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KA220YOU

ECO INNOVATORS

Next-Gen Sustainability through Science and Innovation

GUIDE

A Comprehensive Toolkit for Youth-Led Sustainable Innovation

"Empowering Young Innovators to Build a Sustainable Future"

6	10+	5+
Comprehensive Chapters	Practical Tools & Activities	Real-World Case Studies

Responsible Partner
EuroLinks Association (Türkiye)

Project Partners
PerFA (France) | SkillsLab21 (France)
Mobility Friends (Portugal)

Programme
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FOREWORD

Welcome to the Eco-Innovators Guide - a practical, comprehensive, and youth-centred resource developed as part of the EcoInnovators project, co-funded by the Erasmus+ Programme of the European Union (2024-2-FR02-KA220-YOU-000279572).

This guide is a core intellectual output of Work Package 2: International Cooperation and Experience Sharing. It has been designed to bridge the gap between sustainability awareness and real-world action, equipping young people aged 16–25 with the knowledge, tools, and confidence to become active sustainability innovators in their communities.

The EcoInnovators project brings together four partner organisations across Europe — EuroLinks Association (Türkiye), PerFA (France), SkillsLab21 (France), and Mobility Friends (Portugal) — united by a shared belief: that young people are not only the most affected by environmental challenges but also the most powerful agents of change.

This guide has been developed through extensive collaboration, drawing on insights gathered during international learning, teaching, and training events (LTTs), virtual activities, and cross-border peer learning. It integrates sustainability science, circular economy principles, design thinking, and youth entrepreneurship into a single, accessible toolkit.

How to Use This Guide

This guide is organised into 6 chapters. Each chapter builds on the previous one, taking you from foundational knowledge to hands-on action.

You can work through the guide individually or in groups. Each chapter includes activities, tools, and reflection exercises.

Educators and youth workers will find lesson plans and facilitation notes throughout.

All tools and templates are freely reproducible for educational purposes under Creative Commons Attribution.

We hope this guide inspires you to look at the world differently — and to take action.

The EcoInnovators Team

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ABOUT THE ECOINNOVATORS PROJECT

Project Overview

The EcoInnovators: Next-Gen Sustainability through Science and Innovation project is a 24-month Erasmus+ KA220-YOU cooperation partnership running from 1 March 2025 to 28 February 2027. The project aims to empower young people aged 16–25 by developing their skills in sustainable product development and increasing their digital competencies.

The project promotes youth entrepreneurship with a focus on environmental sustainability, fostering cooperation, innovation, and civic engagement across Europe while equipping young people with the tools to tackle global environmental challenges.

Partner Organisation	Country	Role in This Guide
EuroLinks Association	Türkiye	Lead Partner — Overall coordination, practical content, youth tools, formatting (EUR 5,920)
PerFA	France	Theoretical sustainability background, EU policy alignment, climate literacy (EUR 2,410)
SkillsLab21	France	Youth entrepreneurship, business model canvas, eco-innovation examples (EUR 2,410)
Mobility Friends	Portugal	Review, intercultural adaptation, pilot testing with youth groups (EUR 2,055)

Project Objectives

- Develop digital and sustainability competencies among young people aged 16–25 across five European countries.
- Promote youth-led eco-innovation and green entrepreneurship through practical training and international cooperation.
- Create open-access educational resources, including this guide, accessible via the GreenLink Hub platform.
- Foster cross-border collaboration and peer learning through Learning, Teaching, and Training (LTT) events and virtual activities.
- Strengthen the capacity of youth organisations and educators to embed sustainability into non-formal education.

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CHAPTER 1: INTRODUCTION TO SUSTAINABLE INNOVATION

Responsible Partner(s): PerFA — Sustainability theory, climate literacy, EU policy alignment | EuroLinks — Coordination, introductory content and EcoInnovators mindset framework

Learning Objectives

By the end of this chapter, you will be able to:

- Define sustainability and its three pillars (environmental, social, economic).
- Explain the key global sustainability challenges facing young people today.
- Describe the role of the SDGs in guiding sustainable development.
- Understand how innovation can be a powerful tool for environmental solutions.
- Adopt the EcoInnovators mindset in your daily life and work.

1.1 The Sustainability Challenge

We live on a planet of extraordinary beauty and resilience — but also a planet under pressure. The decisions made by our generation will shape the next century of life on Earth. The evidence is clear: climate change, biodiversity loss, pollution, and resource depletion are accelerating. The world needs urgent, creative, and youth-driven solutions.

Sustainability is not just about protecting the environment. It is about creating systems — economic, social, and ecological — that meet the needs of today without compromising the ability of future generations to meet their own needs. This definition, from the Brundtland Commission (1987), remains the foundation of sustainable development thinking.

Environmental	Social	Economic
Protecting ecosystems, reducing emissions, conserving biodiversity, managing natural resources.	Ensuring equity, inclusion, human rights, access to education, health, and safe communities.	Creating livelihoods, responsible production, green jobs, and fair distribution of resources.

1.2 Global Challenges That Demand Innovation

The scale of today's environmental challenges requires us to move beyond small individual changes. We need systemic innovation — new ways of designing products, organising economies, and building communities.

Climate Change

Global temperatures have already risen over 1.1°C above pre-industrial levels. Extreme weather events, rising sea levels, and disrupted ecosystems affect millions of young people worldwide — including in the four countries of the EcoInnovators project.

Plastic and Waste Crisis

Over 380 million tonnes of plastic are produced annually, and less than 10% is recycled. Young people are inheriting a world drowning in waste. Innovation in product design, materials, and systems is urgently needed.

