Metal parts of the umbrella (if removed from other materials)

3) Which product is the hardest to recycle or dispose of properly?

- Sneaker (mixed materials, glued together),
- Umbrella (fused materials, hard to disassemble),
- Coffee cup (plastic lining, often wishcycled)

✓ Task 2: A

✓ Task 3:

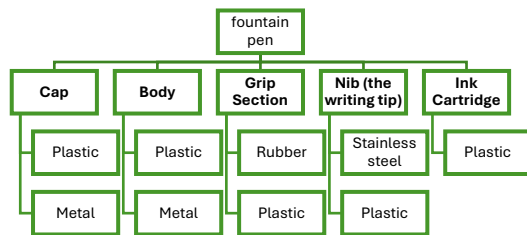
1) Why is wishcycling causing problems?

It contaminates recycling batches, damages machines, increases costs, wastes time, and can make the whole bin of recyclables unusable. It also leads to higher fees or service warnings.

2) What is the correct meaning of wishcycling in your own words?

Putting things into the recycling bin because you hope they can be recycled, even if they actually can't be recycled in your area.

✓ Task 4: sample solution:



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✓ Task 5: quiz

1. **Plastic bags** b) NO
2. **Plastic films/wrap** b) NO
3. **Styrofoam coffee cups** b) NO
4. **Styrofoam packaging** b) NO
5. **Clean cardboard box** a) YES
6. **Greasy pizza box – whole box** b) NO
7. **Greasy pizza box – clean part only** a) YES
8. **Shredded paper** b) NO
9. **Whole sheet of paper (not shredded)** a) YES
10. **Broken drinking glass** b) NO
11. **Ceramic mug or plat** b) NO
12. **Glass mirror** b) NO
13. **Glass bottle (unbroken)** a) YES
14. **Polystyrene foam food box** b) NO
15. **Pizza box in compost bin (greasy part)** a) YES
16. **Electronics (e.g., old phone)** b) NO
17. **Household hazardous waste** b) NO
18. **Batteries** b) NO
19. **Bulky waste** b) NO
20. **Clean cardboard from packaging** a) YES

SOURCES

AI-generated images: OpenAI. (2025). AI-generated images of recycling related themes. Generated using ChatGPT and DALL-E by OpenAI, 2025. <https://openai.com/>

Texts adapted from:

Farnsworth, T. (2020, December 6). *What is Wish-Cycling and Why Does It Matter?* Recycle Nation. Retrieved June 12, 2025, from <https://recyclenation.com/2020/12/what-is-wish-cycling-and-why-does-it-matter/>

Quiz information source:

McLennan, A. (2025, February 24). *The most common wishcycling examples and how to prevent them*. Routeware. Retrieved August 13, 2025, from <https://routeware.com/blog/the-most-commonly-wishcycled-materials-and-how-to-prevent-them/> routeware.com

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PRODUCT AUTOPSY AND MATERIAL ANALYSIS

SET OF FACTSHEETS WITH PRODUCT MATERIAL ANALYSIS

Set of factsheets created by students of:

Střední uměleckoprůmyslová škola Jihlava-Helenín (CZ)

Państwowe Liceum Sztuk Plastycznych im. Antoniego Kenara w Zakopanem (PL)

Súkromná škola umeleckého priemyslu v Žiline (SK)

ACCESSIBLE FROM:

<https://tinyurl.com/tvigPMA>



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LIFECYCLE MAP OF A PRODUCT, CIRCULAR ECONOMY

TASK 1: WHAT DO YOU THROW AWAY?

Discuss in a pair:

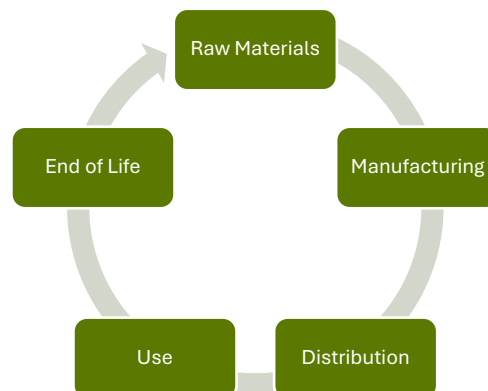
- 4) Brainstorm 5 things you threw away today or yesterday.
- 5) Are any of these items recyclable or reusable?

TASK 2: PRUDUCT LIFECYCLE STAGES

Every product goes through different stages in its life — from raw materials to its final disposal or recycling. Understanding these stages helps us think about sustainability and the environment.

Match the stage (1–5) with its correct description (A–E):

Stage	Description
1) Raw Materials	A. People buy and use the product
2) Manufacturing	B. Product is thrown away or recycled
3) Distribution	C. Products are transported to shops/customers
4) Use	D. Natural resources are extracted (e.g., oil, trees)
5) End of Life	E. Materials are processed and turned into products



TASK 3: CIRCULAR ECONOMY VS. LINEAR ECONOMY

Read and complete:

Fill in the blanks with: *circular*, *linear*

In a _____ economy, products are made, used, and thrown away. This creates a lot of waste.

In a _____ economy, we try to recycle, reuse, and reduce waste so products stay in use for longer.

TASK 4: ♻️ WHAT IS A CIRCULAR ECONOMY?

Read the text. Fill in the gaps with the words from the box:

unlimited | raw | environment | design | economy | pollution | resources | longer-lasting | waste | metal

The circular economy is a way of making and using things that helps protect the planet. Instead of throwing products away after using them, we try to reuse, repair, and recycle them. This helps products last longer and reduces the amount of 1) _____ we create.

In the traditional 2) _____, we make products, use them, and then throw them away. This uses a lot of natural 3) _____ like trees, oil, and 4) _____. But these resources are not 5) _____, and getting them can hurt the environment.

The circular economy helps in many ways. It reduces 6) _____, saves energy, and protects nature. For example, recycling uses fewer resources and creates less waste. Designing better products from the beginning also means less harm to the 7) _____.

The circular economy can also help the economy. It can create up to 700,000 new jobs in the EU by 2030. People will have access to better, 8) _____ products, which can also help them save money.

The European Union wants to become fully circular by 2050. New laws are already helping – for example, rules about recycling, eco-friendly 9) _____, repairing products, and stopping **greenwashing**. These changes will help Europe become more sustainable and reduce the use of 10) _____ materials from other countries.

Adapted from: European Parliament. (2023, May 24). *Circular economy: Definition, importance and benefits*.

<https://www.europarl.europa.eu/topics/en/article/20151201STO05603/circular-economy-definition-importance-and-benefits>

TASK 5: GREENWASHING DEFINITION

In task 4, the word greenwashing was underlined. Do you know what it means? If not, try to find out online.

Greenwashing =

TASK 6: READING: GREENWASHING EXAMPLES

Do you know about any examples of greenwashing? Tell the class.

Read the flowing examples and then discuss: Why is greenwashing a problem?

Examples of companies that were caught greenwashing:

Volkswagen

Volkswagen said their cars were low in pollution. But they secretly used special software to cheat emissions tests. Their cars actually polluted up to 40 times more than allowed.