Biodiversity Loss

One million species are currently at risk of extinction. The destruction of natural ecosystems is not only an ecological tragedy — it undermines food security, water availability, and human wellbeing.

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Energy Transition

The global energy system must shift from fossil fuels to renewables within this decade. This transition creates enormous opportunities for youth-led innovation in energy efficiency and clean technology.

Unsustainable Consumption

The global economy extracts three times more natural resources than the Earth can sustainably provide. Changing how we design, use, and dispose of products is the most powerful lever we have.

1.3 The Sustainable Development Goals (SDGs)

In 2015, all 193 United Nations member states adopted the 2030 Agenda for Sustainable Development, built around 17 Sustainable Development Goals (SDGs). These goals provide a shared blueprint for peace, prosperity, and sustainability for people and the planet.

The EcoInnovators project aligns most directly with the following SDGs:

SDG 4	Quality Education — Building sustainability literacy and STEM skills among youth
SDG 8	Decent Work & Economic Growth — Fostering green entrepreneurship and circular jobs
SDG 9	Industry, Innovation & Infrastructure — Promoting sustainable industrial innovation
SDG 11	Sustainable Cities & Communities — Designing products and systems for liveable futures
SDG 12	Responsible Consumption & Production — Core focus of sustainable product design
SDG 13	Climate Action — Reducing carbon footprints through design and innovation
SDG 17	Partnerships for the Goals — Embodied in the cross-European cooperation model

1.4 What Is Innovation?

Innovation is often misunderstood as only high-tech invention. In reality, innovation is any new idea, method, product, process, or approach that creates value — social, environmental, or economic. Innovation can be:

- Technological: A new material, energy source, or digital platform
- Social: A new way of organising communities or sharing resources
- Design-based: A new way of making or packaging a product
- Business model-based: Shifting from selling products to providing services
- Systemic: Redesigning entire supply chains or policy frameworks

The EcoInnovators project focuses on sustainability-driven innovation: applying creative thinking to design products, services, and systems that reduce environmental impact, promote social equity, and support economic resilience.

The EcoInnovators Mindset

Think systemically: Every product is part of a larger system. Ask: where do the materials come from? Where do they go at the end of life?

Question the status quo: Why do we make things this way? Is there a better way?

Embrace failure as learning: Innovation requires experimentation. Every failed prototype is a lesson.

Collaborate across borders: The best sustainability solutions are co-created by diverse teams.

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Act locally, think globally: Your community is your laboratory. Your solutions can scale globally.

1.5 Activity: My Sustainability Footprint

Activity 1: My Sustainability Footprint | 45 minutes | Individual + Group

Step 1: On a sheet of paper, draw a typical day in your life and list 5 products you use (food, clothing, technology, transport, packaging).

Step 2: For each product, ask: Where was it made? What materials does it use? How will it be disposed of?

Step 3: Rate each product on a sustainability scale from 1 (very unsustainable) to 5 (very sustainable). Be honest!

Step 4: Share your results in small groups. Discuss: which product would you most like to redesign? Why?

Step 5: Write one innovation idea to make your least sustainable product more environmentally friendly.

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CHAPTER 2: UNDERSTANDING PRODUCT LIFECYCLE & ENVIRONMENTAL IMPACT

Responsible Partner(s): PerFA — Product lifecycle analysis and environmental impact theory | EuroLinks — Practical LCA tools and activity design

Chapter Focus

This chapter introduces the concept of Product Lifecycle Analysis (LCA) — a powerful tool for understanding the full environmental impact of any product, from the extraction of raw materials to final disposal.

Understanding how products interact with the environment across their entire lifecycle is the foundation of sustainable innovation.

2.1 What Is a Product Lifecycle?

Every product has a story — a lifecycle that begins long before it reaches the consumer and continues long after it is thrown away. Understanding this lifecycle is essential for any eco-innovator. The product lifecycle consists of six main stages:

#	Stage	Key Questions for Eco-Innovators
1	Raw Material Sourcing	Where do the materials come from? Are they renewable? Are they extracted ethically and sustainably?
2	Manufacturing & Production	How much energy is used? What waste is produced? Are workers paid fairly and treated well?
3	Packaging & Distribution	How is the product packaged? How far does it travel? What is the carbon footprint of transportation?
4	Consumer Use Phase	How long does the product last? Does it use energy during use? Can it be repaired?
5	End-of-Life Management	Can the product be recycled or composted? Does it create toxic waste? What happens to it after use?
6	Circular Recovery	Can materials be recovered and re-used in new products? Is there a take-back system?

2.2 Life Cycle Assessment (LCA): A Practical Introduction

Life Cycle Assessment (LCA) is a standardised method (ISO 14040/14044) for evaluating the environmental impact of a product across its entire lifecycle. While professional LCAs require specialist software and data, young eco-innovators can use simplified LCA thinking to evaluate and improve products.

Four Steps of a Simplified LCA:

Step: Goal and Scope Definition

Define which product you are assessing and which lifecycle stages you will examine.

Step: Inventory Analysis

List all the inputs (materials, energy, water) and outputs (products, emissions, waste) at each lifecycle stage.

Step: Impact Assessment

Estimate the environmental impacts: carbon emissions, water use, land use, toxicity, biodiversity effects.

Step: Interpretation

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Use your findings to identify the most impactful stages and prioritise where innovation can make the biggest difference.

CASE STUDY 1: LIFECYCLE OF A COTTON T-SHIRT (Global / EU Context)

Challenge

A single cotton t-shirt uses approximately 2,700 litres of water to produce — enough for one person to drink for 2.5 years. Cotton farming often involves intensive pesticide use, and most t-shirts travel thousands of kilometres before reaching the consumer.