Nestlé

Nestlé promised that all its packaging would be recyclable or reusable by 2025. But they gave no real plan or timeline. Greenpeace called their promise “greenwashing baby steps.”

Coca-Cola

Coca-Cola is the world’s top plastic polluter. They say they will collect back all their bottles by 2030. But they were sued in 2021 for pretending to be eco-friendly.

Starbucks

They made a “strawless” lid to reduce plastic use — but the lid used *more* plastic than the old straw and lid combo. Also, most plastic isn’t recycled, so the problem remained.

Adapted from: Robinson, D. (2022, July 17). *10 companies called out for greenwashing*. Earth.Org. <https://earth.org/greenwashing-companies-corporations/>



TEACHER'S NOTES

TOPICS

Product lifecycle, Circular economy

TARGET GROUP

Secondary school students, VET students, age: 15–19

LANGUAGE LEVEL:

B1 (CEFR)

DURATION

2 x 45 minutes

ANSWER KEY

✓ Task 2: **1D, 2E, 3C, 4A, 5B**

✓ Task 3: **LINEAR, CIRCULAR**

✓ Task 4: 1) **waste** 2) **economy** 3) **resources** 4) **metal** 5) **unlimited** 6) **pollution** 7) **environment** 8) **longer-lasting** 9) **design** 10) **raw**

✓ Task 5:

Greenwashing is when a company or organization gives a false impression that its products, services, or policies are environmentally friendly, often through misleading marketing or labels, while not making meaningful efforts to reduce its environmental impact.

✓ Task 6:

Why is greenwashing a problem?

Greenwashing tricks people. It slows down real climate action. People think they're helping the planet when they support these brands, but often they are not.

SOURCES

Texts adapted from:

Adapted from: European Parliament. (2023, May 24). *Circular economy: Definition, importance and benefits*.

<https://www.europarl.europa.eu/topics/en/article/20151201STO05603/circular-economy-definition-importance-and-benefits>

Robinson, D. (2022, July 17). *10 companies called out for greenwashing*. Earth.Org.

<https://earth.org/greenwashing-companies-corporations/>

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LIFE CYCLE MAP OF A PRODUCT

PRESENTATIONS ABOUT LIFE CYCLES OF VARIOUS PRODUCTS

Set of presentations created by students of:

Střední uměleckoprůmyslová škola Jihlava-Helenín (CZ)

Państwowe Liceum Sztuk Plastycznych im. Antoniego Kenara w Zakopanem (PL)

Súkromná škola umeleckého priemyslu v Žiline (SK)

ACCESSIBLE FROM:

<https://tinyurl.com/tvigLMP>



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ALTERNATIVE 3D PRINTING MATERIALS

ALTERNATIVE MATERIALS IN 3D PRINTING

Focusing on Biomaterials and Eco-Friendly Production in FDM Technology

INTRODUCTION: WHY SEEK ALTERNATIVES?

3D printing is one of the most accessible and fastest-growing technologies in digital design and manufacturing. FDM (Fused Deposition Modeling) printers are now found not only in industrial settings but also in schools, fablabs, and home workshops.

While the technology enables rapid production of prototypes, models, and end-use products, most commonly used materials (e.g., PLA, PETG, ABS) have environmental limitations – they either decompose slowly or only under specific industrial conditions.

Therefore, increasing attention is being paid to alternative, eco-friendlier materials. These reduce environmental burden while opening new avenues for design thinking.

BIOPLASTICS AND BIOMATERIALS IN FDM PRINTING

Among alternative materials, biomaterials are key – derived from natural or renewable sources and biodegradable.

Common bioplastics in FDM:

- PLA (polylactic acid): widely used starch-based plastic suitable for education, but compostable only in industrial settings.
- PHA (polyhydroxyalkanoates): a group of biopolymers created by microorganisms. Biodegradable in nature but less commercially available.
- allPHA: a certified, highly eco-friendly type of PHA compatible with regular FDM printers.
- PBS, PBAT, PHB: lesser-known, but promising options with reduced environmental impact.

Some materials can be printed similarly to PLA, while others require higher nozzle temperatures or enclosed chambers.

allPHA – A MODEL BIOMATERIAL FOR ECOLOGICAL 3D PRINTING

allPHA is a new type of biodegradable material developed by Paques Biomaterials in the Netherlands. Its key properties:

- 100% degradability in nature – soil, freshwater, and seawater
- Made via fermentation of plant oils – no fossil input
- No microplastics – decomposes cleanly and safely



- Compatible with FDM – usable in standard desktop printers
- Certified under OK Biodegradable Soil & Marine standards

In design practice, allPHA is revolutionary as it enables the creation of objects with not only functional but also environmentally responsible lifecycles.

PRACTICAL USE CASES FOR BIOMATERIALS

Alternative filaments are increasingly used in school and professional projects. Typical applications include:

- Molds for artisanal products – soaps, candles, castings
- Packaging and temporary products – seasonal decorations, short-life containers
- Experimental design – prototypes designed to decompose or re-enter natural cycles
- Educational tasks – students track the full product cycle: design → print → use → compost

Using biomaterials supports students' critical thinking about design impact, sustainability, and responsible innovation.

OTHER ALTERNATIVE APPROACHES

Beyond bioplastics, other natural or recycled materials are being explored as filaments, composites, or powders:

- Filaments with wood, bamboo, or cork – visually appealing and biodegradable
- Mycelium as a molding material – not directly printable but used for biological casting
- Recycled PET bottles (rPET) – reducing household plastic waste
- Filaments with coffee grounds, husks, straw – upcycling of organic waste

Not all are suitable for standard FDM printers but show strong potential for eco-conscious design.

CHALLENGES AND RECOMMENDATIONS

Despite growing popularity, alternative materials still face some challenges:

- Higher price (especially allPHA)
- Limited market availability
- Specific printing parameters
- Lower mechanical durability in some types

Still, they are strongly recommended for integration into education and pilot projects – as innovative assignments or eco-oriented school experiments. Schools investing in sustainable filaments and linking them to environmental learning help shape a new generation of designers with vision and responsibility.

SOURCES

Paques Biomaterials – allPHA

<https://www.paquesbiomaterials.com> → Official information on allPHA: a fully biodegradable bioplastic made via bacterial fermentation. Includes material properties, certifications, and ecological use cases.

TÜV Austria – OK Biodegradable Certification

<https://www.tuv-at.be> → Certifying body for biodegradability standards such as OK biodegradable SOIL, MARINE, and HOME. Used to verify environmental claims of materials like allPHA.

European Bioplastics Association

<https://www.european-bioplastics.org> → Definitions, market data, and environmental assessments for various bioplastics including PLA, PHA, and PBS. Key source for understanding the role of bioplastics in circular economy.

Filamentive – Sustainable 3D Printing Materials

<https://www.filamentive.com> → Supplier of recycled and sustainable filaments (rPLA, rPETG, wood-filled, etc.). Includes lifecycle insights and practical use cases for eco-conscious FDM printing.