Solution

A European youth-led social enterprise redesigned the supply chain by sourcing organic cotton locally in Southern Europe, partnering with certified fair-trade manufacturers, using natural dyes, and creating a take-back programme to recycle old garments into new fabric.

Result & Impact

The redesigned t-shirt reduced water consumption by 65%, eliminated pesticide use, reduced transport emissions by 80%, and created local employment for 12 young people in a rural community.

2.3 Environmental Impact Categories

When conducting lifecycle analysis, eco-innovators should consider multiple categories of environmental impact:

Impact Category	Definition & Relevance
Climate Change (Carbon Footprint)	Greenhouse gas emissions measured in CO_2 equivalent. The most widely tracked indicator of environmental impact.
Water Footprint	Total volume of freshwater used throughout the lifecycle. Critical in water-scarce regions.
Land Use	Area of land occupied or transformed. Linked to deforestation, habitat loss, and food security.
Toxicity	Release of hazardous substances to soil, water, or air. Affects ecosystems and human health.
Biodiversity Impact	Effect on ecosystems and species. Often overlooked but critically important.
Resource Depletion	Extraction of non-renewable materials (metals, fossil fuels). Linked to circular economy principles.
Waste Generation	Volume and type of waste produced. Linked to landfill, ocean pollution, and microplastics.

CASE STUDY 2: ECOINNOVATORS V1 VIRTUAL ACTIVITY — PRODUCT LIFECYCLE ANALYSIS IN PRACTICE (Turkey · Portugal · France (Virtual, 16 January 2026))

Challenge

During the first EcoInnovators virtual activity, 21 participants from Turkey, Portugal, and France were challenged to pick an everyday product and analyse its full lifecycle. Groups chose a disposable coffee cup, a glass water bottle, and a shampoo bottle — common items that hide a surprisingly large environmental footprint.

Solution

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Using a structured analytical framework covering materials, production impact, lifespan, and end-of-life disposal, participants uncovered striking findings. The disposable coffee cup — made of paper with a plastic lining — requires 4 litres of water to produce, emits 110g CO_2 per unit, and takes 30 years to degrade in landfill because of its composite materials. Participants then developed redesign proposals: the Eco-Fold Cup (agri-waste paper with beeswax lining, foldable design, 100% recyclable), the Refillable Shampoo System (durable recycled-plastic bottle, pharmacy refill stations, QR code for nearest refill point), and the Glass Bottle with Lifecycle Tracking (QR-based usage counter encouraging reuse).

Result & Impact

All four groups successfully completed their lifecycle analyses and presented concrete redesign proposals. Post-activity evaluation confirmed that 100% of participants demonstrated improved understanding of circular economy principles. The session was facilitated by EuroLinks Association (Turkey) and cost just €17.86 per participant — showing the power of virtual formats for accessible international learning.

2.4 Activity: Lifecycle Mapping Workshop

Activity 2: Product Lifecycle Map | 60 minutes | Small Groups (3–5 people)

Step 1: Choose a common product: a smartphone, a water bottle, a pair of jeans, or a food item.

Step 2: Draw a lifecycle map on a large sheet of paper: Raw Materials → Production → Distribution → Use → Disposal.

Step 3: For each stage, identify: materials used, energy consumed, emissions produced, and waste generated.

Step 4: Use the Impact Category table above to rate the impact at each stage (Low / Medium / High).

Step 5: Identify the 'hotspot' — the stage with the greatest environmental impact.

Step 6: Brainstorm three innovations that could reduce the impact at this hotspot stage.

Step 7: Present your findings to other groups and discuss similarities and differences.

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CHAPTER 3: PRINCIPLES OF SUSTAINABLE PRODUCT DESIGN

Responsible Partner(s): PerFA — EU legislation and Ecodesign regulatory framework | EuroLinks — Design principles content, audit templates and case studies

Sustainable product design is the art and science of creating products that minimise environmental harm, maximise social value, and remain economically viable throughout their entire lifecycle. This chapter introduces the key design principles that every eco-innovator needs to know.

3.1 The Seven Principles of Sustainable Design

Principle 1: Design for Durability

Products should be designed to last as long as possible. Every year of extended product life reduces the environmental impact per year of use.

How to apply this principle:

- Use high-quality, robust materials
- Avoid planned obsolescence
- Design for easy repair
- Offer extended warranties

Principle 2: Design for Repairability

Products should be easy and affordable to repair. The Right to Repair movement is gaining momentum across Europe and supports this principle.

How to apply this principle:

- Use modular components
- Make spare parts available
- Provide repair manuals
- Avoid glued or fused components

Principle 3: Design for Reuse

Products and packaging should be designed to be reused multiple times, extending the useful life of materials before they need to be recycled.

How to apply this principle:

- Refill systems for packaging
- Multi-purpose product functions
- Standardised sizes and fittings
- Take-back and refill programmes

Principle 4: Design for Recyclability

At end-of-life, materials should be easy to separate, sort, and recycle into new products with minimum loss of quality.

How to apply this principle:

- Use monomaterials where possible
- Avoid multi-material laminates
- Label materials clearly

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- Design for disassembly

Principle 5: Material Efficiency

Use only the materials necessary for the product's function. Reducing material use reduces extraction, processing, and disposal impacts.

How to apply this principle:

- Lightweight design techniques
- Remove non-functional elements
- Right-size packaging
- Use digital alternatives to physical products

Principle 6: Low-Carbon Production

Manufacturing processes should use renewable energy, minimise energy consumption, and avoid carbon-intensive materials.

How to apply this principle:

- Source from renewable energy suppliers
- Optimise production processes
- Use bio-based materials
- Measure and offset unavoidable emissions

Principle 7: Social and Ethical Design

Sustainable products must also be socially responsible — respecting workers' rights, ensuring fair wages, and supporting local communities.