3Dnatives – 3D Printing News & Material Guides

<https://www.3dnatives.com/en> → Industry news portal offering comparative guides on 3D printing filaments, including emerging biobased materials and their compatibility with FDM technologies.

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VIDEO TUTORIAL OF 3D PRINTING & ECOFRIENDLY MATERIALS

VIDEO TUTORIAL OF 3D PRINT AS A NO-WASTE SUSTAINABLE TECHNOLOGY

Created by students and teachers of:

Súkromná škola umeleckého priemyslu v Žiline (SK)

ACCESSIBLE FROM:

<https://tinyurl.com/tvig3DV>



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SUSTAINABLE DESIGN & CIRCULAR ECONOMY

SUSTAINABLE DESIGN & CIRCULAR ECONOMY

Focus: allPHA bioplastic in design practice

1. INTRODUCTION: WHY SUSTAINABLE DESIGN?

Design plays a key role in transforming society towards a more environmentally responsible future. Traditional design processes often followed a linear 'take – make – use – dispose' model, ignoring the broader environmental consequences. In contrast, sustainable design focuses on minimizing environmental impact by using renewable or recyclable materials, extending the lifespan of products, and encouraging responsible consumption.

A designer is not only a creative force but also a strategic thinker. Every decision—from material choice to manufacturing method, repairability, and end-of-life options—affects the ecological footprint of a product. Design education, therefore, must incorporate sustainability as a core component of creative thinking.

2. CIRCULAR ECONOMY: CLOSING THE LOOP

The circular economy offers an alternative to the traditional linear economic model. Its goal is to keep products, materials, and resources in use for as long as possible, extracting maximum value while minimizing waste.

Key principles of the circular economy include:

- Designing for durability and repairability
- Promoting reuse and refurbishment
- Encouraging recycling and upcycling
- Supporting biodegradability and natural material cycles

For designers, this means adopting a lifecycle perspective from the very beginning—considering what happens to a product after its use phase, and how its components can re-enter the system in a meaningful way.

3. BIOPLASTICS IN SUSTAINABLE DESIGN

Bioplastics are a diverse group of materials derived from renewable resources or designed to be biodegradable—or both. They are increasingly viewed as an alternative to conventional fossil-based plastics in contexts where environmental impact matters.

Common types of bioplastics include:

- PLA (polylactic acid): Derived from corn starch; widely used in 3D printing, but only compostable in industrial settings.



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- PHA (polyhydroxyalkanoates): Produced by microbial fermentation; biodegradable in natural environments.
- PBAT, PBS, PHB: Other biodegradable materials with varying properties.

Although not all bioplastics have ideal mechanical or thermal properties for all applications, innovation in this field is rapidly advancing. Designers must balance performance, usability, and ecological impact when choosing materials.

4. ALLPHA – A NEXT-GENERATION BIOPLASTIC

allPHA is a branded bioplastic from the PHA family, developed by Paques Biomaterials in the Netherlands. What makes allPHA unique is its complete biodegradability in both industrial and natural environments—including home compost, freshwater, and saltwater.

Produced through the fermentation of plant-based sugars or oils by bacteria, allPHA offers a fossil-free, microplastic-free alternative to conventional plastics. Its decomposition leaves no harmful residues, aligning perfectly with circular economy principles.

In terms of usability, allPHA supports processing methods such as injection molding, film extrusion, and FDM 3D printing. It combines flexibility and strength, making it suitable for both packaging and durable design elements. It is certified by recognized standards including TÜV OK biodegradable and Marine certifications.

5. COMPARING ALLPHA WITH OTHER MATERIALS

The following table compares allPHA with commonly used plastics and bioplastics in design and prototyping applications.

Material	Biodegradability	Source	Processing	Usage	Ecology
allPHA	100% (incl. nature)	Biological (oils)	3D printing, molding	Packaging, design	5/5
PLA	Industrial compost only	Biological (starch)	3D printing	Packaging, models	3/5
PETG	Non-degradable	Fossil-based	3D printing	Technical parts	2/5
ABS	Non-degradable	Fossil-based	3D printing	Durable parts	1/5



6. DESIGN APPLICATIONS OF ALLPHA

Thanks to its eco-friendly credentials and versatility, allPHA is particularly well-suited for:

- Mold design for handcrafted products (e.g., candles, soaps), where the mold can be composted after use
- 3D-printed prototypes using FDM printers with water-soluble supports (e.g., PVA)
- Temporary or short-lived objects that minimize environmental impact after disposal
- Educational projects focused on sustainability and life-cycle awareness

In school environments, where prototyping and experimentation are frequent, allPHA provides a meaningful bridge between creative freedom and ecological responsibility.

7. CONCLUSION AND OUTLOOK

As sustainable design becomes more central to the creative industries, materials like allPHA offer practical solutions that align with ecological values. Its compatibility with popular design tools and technologies, such as 3D printing, enhances its accessibility for students, educators, and professionals alike.

Integrating allPHA into design practice encourages a mindset of responsibility, innovation, and long-term thinking. It represents more than a material—it embodies a shift toward materials that serve not just form and function, but also the planet.

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VIRTUAL REALITY & DESIGN FOR SUSTAINABILITY



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SERVICE DOMINANT LOGIC:

SHARING ECONOMIES

TASK 1: WHAT IS THE SHARING ECONOMY?

Read the explanation of the sharing economy below. Then discuss:
Is the sharing economy good for the environment?

What Is the Sharing Economy?

The sharing economy is when people share things or services they are not using, usually through online platforms. It helps others rent or borrow items like cars or rooms for a short time

How It Works

People use websites or apps to connect. For example: You can rent a car from Zipcar instead of owning one. You can stay in someone's spare room on Airbnb, which is often cheaper than a hotel.

These services let people make money from things they already have, like a car or extra space at home.

How It's Evolving

The sharing economy is growing and now includes more areas, such as:

Shared workspaces for freelancers (co-working spaces)
Peer-to-peer lending, where people lend each other money
Fashion platforms, where people rent or sell clothes
Freelance job platforms for writers, handymen, etc.

The value of the sharing economy has grown a lot and is expected to keep growing.

Criticisms

1. Lack of Rules

Some services may break local laws or avoid paying taxes. For example, Airbnb was accused of hiding information from local governments in Virginia.

2. Unfair Treatment

There's little control over how people are treated. Contractors may be underpaid or lack benefits.

3. Bias

People on these platforms might show unfair preferences based on race or gender.

4. Not Really Sharing Anymore

Some users treat these platforms like full businesses. For example, people buy houses just to rent them on Airbnb, which can raise housing prices and reduce available homes.

The Gift Economy

In contrast, the gift economy is about sharing for free. Examples:

Buy Nothing Project: Give or lend items in your neighborhood

Repair cafés: Volunteers help fix items

Tool libraries: Borrow tools instead of buying

Little Free Library: Take or leave books in public boxes

How Is It Different From a Regular Economy?

People deal directly with each other, not big stores

Jobs are usually short-term

It makes better use of what people already have

Adapted from: Investopedia. (2024, January 29). *Sharing economy: Model defined, criticisms, and how it's evolving*.
<https://www.investopedia.com/terms/s/sharing-economy.asp>



TASK 2: COWORKING SPACES

What is a coworking space? Read the article and complete the gaps using the words from the box.

warehouse | stylish | furniture | district | stylish | wallpaper | space | pastel

WeWork, Shanghai, China

WeWork's newest coworking space in the Jing'an 1) _____ of Shanghai is more than just an office—it's a journey through the city's lively history. The 2) _____ is inside a building that has an interesting past. It was once used as a 3) _____ for the East India Company and was later said to have been an opium factory.

WeWork worked with a local design firm called Linehouse to create a bright and 4) _____ space. The design mixes WeWork's cool, modern look with traditional Shanghai style. Inside, you'll find green metal decorations, soft 5) _____ colors, and 6) _____ inspired by the 1950s and 60s.



There is also a bar with fun tropical designs and hand-painted flower 7) _____. The WeWork Jing'an space is a celebration of both creative ideas and the rich history of the city.

Adapted from: **Pisarna**. (2025). *9 fantastic coworking places from around the world*. <https://pisarna.co/9-fantastic-coworkings-around-the-world/>

TASK 3: DISCUSSION TASK – PAIR WORK

Topic: Sharing Economy in Your City

Your local council wants to promote the sharing economy. What could they support? Here are some ideas:

- Bike-sharing system
- Tool library for DIY projects
- Community fridge to reduce food waste
- App for sharing rides to school
- Clothes swap event

Instructions:

- Talk about each idea and say what you think about it
- Choose two ideas that would work best

TASK 4: SERVICE DOMINANT LOGIC

Complete the text with the following words: co-created | lasting | services | tools

Service-Dominant Logic is a way of thinking that focuses on 1) _____ rather than just selling products.

Value is 2) _____ between the company and the customer during use.

Products are seen as 3) _____ to provide services and should be designed for 4) _____ use, repair, or sharing.



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TEACHER'S NOTES

TOPICS

Sharing economy, Service dominant logic

TARGET GROUP

Secondary school students, VET students, age: 15–19

LANGUAGE LEVEL:

B1 (CEFR)

DURATION

1 x 45 minutes

ANSWER KEY

✓ Task 1:

Is the sharing economy good for the environment?

Yes, it can be.

The sharing economy helps people use existing resources more efficiently. For example, sharing cars or homes reduces the need to buy new ones, which lowers energy use, pollution, and waste. However, it depends on how the system is used—if sharing platforms grow into large businesses, the environmental benefits may be reduced.

✓ Task 2:

WeWork, Shanghai, China

WeWork's newest coworking space in the Jing'an 1) **district** of Shanghai is more than just an office—it's a journey through the city's lively history. The 2) **space** is inside a building that has an interesting past. It was once used as a 3) **warehouse** for the East India Company and was later said to have been an opium factory.

WeWork worked with a local design firm called Linehouse to create a bright and 4) **stylish** space. The design mixes WeWork's cool, modern look with traditional Shanghai style. Inside, you'll find green metal decorations, soft 5) **pastel** colors, and 6) **furniture** inspired by the 1950s and 60s.

There is also a bar with fun tropical designs and hand-painted flower 7) **wallpaper**. The WeWork Jing'an space is a celebration of both creative ideas and the rich history of the city.

✓ Task 4:

Service-Dominant Logic is a way of thinking that focuses on 1) **services** rather than just selling products.

Value is 2) **co-created** between the company and the customer during use.

Products are seen as 3) **tools** to provide services and should be designed for 4) **lasting** use, repair, or sharing.



SOURCES

Images:

Pisarna. (2025). *9 fantastic coworking places from around the world*. <https://pisarna.co/9-fantastic-coworkings-around-the-world/>

(Originally on <https://www.wework.cn/zh-CN/building/weihailu/?lang=en-us>)

Texts adapted from:

Investopedia. (2024, January 29). *Sharing economy: Model defined, criticisms, and how it's evolving*. <https://www.investopedia.com/terms/s/sharing-economy.asp>

Pisarna. (2025). *9 fantastic coworking places from around the world*. <https://pisarna.co/9-fantastic-coworkings-around-the-world/>

Info:

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SERVICE-DOMINANT LOGIC, SHARING ECONOMY

QUICK REFLECTION:

- Do you really need to own everything you use? Why or why not?
- Have you ever shared something (a ride, clothes, tools)?
- Why might sharing be better for the environment?
- Would you feel comfortable using services like Airbnb or Uber? Why?

SERVICE-DOMINANT LOGIC

Service-Dominant Logic is the idea that **value comes from services and helping others**, not just from owning products. People use their **skills, knowledge, or resources** to benefit others, and in return, they receive value too.

Example: Instead of owning a drill, you borrow one from someone who has it.

SHARING ECONOMY

The sharing economy is a system where people share access to goods and services—often through digital platforms—so that resources can be used more efficiently instead of being owned individually.

EXAMPLES

BlaBlaCar

A ride-sharing platform where drivers offer empty seats in their cars and passengers share travel costs.

<https://www.blablacar.cz/>

Airbnb

A global platform where people rent out homes or rooms to travelers.

<https://www.airbnb.com/>

TaskRabbit

An online platform connecting people who need help (moving, repairs, furniture assembly) with individuals offering these services.

<https://www.taskrabbit.com/>

CAR4WAY

A Czech car-sharing service where users can book and unlock cars via an app.

<https://www.car4way.cz/en>

Turo

A peer-to-peer car rental service where private car owners rent out their vehicles.

<https://turo.com/>

Vinted

An online marketplace for buying and selling second-hand clothes.

<https://www.vinted.com/>

Yottabe Space (Jihlava)

A coworking space offering shared offices, meeting rooms, and community events.

<https://www.yottabespace.cz/>

Reuse centre (“Útulek věcí”, Jihlava)

A local initiative where people donate items for others to reuse (no official website available).

Uber

A platform connecting drivers using their own cars with passengers.

<https://www.uber.com/>

Rekola

A Czech bike-sharing service for short city trips.

<https://www.rekola.cz/>

Too Good To Go

An app that helps businesses sell unsold food at a lower price.

<https://www.toogoodtogo.com/>

BikeKIA

A bike-sharing system in Žilina promoting eco-friendly transport (local service, no main global site).

Bookbot (Knihobot)

An online second-hand bookstore managing selling and distribution.

<https://www.bookbot.cz/> (or <https://www.knihobot.sk/>)

Swappie

A platform selling refurbished iPhones with warranty.

<https://www.swappie.com/>

IKEA

A growing number of IKEA markets buy back IKEA furniture from customers who no longer need it and re-sell these good-quality second-hand items to new customers in the As-Is areas in stores.

<https://www.ikea.com/>

Najšport

A ski equipment rental service.

<https://www.najsport.sk/>

Slovnaft BAJk

A bike-sharing system in Bratislava.