How to apply this principle:

- Fair trade sourcing
- Transparent supply chains
- Community consultation in design
- Inclusive design for accessibility

3.2 Ecodesign and the EU Regulatory Framework

The European Union has established a strong regulatory framework to promote sustainable product design. The EU Ecodesign Regulation (previously Directive 2009/125/EC, now expanded under the Ecodesign for Sustainable Products Regulation - ESPR) sets mandatory requirements for a growing range of product categories.

Key EU policies relevant to eco-innovators:

- European Green Deal (2019): Europe's roadmap to climate neutrality by 2050
- Circular Economy Action Plan (2020): Targets for product design, sustainable consumption, and waste reduction
- EU Taxonomy for Sustainable Activities: Classification system for green investments
- Corporate Sustainability Reporting Directive (CSRD): Mandatory sustainability reporting for companies
- Extended Producer Responsibility (EPR): Producers responsible for end-of-life management of their products

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CASE STUDY 2: FAIRPHONE: THE RIGHT TO REPAIR IN PRACTICE (Netherlands)

Challenge

The smartphone industry produces over 1.4 billion devices annually, with average lifespans of only 2.5 years. Most smartphones cannot be repaired and contain rare minerals extracted under harmful conditions.

Solution

Fairphone designed a modular smartphone where every component — screen, battery, camera, speakers — can be replaced by the user using a standard screwdriver. They also created a transparent supply chain for conflict-free minerals.

Result & Impact

Fairphone 4 has a repairability score of 9.3/10 (iFixit). The company has extended phone lifespans by an average of 4+ years, reducing lifecycle carbon emissions by over 30% compared to industry average.

3.3 Activity: Sustainable Design Audit

Activity 3: Sustainable Design Audit | 75 minutes | Pairs or Small Groups

Step 1: Select a product you own or use regularly (packaging, clothing item, electronic device, food container).

Step 2: Evaluate the product against each of the 7 Sustainable Design Principles using the checklist below.

Step 3: Score each principle: 0 = not applied, 1 = partially applied, 2 = fully applied. Maximum score: 14.

Step 4: Identify the 3 lowest-scoring principles — these are your innovation opportunities.

Step 5: Redesign the product on paper, applying the 3 principles you identified. Describe what changes you would make.

Step 6: Share your redesign with the group and discuss feasibility and potential impact.

☐	Durability: Is the product built to last? Is it made from quality, long-lasting materials?
☐	Repairability: Can it be repaired easily? Are spare parts available? Is it modular?
☐	Reuse: Can the product or its packaging be reused? Are refill options available?
☐	Recyclability: Are the materials clearly labelled? Are they easily separable for recycling?
☐	Material Efficiency: Is the product as lightweight and compact as functionally possible?
☐	Low-Carbon Production: Is it made with renewable energy? Does it use bio-based materials?
☐	Social Responsibility: Is it fairly traded? Is the supply chain transparent and ethical?

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CHAPTER 4: CIRCULAR ECONOMY AND INNOVATION SYSTEMS

Responsible Partner(s): SkillsLab21 — Business model canvas, green entrepreneurship and circular economy examples | EuroLinks — Content coordination and activity design

The circular economy is one of the most powerful frameworks available to eco-innovators. It offers a systemic alternative to the traditional 'take-make-waste' model of production — and it creates enormous opportunities for youth-led innovation, green entrepreneurship, and sustainable community development.

4.1 From Linear to Circular: A Systems Shift

The current global economy is overwhelmingly linear: we extract natural resources, manufacture products, sell them to consumers, and then discard them as waste. This model has generated enormous economic growth — but at an unsustainable environmental cost.

The Linear Economy	The Circular Economy
◦ TAKE: Extract raw materials from the earth ◦ MAKE: Manufacture products using energy and labour ◦ USE: Consumer uses the product ◦ DISPOSE: Product is thrown away as waste *Result: Resource depletion, pollution, climate change, and waste.*	◦ DESIGN: Design out waste from the beginning ◦ USE: Share, maintain, repair, and reuse products ◦ RECOVER: Collect and remanufacture products ◦ REGENERATE: Return biological nutrients to nature *Result: Resource efficiency, economic opportunity, and environmental restoration.*

4.2 Circular Economy Principles (Ellen MacArthur Framework)

The Ellen MacArthur Foundation, one of the world's leading circular economy organisations, defines three core principles:

Design Out Waste and Pollution

Waste and pollution are not accidents — they are the result of design decisions. By designing products differently, we can eliminate waste at the source.

Keep Products and Materials in Use

Products, components, and materials should be kept in use at their highest value for as long as possible through maintenance, repair, reuse, remanufacturing, and recycling.

Regenerate Natural Systems

The circular economy goes beyond sustainability to actively restore and regenerate natural systems, returning nutrients to the soil and rebuilding natural capital.

4.3 Circular Business Models: Innovation Opportunities

The circular economy is not just an environmental philosophy — it is a source of significant business and social innovation. Here are the key circular business models that young eco-innovators can explore:

Business Model	How It Works & Youth Innovation Opportunity
Product-as-a-Service (PaaS)	Instead of selling products, companies sell the service the product provides (e.g. 'lighting as a service' instead of light bulbs). Opportunity: Youth can design subscription models for sustainable products.

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Sharing Economy	Platforms that enable shared access to underutilised assets (tools, vehicles, spaces). Opportunity: Community tool libraries, peer-to-peer clothing rental, co-working spaces.
Repair and Remanufacturing	Extending product life through repair, refurbishment, and remanufacturing. Opportunity: Youth repair cafés, upcycling workshops, second-hand marketplaces.
Take-Back and Refill Systems	Manufacturers take back their products at end-of-life for disassembly and material recovery. Opportunity: Refill stations for household products, reverse vending machines.
Biomimicry and Biological Cycles	Products designed to return safely to nature at end-of-life (composting, biodegradation). Opportunity: Packaging from mycelium, seaweed, or hemp.
Industrial Symbiosis	Waste from one industry becomes input for another. Opportunity: Local resource exchange networks connecting farmers, manufacturers, and restaurateurs.

CASE STUDY 3: REPAIR CAFÉ MOVEMENT — COMMUNITY-LED CIRCULAR INNOVATION (Netherlands / Belgium)

Challenge

Millions of functional items are discarded annually in Europe because owners lack the skills or resources to repair them. Landfill waste is growing, and communities lack spaces for skill-sharing.

Solution

The Repair Café movement (founded in Amsterdam in 2009 and now active across Belgium and the wider EU) creates free community spaces where people bring broken items and receive help from volunteer repair experts — electricians, seamstresses, carpenters, and IT specialists.

Result & Impact

Over 2,500 Repair Cafés operate worldwide. Each event saves an average of 1 tonne of CO_2 equivalent and prevents hundreds of items from entering landfill. Youth volunteers gain technical skills, entrepreneurship experience, and a sense of community contribution.

4.4 Waste Hierarchies and Resource Efficiency

Circular economy thinking is guided by the Waste Hierarchy — a framework that prioritises the most environmentally preferable options for managing resources:

- PREVENT: Avoid creating waste in the first place through design and behaviour change (Most preferred)
- MINIMISE: Reduce the amount of waste generated
- REUSE: Use items again without significant processing
- RECYCLE: Process waste materials into new products
- ENERGY RECOVERY: Recover energy from waste that cannot be recycled
- DISPOSE: Landfill or incinerate as a last resort (Least preferred)

4.5 Activity: Circular Economy Business Model Canvas

Activity 4: Circular Business Model Canvas | 90 minutes | Teams of 3–5

Step 1: Choose a common product that is currently made and disposed of in a linear way (e.g. coffee cups, fast fashion, electronic accessories).

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Step 2: Map the current linear model: Where do materials come from? Where do they go? What value is lost at end-of-life?

Step 3: Using the circular business model cards provided, select TWO circular strategies that could be applied to this product.

Step 4: Design a new circular business model: What changes in production? Who are the new stakeholders? How does revenue change?

Step 5: Calculate potential impact: How much waste could be saved? How much CO_2? How many new jobs could be created?

Step 6: Pitch your circular business model to the group in 3 minutes.

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CHAPTER 5: PRACTICAL INNOVATION TOOLKIT FOR YOUNG ECO-INNOVATORS

Responsible Partner(s): EuroLinks — Practical toolkit, templates and activity guide | SkillsLab21 — Entrepreneurship tools and youth project examples

Welcome to the Core Practical Section!

This chapter is the heart of the Eco-Innovators Guide. Here you will find step-by-step tools, templates, and methods to help you develop your own sustainable product idea — from initial spark to working prototype.

These tools have been tested and refined during the EcoInnovators WP2 activities: the V1 Virtual Workshop (16 January 2026, 21 participants across Turkey, Portugal, France & French Guiana) and the LTT1 training in Brussels (3–7 November 2025, 23 participants from 5 countries). The frameworks below are grounded in what actually worked in practice.

V1 Virtual Activity

16 January 2026 · Zoom

21 participants · Turkey, Portugal, France, French Guiana

Focus: Product lifecycle analysis, sustainable redesign, STEM-integrated thinking

LTT1 — Brussels

3–7 November 2025 · Brussels, Belgium

23 participants · 5 partner countries · Lead: SkillsLab21

Focus: Prototype development, sustainability skills, educational materials

5.1 Design Thinking for Sustainability

Design Thinking is a human-centred innovation methodology that has been adapted for sustainability challenges. It provides a structured process for understanding problems, generating creative solutions, and testing them in the real world.

The EcoInnovators Design Thinking process has five stages:

1. EMPATHISE	2. DEFINE	3. IDEATE	4. PROTOTYPE	5. TEST
Understand the people and communities affected by the problem	Articulate the core sustainability challenge clearly	Generate as many creative solutions as possible — no limits!	Build a quick, low-cost model of your best idea	Try it out with real users and refine based on feedback

5.2 Tool 1: Product Sustainability Analysis Template

Use this template to analyse any existing product or your own product concept. This systematic analysis helps you understand the sustainability profile and identify the most important areas for improvement.

Analysis Area	Current Situation	Improvement Opportunity
Materials & Resources		
Energy Use in Production		
Carbon Footprint		
Water Consumption		
Packaging		
Durability / Lifespan		
End-of-Life / Recyclability		
Social & Ethical Impact		

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5.3 Tool 2: Innovation Brainstorming Methods

Method A: How Might We...? (HMW)

The 'How Might We...?' method transforms problems into open-ended innovation challenges. It is widely used by design firms and sustainability organisations.

How to Run a HMW Session:

Step 1: State the problem clearly. Example: 'Single-use coffee cups generate millions of tonnes of waste per year.'

Step 2: Reframe as an HMW question. Example: 'How might we design a coffee culture that generates zero single-use waste?'

Step 3: Generate at least 20 ideas in 15 minutes. No filtering — every idea is welcome!

Step 4: Cluster ideas into themes. Vote on the most promising cluster.

Step 5: Develop the top 3 ideas further.