<https://www.slovnaftbajk.sk/>

Bolt

A ride-hailing app connecting passengers with drivers.

<https://bolt.eu/>

Lyft

A transportation platform offering rides and shared mobility.

<https://www.lyft.com/>

Couchsurfing

A platform where travelers stay with hosts for free.

<https://www.couchsurfing.com/>

BorrowMyDoggy

A service connecting dog owners with people who help care for pets.

<https://www.borrowmydoggy.com/>

Olio

An app for sharing food and household items locally.

<https://olioapp.com/>

Peerby

A platform for borrowing items from neighbours.

<https://www.peerby.com/>

Wawashare

A Warsaw-based initiative promoting community sharing.

<https://biznes.um.warszawa.pl/waw/wawashare>

OLX

An online platform for buying and selling goods and services.

<https://www.olx.pl/>

Cohealo

A company enabling hospitals to share medical equipment.

<https://cohealo.com/equipment-sharing/>

OBI (tool rental)

A DIY store offering tool rental services.

<https://www.obic.cz/>

SOURCES

Examples were collected by students as part of an eTwinning activity in the Erasmus+ project *Three Voices in Green*.

Wikipedia contributors, "Service-dominant logic," *Wikipedia, The Free*

Encyclopedia, https://en.wikipedia.org/w/index.php?title=Service-dominant_logic&oldid=1344440270 (accessed March 23, 2026).

Wikipedia contributors, "Sharing economy," *Wikipedia, The Free*

Encyclopedia, https://en.wikipedia.org/w/index.php?title=Sharing_economy&oldid=1343404437 (accessed March 23, 2026).

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COMPANY SUSTAINABILITY AND ESG STRATEGIES

TASK 1: VOCABULARY WARM-UP

Match the terms (1–6) with their definitions (A–F).

Terms	Definitions
1. Sustainability	A. A person or group interested in a company's activities
2. ESG	B. The total greenhouse gas emissions caused by a person or organisation
3. Renewable energy	C. A business approach that includes Environmental, Social, and Governance factors
4. Supply chain	D. Producing and using energy from sources like wind, solar, or water
5. Carbon footprint	E. The process of making sure a business can continue without harming the environment
6. Stakeholder	F. All the steps and organisations involved in producing and delivering a product

TASK 2: READING & MATCHING

Read about four companies and their initiatives. Match each company (1–4) to the correct initiative (A–E). One initiative is extra.

Companies	Initiatives
1. EcoBuild – uses only certified sustainable wood and supports reforestation	A. Helping suppliers reduce waste in food production
2. GreenerBit IT – designs energy-efficient computers and recycles old devices	B. Promoting sustainable transport to reduce traffic emissions
3. Food and Future – works with farmers to use less water and no harmful pesticides	C. Providing low-energy technology and recycling services
4. CityCycle – provides a bike-sharing scheme for urban commuters	D. Building eco-friendly houses and planting new trees
	E. Offering discounts for online grocery orders

TASK 3: PICTURE DISCUSSION

Look at the picture of a company installing solar panels on its office roof and discuss:

- How is this connected to sustainability?
- What other eco-friendly steps can companies take?
- Do you think customers care about this? Why/Why not?
- Would you like to work for a company that has strong policies to protect the environment?



TASK 3: WHAT IS ESG?

Do you know what ESG stands for? Read the text and complete it with the words from the box.

bribery | renewable | decisions | society | ethically | equality | harm | investors | honest

What is ESG?

ESG means *Environmental, Social and Governance*. It is a way to measure how a business affects the environment, how it helps 1) _____, and how it is managed. It looks at the company's impact, how it works with people, and how 2) _____ and responsible it is.

Many investors now check a company's ESG before they invest money. In fact, two-thirds of 3) _____ consider ESG important. This means that having a good ESG strategy can help a business grow, protect the environment, and support the community

Environmental

The environmental part of ESG focuses on how the business reduces 4) **harm** to the planet. This includes the products or services it sells, how it works with suppliers, and how it runs its daily operations. An example might be using less energy and choosing 5) _____ energy like wind or solar power or using packaging that is biodegradable.

Social

The social part is about how a business treats people inside and outside the company. This includes employees, suppliers, customers, and the local community. Fairness and 6) _____ are very important here. An example might be offering training, health and safety, and wellbeing support or supporting local projects, such as education programmes

Governance

Governance is about how the business is managed and how 7) _____ are made. It also includes being open and honest with stakeholders. An example might be giving clear and correct information about the company's finances, plans, and operations or acting 8) _____, for example, by preventing 9) _____.

Adapted from: British Business Bank. (n.d.). *What is ESG? A guide for smaller businesses*. <https://www.british-business-bank.co.uk/business-guidance/guidance-articles/sustainability/what-is-esg-a-guide-for-smaller-businesses>

TASK 4: PAIR SPEAKING

Here are some things that our school could do to improve its sustainability and ESG (Environmental, Social, and Governance) performance.



Instructions: 1) Look at the diagram and discuss all of the options.
2) Then decide together which 2 ideas are the most important and why.

TEACHER'S NOTES

TOPICS

Sustainability, ESG

TARGET GROUP

Secondary school students, VET students, age: 15–19

LANGUAGE LEVEL:

B1 (CEFR)

DURATION

2 x 45 minutes

ANSWER KEY

✓ Task 1:

1E 2C 3D 4F 5B 6A

✓ Task 2:

1D 2C 3A 4B

✓ Task 3:

Possible answers:

1 It uses clean, renewable energy. It reduces pollution and carbon emissions. It helps the company save energy in the long term.

2 Use less paper and recycle more, Reduce plastic packaging. Use electric cars or bikes for work travel. Save water and electricity in the office.

3 Yes, because they want to support green companies. Yes, it shows the company cares about the planet. No, some customers only look at price. No, not everyone understands the benefits.

✓ Task 4:

1) **society** 2) **honest** 3) **investors** 4) **harm** 5) **renewable** 6) **equality** 7) **decisions** 8) **ethically** 9) **bribery**.

SOURCES

AI-generated images: OpenAI. (2025). AI-generated images of recycling related themes. Generated using ChatGPT and DALL·E by OpenAI, 2025. <https://openai.com/>

Text adapted from:

British Business Bank. (n.d.). *What is ESG? A guide for smaller businesses*. <https://www.british-business-bank.co.uk/business-guidance/guidance-articles/sustainability/what-is-esg-a-guide-for-smaller-businesses>

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ANALYSIS OF A COMPANY SUSTAINABILITY STRATEGY OR ESG POLICY

PRESENTATIONS ABOUT COMPANIES AND SUSTAINABILITY/ESG STRATEGIES

Set of presentations created by students of:

Střední uměleckoprůmyslová škola Jihlava-Helenín (CZ)

Państwowe Liceum Sztuk Plastycznych im. Antoniego Kenara w Zakopanem (PL)

Súkromná škola umeleckého priemyslu v Žiline (SK)

ACCESSIBLE FROM:

<https://tinyurl.com/tvigESGP>



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CASE STUDY ON SUSTAINABILITY STRATEGIES, ESG AND DESIGN WORK AT PLASTIA NOVÉ VESELÍ

“How might we make the world a more sustainable place?”