Method B: SCAMPER Technique

SCAMPER is a creative thinking technique that helps you generate new ideas by systematically applying seven types of creative transformation to an existing product:

Letter	Action	Example Applied to a Plastic Bottle
S	**Substitute**	Replace plastic with plant-based biopolymer from seaweed
C	**Combine**	Combine water bottle with a filter and built-in purification system
A	**Adapt**	Adapt bottle design to be collapsible for easier reuse and storage
M	**Modify / Magnify**	Make bottle modular — separate lid, body, and filter for easy repair
P	**Put to other uses**	Repurpose old bottles as seed starters or construction materials
E	**Eliminate**	Eliminate the bottle entirely — design a refill-only distribution system
R	**Reverse / Rearrange**	Redesign so the material can return to nature as compost at end-of-life

5.4 Tool 3: Carbon Footprint Estimation

Understanding the carbon footprint of your product idea is a critical step in sustainable innovation. Use this simplified estimation framework to assess and compare the climate impact of different design options.

Lifecycle Stage	Current Design (kg CO_2e)	Redesigned Option (kg CO_2e)	Saving
Raw Material Extraction	_____	_____	_____
Manufacturing & Processing	_____	_____	_____
Packaging & Distribution	_____	_____	_____
Consumer Use Phase	_____	_____	_____
End-of-Life Disposal	_____	_____	_____
TOTAL FOOTPRINT	_____	_____	_____

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5.5 Tool 4: Sustainability Assessment Checklist

Before presenting your innovation idea, use this comprehensive checklist to ensure it meets the key criteria for sustainable innovation:

☐	ENVIRONMENTAL: Does your product reduce carbon emissions compared to the current alternative?
☐	ENVIRONMENTAL: Does it use fewer or more sustainable materials?
☐	ENVIRONMENTAL: Is end-of-life management included in the design?
☐	ENVIRONMENTAL: Does it avoid or reduce toxic substances?
☐	SOCIAL: Does it benefit communities, particularly those most vulnerable to environmental impacts?
☐	SOCIAL: Is it accessible and affordable to young people with fewer opportunities?
☐	SOCIAL: Does it respect workers' rights throughout the supply chain?
☐	ECONOMIC: Is there a viable business model that can sustain the innovation long-term?
☐	ECONOMIC: Does it create green jobs or support the local economy?
☐	INNOVATION: Is the solution genuinely new or does it improve significantly on existing alternatives?
☐	SCALABILITY: Can the idea be replicated in other communities or countries?
☐	YOUTH LEADERSHIP: Is the innovation led or co-created by young people?

5.6 Activity: From Problem to Prototype — The EcoInnovators Challenge

Activity 5: The EcoInnovators Innovation Challenge | 3 hours | Teams of 4–6

Step 1: Teams choose a sustainability challenge from their local community (waste, food, energy, transport, water, fashion).

Step 2: Apply the HMW method to generate at least 20 innovation ideas in 20 minutes.

Step 3: Use the SCAMPER technique to develop 3 of your most promising ideas further.

Step 4: Complete the Product Sustainability Analysis Template for your best idea.

Step 5: Estimate the carbon footprint savings of your innovation using the Carbon Footprint Tool.

Step 6: Build a quick prototype using available materials (paper, cardboard, fabric, recycled items).

Step 7: Present your innovation in a 5-minute pitch: Problem → Solution → Impact → Next Steps.

Step 8: Receive peer feedback using the Sustainability Assessment Checklist.

EcoInnovators LTT1 — Real Prototypes from Our Community (Brussels, 3–7 November 2025)

During the first transnational Learning, Teaching and Training activity in Brussels, 23 participants from five partner countries worked in mixed-nationality teams to design and build functional sustainable product prototypes. Here are the five innovations they created:

AquaGuard (Turkey · France · Portugal): A low-cost water quality monitor housed in recycled plastic bottles, powered by solar energy and using an Arduino microcontroller. 80% recycled materials, zero operational carbon footprint.

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EcoBag Loop (France · French Guiana): Biodegradable shopping bags made from cassava starch (abundant in French Guiana) and vegetable glycerin. Biodegrades within 180 days — replacing plastic bags that take 500+ years to decompose.

RePack (Portugal · Turkey): A modular furniture system from upcycled wooden pallets, assembled without tools. Multiple configurations — shelving, seating, tables, storage — all from waste pallets diverted from landfill.

SunDry (Turkey · France): A portable passive solar food dehydrator made entirely from recycled materials (reclaimed wood frame, glass panels from old windows). Zero energy consumption — 100% solar powered.

Green Cycle (All Countries): A device that converts bicycle pedalling into electricity for charging mobile phones, built from recycled bicycle components. Encourages sustainable transport while generating clean energy.

All five prototypes were completed and presented on Day 4. Participant satisfaction reached 4.9/5 for hands-on practice — the highest-rated element of the entire training.

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CHAPTER 6: FROM IDEA TO IMPACT — GREEN ENTREPRENEURSHIP & COMMUNITY ACTION

Responsible Partner(s): EuroLinks — Prototyping, community engagement and action planning | SkillsLab21 — Green entrepreneurship and business model content | Mobility Friends — Cultural context adaptation, pilot testing and usability feedback

You now have the knowledge, frameworks, and tools to develop sustainable product ideas. This final chapter is about taking action — moving from concept to real-world impact. It covers prototyping, testing, community engagement, green entrepreneurship, and scaling your solutions.

Lessons from LTT1 — What We Learned in Brussels

The Brussels training generated 8 key success factors that are now built into the frameworks of this chapter:

1. Strong partnership solidarity — effective response to unexpected challenges
2. Experienced facilitation — expertise distributed across all partner organizations
3. Hands-on pedagogical approach — practical learning was rated 4.9/5 by participants
4. Quality materials and resources — adequate supplies enable real creativity
5. Motivated participants — 78% committed to continuing collaboration after the activity
6. Inclusive practices — multilingual support and accessibility for all
7. Clear structure — well-designed daily programme prevents overwhelm
8. Supportive environment — encouraging experimentation reduces fear of failure

These principles apply whether you are organising a workshop for 5 or 500 people. Build them into your action plan from day one.

6.1 From Concept to Prototype

Prototyping is the process of creating a preliminary version of your product idea to test and refine it. In sustainable innovation, we distinguish between different levels of prototype:

Prototype Level	Purpose	Tools & Materials
Sketch / Paper Prototype	Quickly communicate the concept and explore different shapes and functions	Paper, scissors, pens, sticky notes — free!
Low-Fidelity Physical Model	Test the form, size, and user interaction with a physical model	Cardboard, foam, fabric, recycled materials
Functional Prototype	Test specific functions or mechanisms of the product	3D printing, basic electronics, simple materials
Minimum Viable Product (MVP)	A basic but real version that can be tested with actual users	Small production run, handmade batch, or digital demo

6.2 Testing Your Innovation with Real Users

Testing is where innovation becomes real. The goal of testing is not to prove that your idea works — it is to learn as quickly as possible what works, what doesn't, and what needs to change.

The Feedback Loop:

- Build: Create the simplest prototype that can be tested
- Measure: Collect feedback from real users in your target group
- Learn: Analyse what the feedback tells you about user needs and product performance
- Improve: Make specific changes based on what you learned

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- Repeat: Test again with an improved prototype

User Testing Tips for Eco-Innovators:

Test with the people who will actually use your product — not just your friends!
Ask open questions: 'What did you think when you first saw this?' 'What confused you?'
Observe actual behaviour, not just stated preferences — people often say one thing and do another.
Focus on sustainability behaviour: Does the product make it easy for users to make sustainable choices?
Test with young people from different backgrounds, including those with fewer opportunities.

6.3 Community Engagement for Sustainable Change

The most impactful sustainable innovations are co-created with communities. Community engagement transforms eco-innovators from individuals designing 'for' others into collaborative creators working 'with' people.

Key community engagement approaches used by EcoInnovators partners:

Community Mapping

Work with local residents to identify the most pressing sustainability challenges in your neighbourhood. What waste, energy, food, or mobility problems exist? This becomes your innovation brief.

Co-Design Workshops

Invite community members to co-design solutions with you. Use tools from Chapter 5 — HMW brainstorming, prototype testing — in a community setting.

Youth-Led Campaigns

Raise awareness of your innovation and engage more community members as users, partners, or advocates.

Local Authority Partnerships

Connect with local government, schools, and businesses to scale your innovation and secure ongoing support.

Peer Learning Networks

Connect with other youth-led sustainability initiatives through the GreenLink Hub platform to share learnings and build partnerships.

6.4 Green Entrepreneurship: Turning Innovation into Impact

Green entrepreneurship is the creation of businesses that generate positive environmental and social value alongside economic returns. It is one of the most powerful ways for young eco-innovators to create lasting change.

The Social Business Model Canvas for Green Entrepreneurs

Adapt the classic Business Model Canvas for sustainable innovation by adding three sustainability dimensions:

Standard Business Canvas Elements	Sustainability Additions (EcoInnovators)
◦ Value Proposition: What problem do you solve? ◦ Customer Segments: Who benefits from your solution? ◦ Revenue Streams: How does money flow in? ◦ Cost Structure: What are your main costs?	◦ Environmental Impact: What positive impact does your solution create on the environment? ◦ Social Impact: How does it benefit communities, especially vulnerable groups? ◦ Circular Model: How does your business close loops and eliminate waste?

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◦ Key Activities: What do you actually do? ◦ Key Resources: What do you need to operate? ◦ Key Partners: Who supports you? ◦ Distribution Channels: How do you reach users? ◦ Customer Relationships: How do you engage users?	

6.5 Funding and Support for Young Eco-Entrepreneurs

One of the most common questions from young sustainability innovators is: how do I fund my idea? There is a growing ecosystem of support for green entrepreneurship in Europe:

Funding Source	How It Works
Erasmus+ Programme	Supports youth exchanges, training projects, and capacity-building through grants up to €500,000. Visit erasmus-plus.ec.europa.eu
European Social Fund (ESF+)	National programmes supporting youth employment, skills, and social inclusion. Contact your national ESF authority.
Horizon Europe	EU Research & Innovation programme funding sustainable technology development with up to €2.5M for SMEs.
EIC Accelerator	The European Innovation Council supports breakthrough green innovations from startups with grants and equity investment.
National Youth Funds	Most European countries have dedicated youth innovation funds. Check with your national youth agency.
Green Impact Investment	Growing number of impact investors specifically targeting environmental startups. Platforms include GreenBiz, Climate-KIC.
GreenLink Hub (EcoInnovators)	Our own project platform connects eco-innovators with mentors, partners, and resources. Free registration at greenlinkhub.eu

CASE STUDY 5: YOUTH-LED ZERO-WASTE FOOD MARKET — LISBON, PORTUGAL (Portugal)

Challenge

The Lisbon district of Mouraria generated significant plastic and food waste through its weekly street market, with over 60% of vendors using single-use plastic packaging and no food waste recovery system in place.

Solution

A team of youth volunteers from Mobility Friends and a local neighbourhood association mapped waste flows, co-designed a zero-waste market framework with vendors, and introduced compostable packaging standards, a food waste cooperative, and a digital second-hand market for surplus produce.