ESG STRATEGIES THEORY

ESG stands for environmental, social and governance. It is a way of looking at how a company behaves towards the environment, people and society, and how responsibly it is managed.

INTROSPECTIVE

- Inwards-facing strategy
- How can we produce, work, buy, use energy and manage resources more responsibly?

EXTROSPECTIVE

- Outwards-facing strategy
- How can our products, services and communication help customers live more sustainably? What products do we develop and sell?



A simple way to understand the goal of an ESG strategy is this question:

How might we make the world a more sustainable place while still running a successful company?

DO YOU AGREE WITH THIS STATEMENT?

“What is economical must be ecological and vice versa, what is ecological must be economical.”

Prof. Ing. Vladimír Jeníček, DrSc. (FMV VŠE Praha)

ABOUT PLASTIA NOVÉ VESELÍ



Plastia is a Czech family company based in Nové Veselí, Czech Republic. It was founded in 1993 and focuses mainly **on products for growing plants, gardening, composting and bringing nature closer to everyday life**. Its products include **flowerpots, self-**

watering containers, composters, bird feeders, watering accessories and newer products connected with **home growing and circular design**. Plastia exports its products to more than 56 countries. This means that the company is **local in production**, but **international in its market**. It also means that sustainability decisions made in Nové Veselí can influence customers far beyond the Czech Republic. The company presents **perfect design, quality and functionality as central values**. This is important because **sustainable products only work if people actually want to use them**. Good design can therefore support sustainability.



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ESG STRATEGY IN PRACTICE: THREE SIMPLE EXAMPLES

The following examples show how ESG can be visible in real products:

EXAMPLE 1: WORM FARM URBALIVE

FROM SCRAPS TO SOIL, START THE CYCLE AT HOME.

WHY SHOULD YOU CARE ABOUT BIO-WASTE?

- One third of global food is wasted
- Managing bio-waste reduces household trash
- Composting returns nutrients to the soil
- Organic waste in landfills = methane emissions



The **Urbalive worm farm** is a designer home composter for apartments. Plastia designed it to use red wriggler earthworms to turn kitchen biowaste into vermicompost and worm tea (liquid fertilizer), providing both solid and liquid natural fertilizer. The product is **suitable for indoor use** and, when used correctly, composting takes place without odour.

The vermicomposter is also an example of **how design can remove barriers**. Many people may think that composting belongs only in a garden. A **well-designed indoor composter makes composting possible even in a flat or a small classroom**.

The design was created by Czech designer **Jiří Pelcl**. The product received international design awards, including **Red Dot Design Award** and **Good Design Award**.

EXAMPLE 2: URBALIVE MICROGREENS AND REGROW



The second example is connected with home **growing**. Plastia's Urbalive growing products for **microgreens** and regrowing help people produce small fresh plants at home. Microgreens are young edible plants that can be harvested after only a few days, depending on the type of seed.

This product line **connects sustainability with self-sufficiency**. People can grow fresh greens in their **kitchen** even during winter. **They do not need a garden, long transport chains or large equipment**. The product therefore supports a small but practical change in behaviour: **producing part of one's food directly at home**.

The microgreens product also uses an interesting material approach. Its final appearance is created by combining the main material with **10% coffee grounds**, which gives the product a natural-looking texture and colour. This creates a **visible story of material reuse**.

EXAMPLE 3: RECAP REUSABLE CUP

The **REcap** is a reusable cup designed by **Ladislav Škoda**. It is **coloured with real coffee grounds**, which are processed into a dye for plastic. This is an example of **cascade recycling**: a **material that would usually be considered waste receives another use before the end of its life**.



This product is especially useful for explaining the link between **ecology** and **economics**. A reusable cup **can reduce the number of disposable cups**. At the same time, it can also **reduce costs for venues and event organisers** when it is used many times. Plastia communicates that one cup can **replace many disposable cups over repeated washing cycles**.

- Thoughtful design that fits in your hand
- Colored with real coffee
- Lid that actually seals properly
- 100% recyclable
- Serves long and under pressure
- 1095 wash cycles = replaces hundreds of disposables
- Save up to 80% vs. buying paper cups for events



ESG AT PLASTIA OVERALL

The three product examples show the extrospective part of ESG: products that help customers behave more sustainably. However, ESG also includes what happens inside the company. Plastia's approach can be organised into the three ESG areas: Environmental, Social and Governance.

ENVIRONMENTAL: HOW PLASTIA WORKS WITH NATURE AND RESOURCES

The environmental part of ESG focuses on materials, waste, energy, product life and impact on ecosystems.

RECYCLED & RECYCLABLE

Waste from production is **crushed and processed again** and the company also works with **recycled plastic** where it makes sense. Durability is also important: for exterior parts exposed to sun, rain and temperature changes, the company has to choose materials carefully so that **products remain durable**.

LONG PRODUCT LIFE

Plastia emphasises **durable design** and quality processing. **Stronger** load-bearing parts, **modular** accessories and **easy disassembly** help products last longer. Products are tested, improved and tested again. This matters because **the most sustainable product is often the one that does not need to be replaced quickly**.



ENERGY SAVINGS & SOLAR ENERGY

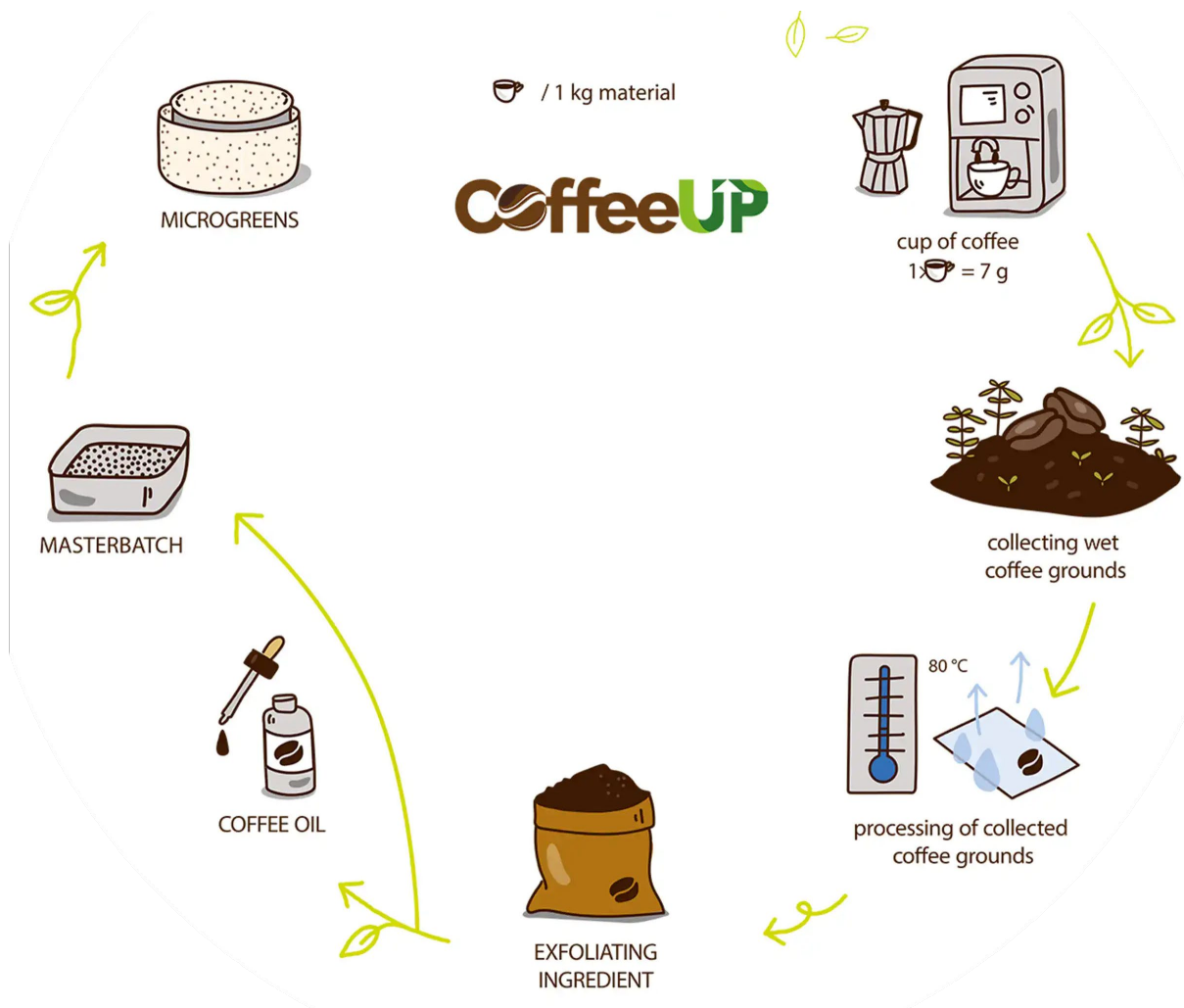
Solar energy powers our machines. Clean production means a clean story you can tell your customers. In times when everyone asks about product carbon footprint, you have a clear answer. The products are made in harmony with nature—and that's today's competitive advantage.

RICE BRAN, WINE SCRAPS AND COFFEE GROUNDS

Plastia and Urbalive experiment with adding **natural by-products into plastic materials**, such as **EU rice bran**, **wine scraps** and **coffee grounds**. These materials would normally be treated as waste or low-value leftovers, but they can be given a **new function in product design**. For example, coffee grounds can be used as a **natural colourant**, giving products a distinctive texture and colour while reducing the need for purely synthetic colouring.



CASCADE RECYCLING OF COFFEE BEANS



PLASTIC IN THE SERVICE OF NATURE

„We also consider how to best use the various types of plastic. We combine plastics with natural materials whenever we can. Inner parts and products that are less exposed to the weather and sunlight are made from recycled plastic whenever possible. Sunlight is major enemy for plastics, so the outer walls of our containers are made of original materials. We carefully monitor our product range. **We only make things which MAKE SENSE.** The individual materials are clearly marked using **recycling symbols**. This makes it easy to recycle the individual parts of a product after the end of its service life. The individual materials can be easily **taken apart** to make recycling even easier. Moreover, no piece of plastic goes to waste in our manufacturing process. Manufacturing waste is simply crushed and reprocessed. We are taking small but steady steps towards a **circular economy**.“

„OTOČ KVĚTINÁČ“ | RETURN AND REUSE OF FLOWERPOTS

The project **Otoč květináč** is a practical example of circular economy. Customers can **bring old plastic flowerpots and planters to collection boxes** in partner stores. The collected items are sorted. **Functional pieces** can be **donated** to places where they can still be useful, such as schools, social institutions or reuse centres. **Broken** pieces can be crushed and used to make new flowerpots, or sent for **proper recycling**.

This project is important because it goes beyond normal production. It tries **to influence what happens after the product has been used**. In a circular economy, companies think not only about selling a product, but also about **what happens at the end of its first life**.



SOCIAL: HOW PLASTIA WORKS WITH PEOPLE AND COMMUNITIES

The social part of ESG focuses on employees, customers, education, community and cooperation.

LOCAL EMPLOYMENT AND PRODUCTION

Plastia produces in Nové Veselí and works with employees **in one production location**. **Local production** supports **regional employment** and keeps know-how in the area.

EDUCATION THROUGH PRODUCTS

Products such as vermicomposters, microgreens kits and bird feeders are not only objects. They can become **educational tools**. A student using a vermicomposter can **learn about decomposition, soil, microorganisms, worms, food waste and nutrient cycles**. A class observing birds at a feeder can learn about biodiversity, species recognition and seasonal behaviour.



VERMICOMPOSTERS IN SCHOOLS

The project „Žížaláci ve vermikompostéru“ showed how a composter can become part of school life. In the 2017/18 school year, **Plastia cooperated with the Ekoškola programme of the educational centre Tereza**. Fifteen schools were involved in a year-long project. The **schools received vermicomposters and methodological materials**, and pupils learned through observation, care and problem-solving.



COOPERATION WITH EXPERTS AND ORGANISATIONS

Plastia **cooperates with growers, professional gardeners, florists, designers** and, in the case of bird products, also with **ornithology-related partners**. Cooperation with experts improves product quality and helps prevent superficial solutions.

CITIZEN-SCIENCE ACTIVITIES: „PTAČÍ HODINKA“ (THE BIRD HOUR)

Ptačí hodinka is a bird-counting project organised in the Czech Republic by the Czech Society for Ornithology. This connects product use with public education and nature observation.



SUPPORT FOR FAMILIES, MOTHERS, CHILDREN, HOSPITALS

Plastia financially supports **Mateřská škola Nové Veselí, Mateřské centrum Zvoneček Havlíčkův Brod** and **Mateřské centrum Boskovice**. These examples show support for local education, childcare and family communities.

The company also supports **Nedoklubko**, an association helping premature babies and their parents. In this case, Plastia contributes not only financially, but also through the direct involvement of employees in the association's activities.

Another example is support for the **Neonatology Department of University Hospital Brno**, specifically the department for premature babies. Plastia helped by purchasing specialised equipment in cooperation with **DN Formed Brno**.

PARTNERSHIP WITH ITS OWN EMPLOYEES

Professional development and training

Plastia supports employees through language courses and other training.

Return-to-work support after maternity leave

Plastia helps women return to work after maternity leave through part-time employment.

Inclusion of people with disabilities

Plastia supports the employment of people with disabilities.

Employee family support

Plastia organises an annual afternoon of games and competitions for employees' children.

GOVERNANCE: HOW PLASTIA MAKES RESPONSIBLE DECISIONS

Governance is often the least visible part of ESG, but it is very important. It means how decisions are made, how quality is controlled, and how the company behaves as a business partner.