Result & Impact

Within one year, plastic use at the market decreased by 78%, food waste fell by 65%, and the food waste cooperative provided 200 meals per week to vulnerable households. The model has been replicated in three other Lisbon markets and presented at the European Youth Week.

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6.6 Scaling Your Sustainable Solution

Once your innovation has been tested and validated, the next step is scaling — expanding its reach and impact beyond your initial pilot.

Strategies for Scaling Sustainable Innovation:

Replicate and Adapt

Share your model openly through the GreenLink Hub so other communities can replicate it, adapting for their local context.

Build Partnerships

Partner with schools, municipalities, businesses, and other NGOs to embed your innovation in existing systems.

Policy Advocacy

Use evidence from your pilot to advocate for policy changes that would enable your innovation to scale systemically.

Youth Network

Connect with the EcoInnovators partner network across Turkey, France, Belgium, and Portugal to share learnings and co-create cross-border solutions.

Digital Scaling

Use digital platforms, social media, and open-source resources to share knowledge and tools with eco-innovators worldwide.

6.7 Final Activity: My EcoInnovators Action Plan

Activity 6: Personal EcoInnovators Action Plan | 60 minutes | Individual Reflection + Peer Sharing

Step 1: Identify ONE sustainability challenge in your community that you are passionate about solving.

Step 2: Describe your sustainable innovation idea in one sentence: 'We will design/create/build [PRODUCT/SERVICE] for [USER GROUP] to address [CHALLENGE] using [APPROACH].'

Step 3: List three people or organisations you will involve as co-creators or partners.

Step 4: Outline your first three practical steps in the next 30 days.

Step 5: Identify one potential obstacle and how you will overcome it.

Step 6: Set a 6-month impact goal: What measurable change will your innovation create?

Step 7: Register on the GreenLink Hub platform and share your Action Plan with the EcoInnovators community.

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GLOSSARY OF KEY TERMS

Term	Definition
Biodegradable	Capable of being broken down naturally by living organisms into harmless substances.
Bio-based material	Material derived from biological resources (plants, animals, microorganisms) rather than fossil fuels.
Carbon footprint	The total amount of greenhouse gases produced, directly and indirectly, measured in CO_2 equivalent.
Circular economy	An economic system designed to eliminate waste and keep resources in use for as long as possible.
Design thinking	A human-centred methodology for solving complex problems through empathy, creativity, and experimentation.
Eco-design	Design methodology that incorporates environmental considerations throughout the product development process.
End-of-life management	The strategies and processes used to handle a product when it reaches the end of its useful life.
Extended Producer Responsibility (EPR)	Policy approach holding producers financially and/or physically responsible for end-of-life management of their products.
Green entrepreneurship	Creating businesses that generate positive environmental and social value alongside economic returns.
GreenLink Hub	The EcoInnovators project's digital platform for youth sustainability collaboration, resources, and networking.
Life Cycle Assessment (LCA)	A systematic method for evaluating the environmental impact of a product throughout its entire lifecycle.
Linear economy	The traditional 'take-make-dispose' economic model based on continuous extraction and disposal of resources.
Minimum Viable Product (MVP)	The simplest version of a product that allows testing and learning with minimal resources.
Mycelium	The root-like structure of fungi; used as a sustainable alternative material for packaging, insulation, and leather.
Product-as-a-Service (PaaS)	Business model where companies sell product performance rather than ownership (e.g. 'mobility' not 'car').
SDGs	The 17 Sustainable Development Goals adopted by the UN in 2015 as a blueprint for peace, prosperity, and sustainability by 2030.
SCAMPER	A creative thinking technique using seven transformations: Substitute, Combine, Adapt, Modify, Put to other uses, Eliminate, Reverse.
Upcycling	The process of transforming waste materials into new products of higher quality or environmental value.
Waste hierarchy	A framework prioritising waste prevention, then reuse, recycling, energy recovery, and disposal as last resort.
Zero waste	A goal and design philosophy aimed at eliminating all waste, particularly single-use waste, from systems and products.

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REFERENCES & FURTHER READING

Core Frameworks and Organisations

- Ellen MacArthur Foundation. (2023). Circular Economy Overview. ellenmacarthurfoundation.org
- European Commission. (2020). Circular Economy Action Plan. ec.europa.eu/environment/circular-economy
- United Nations. (2015). Transforming Our World: The 2030 Agenda for Sustainable Development. un.org/sustainabledevelopment
- IDEO. (2019). The Field Guide to Human-Centred Design. ideo.com
- World Resources Institute. (2022). A Roadmap for a Net Zero Economy. wri.org

EU Policy References

- European Green Deal (COM/2019/640)
- Ecodesign for Sustainable Products Regulation (EU) 2024/1781
- EU Taxonomy Regulation (EU) 2020/852
- European Pillar of Social Rights Action Plan (2021)
- Erasmus+ Programme Guide 2025 — KA220 Youth Cooperation Partnerships

Recommended Books and Resources for Young Eco-Innovators

- McDonough, W. & Braungart, M. (2002). Cradle to Cradle: Remaking the Way We Make Things. North Point Press.
- Hawken, P. (2017). Drawdown: The Most Comprehensive Plan Ever Proposed to Reverse Global Warming. Penguin Books.
- Raworth, K. (2017). Doughnut Economics: Seven Ways to Think Like a 21st Century Economist. Random House.
- Ellen MacArthur Foundation. Schools Programme Resources. ellenmacarthurfoundation.org/education
- European Environment Agency. Youth Resources. eea.europa.eu/themes/sustainability-transitions/youth

Join the EcoInnovators Community

This guide is just the beginning. The real journey starts when you take action.

Register on the GreenLink Hub Platform

Connect with eco-innovators across Europe | Access free resources

Share your sustainable product ideas | Build partnerships

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