LOCAL CONTROL OF DEVELOPMENT AND PRODUCTION

Because **development, testing and production are close to each other in Nové Veselí**, Plastia can control the process more directly. Problems can be noticed and solved faster. Designers and production specialists can work together.

SUPPLIER AND PARTNER SELECTION

The company values **strong local partnerships and carefully selects suppliers**, with preference for Czech suppliers where possible. Local and reliable partnerships can **reduce risks, shorten communication chains** and **support regional economic resilience**.

COMPLIANCE AND REGULATION

The REcap reusable cup shows how governance is connected with legal and market requirements. Companies must react to regulations on packaging and single-use products. **Instead of seeing regulation only as a problem, Plastia uses it as a reason for innovation.**

EMPLOYEE PARTNERSHIP AND RESPONSIBLE MANAGEMENT

Employee evaluation and motivation system

Plastia has an implemented system for evaluating and motivating employees.

Gender equality in management

Women make up 50% of Plastia's top management, and their share in management overall is even higher.

Equal opportunity principles

Plastia follows principles of gender equality in its work.

PLASTIA NOVE VESELÍ

Plastia's case shows that esg can be practical. It is not only a report, slogan or advertisement. It can influence what a company produces, how it produces, how it works with customers and what projects it supports.

www.plastia.eu

www.urbalive.eu

www.otockvetinac.cz

info@plastia.cz

Plastia s.r.o.
Ždárská 313
592 14 Nové Veselí
Czech Republic

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DESIGN FOR SUSTAINABILITY, VR IN ART AND DESIGN WORK

THE FUTURE OF DESIGN: RETHINKING HOW DESIGNERS CREATE

Have you ever wondered...

- ...how designers can test their ideas without producing waste?
- ...whether a digital environment could replace physical prototypes?
- ...how new technologies can help artists and designers create more sustainably?

CONTEXT OF VR IN SUSTAINABLE DESIGN

Creative industries are changing as traditional artistic practices increasingly combine with digital technologies. One of these technologies is **virtual reality (VR)**. VR is not only used for presenting finished designs — it can also serve as a **creative workspace** where designers and artists develop, test, and improve their ideas in an immersive digital environment.

In **sustainable design**, VR allows creators to experiment with shapes, spaces, and materials **without immediately producing physical objects**. This can reduce material waste and support more efficient design processes. Digital and hybrid workflows also make it easier to **prototype, iterate, and collaborate across different disciplines**, connecting art, design, and technology.

By using VR, designers can explore innovative solutions while thinking about the **environmental impact of their work** and developing more sustainable design practices.

WHAT SKILLS CAN VR SUPPORT?

- Virtual reality can help develop a wide range of creative, technical, and **sustainable design skills**:
 - development of **spatial** and **conceptual** thinking
 - working with **volume, scale, structure, and space in 3D**
 - development of **digital** and **hybrid creative skills**
 - understanding the **possibilities and limits of production**
 - understanding the complete creative process: **design → prototype → transformation → realization**
 - developing an **independent** and **critical approach** to digital creation
- VR also supports **broader competencies** needed in modern **creative fields**:
 - connecting art, design, and **new technologies**
 - encouraging **innovation** in **creative practice**
 - developing **digital competencies** and creativity
 - supporting **sustainable** working methods in design
 - learning to **experiment and work with mistakes** as part of the creative process
 - preparing students for the **rapidly evolving** creative **industries**



HOW VIRTUAL REALITY SYSTEMS WORK⁹

Virtual reality (VR) systems are built on a combination of **hardware** and **software** that allow people to experience digital worlds using their senses. The goal of a VR system is to make the virtual environment feel as real as possible—something you can see, hear, and sometimes even feel. Since humans and computers communicate in very different ways, the VR system acts like a translator between them. It takes **actions from the user**, such as **moving** their head or **pressing a button**, and turns them **into digital information** the computer can understand. The system then sends **feedback back to the user through displays, sound, or touch devices**. This constant cycle of **input** and **output** allows users **to interact naturally with the virtual environment**.

VR systems include several main parts: **input, the application, rendering, and output**. **Input devices** collect information about the user, such as where their hands or eyes are located. The **application** controls what happens in the virtual world, including **interactions, movement, and physics**. **Rendering** then converts **this information into images, sounds, or touch sensations** that the user can perceive. Finally, **output devices** deliver this **information through screens, speakers, or haptic devices**. VR can be **experienced through** different types of **displays**, including **head-mounted displays** worn on the head, **large world-fixed screens** in a room, or **handheld devices** like smartphones and tablets. Each type of display offers different levels of immersion and is suited for different situations.

VR IN THE DESIGN PROCESS

VR AS A CREATIVE ENVIRONMENT

- creating directly inside **an immersive 3D space**
- working at **real scale (1:1)**
- **quickly iterating design ideas** without producing physical prototypes
- **spatial sketching** and **experimentation** with shapes and forms

VR AS A DESIGN TOOL

- testing **proportions, ergonomics, and functionality**
- exploring shapes **without immediate technological or material limits**
- supporting **creativity and conceptual thinking**

DIGITAL RESOURCES AND SUSTAINABLE DESIGN

CREATING DIGITAL RESOURCES

- building **3D databases of objects, structures, and materials**
- creating **shared digital libraries** for future projects
- using **digital references in spatial form**

STAINABILITY IN DESIGN

- reducing **material consumption through virtual prototyping**
- reusing digital models in multiple design stages
- focusing on **experimentation, iteration, and design optimization**

⁹ Jerald, Jason. *The VR Book: Human-Centered Design for Virtual Reality*. ACM Books. San Rafael, CA: Morgan & Claypool, 2015, 30–34.



CONNECTING PHYSICAL AND DIGITAL CREATION

3D SCANNING

- digitizing **physical models, objects, and sculptures**
- analyzing **shape, structure, and surface details**
- editing and transforming scanned objects in digital environments
- combining **manual and digital creative processes**

SCANNING AS A RESEARCH TOOL

- digitizing **natural structures, materials, and found objects**
- building **personal digital collections of inspiration**
- experimenting with **deformation and transformation of forms**

FROM DIGITAL DESIGN TO PHYSICAL OBJECTS

HYBRID CREATIVE WORKFLOW

Modern design often combines physical and digital processes:



This approach helps designers understand the relationship between **digital models, materials, and production technologies**.

APPLICATIONS IN CREATIVE FIELDS

PRODUCT DESIGN

- designing products in VR at **real scale**
- testing **ergonomics and usability**
- fast prototyping without material costs

MOTION DESIGN, ANIMATION AND DIGITAL MEDIA

- creating **objects and scenes in 3D space**
- understanding **movement, camera, and spatial composition**
- using 3D objects in **animation and VR environments**

GAME DESIGN AND VIRTUAL WORLDS

- creating **game assets in VR**
- working with **scale, space, and interaction**
- exporting models to **game engines (e.g., Unreal Engine)**

SOURCES

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