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Green Training Toolkit

Work Package 4

Piloting the Green Transition

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Executive Report

The European Green Deal presents an ambitious vision for a climate-neutral, resource-efficient, and competitive economy. To achieve this, a shift in behaviour is needed that reduces resource consumption, embraces circular economy principles, and respects the planet's ecological limits. Achieving this vision calls not only for structural changes across key sectors but also for a strategic investment in equipping the workforce with the necessary skills.

Occupations within sectors such as Additive Manufacturing, Automotive, Battery, Defence, Energy, and Maritime have been identified as pivotal to advancing the green transition. These roles play a central part in implementing sustainable practices, fostering innovation, and driving the adoption of green technologies. Empowering professionals in these fields requires focused investment in green skills, defined by Cedefop as the knowledge, abilities, values, and attitudes essential to supporting and shaping a sustainable future.

A review of current vocational education and training (VET) and higher education (HE) programs highlights a gap between the green skills demanded by emerging occupations and those presently embedded in curricula. Addressing this gap calls for a rethinking of both educational content and pedagogical approaches. Integrating green and digital skills, along with transversal competencies such as critical thinking, problem-solving, adaptability, and systems thinking, is essential in preparing the workforce for the challenges of tomorrow.

In response to this need, the GREEN Project developed the Green Training Toolkit. The toolkit acts as a comprehensive framework created to support educators in integrating sustainability into their teaching practices. Drawing on sector-specific skill needs and innovative educational methods including project-based learning and interdisciplinary collaboration, the Toolkit offers practical resources for delivering holistic, sustainability-focused education.

This report introduces the Green Training Toolkit, details its development, and illustrates its application in enhancing curricula and supporting educators. By embedding sustainability principles into existing programs, it enables trainers to deliver green and transversal skills that align with evolving occupational demands. The toolkit is developed in accordance with the project's training guidelines and the guidance document on green skill development (D3.2 and D3.3), providing targeted support for integrating green competencies from both the trainer's and the trainee's perspective. Feedback gathered during the piloting phase played a key role in refining the material to ensure its relevance and effectiveness in real training contexts. The Toolkit is a flexible resource that can be adapted to various educational settings and used to address the defined competence units, thereby supporting the structured integration of green skills into curricula across Europe.

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Worksheets of best practices that can be used for the upskilling and reskilling of the workforce can be found in annexes 1 and 2. Both project partners (UCY, EWF, CETMAR, MERCANTEC, VSB-TUO) and external institutions (ISQ, Universidade da Coruña, Academia de Formação (ATEC), Ambitious, CIFP Ferrolterra and Public School of Advanced Vocational Training SAEK Egaleo) that joined the network during the project's Duration made significant contributions to the development of the material.

1 Introduction

The European Green Deal outlines a bold plan to create a climate-neutral, resource-efficient, and competitive economy. To achieve this goal, the EU intends to shift to a regenerative growth model, decreasing resource consumption to stay within planetary limits and adopting circular principles to double its material use rate over the next ten years.

To drive this green transition, certain occupations are projected to have a crucial and strategic contribution to enable the path to a sustainable future. These essential occupations are crucial in promoting sustainable practices, adopting green technologies, and encouraging eco-friendly processes. For the practitioners of the identified occupations to be able to support a sustainable future, they should be equipped with the necessary skills and knowledge. More specifically, the acquisition of green skills will play a vital role in equipping the current and future workforce with the necessary skills and knowledge to achieve the green transition. Green skills, as defined by Cedefop, will enclose all the knowledge, abilities, values and attitudes that will be essential in developing and supporting a sustainable future [1]. These skills will be vital across all sectors and levels of the workforce, supporting the creation and maintenance of a sustainable and resource-efficient society. By investing in the capabilities of key workers through targeted training and skill development initiatives, industries can fully harness their workforce's potential to drive the green transition.

Through previous work of the project, key occupations in 6 targeted sectors, namely Additive Manufacturing, Automotive, Battery, Defence, Energy and Maritime, were identified with their relevant set of skills and knowledges as described in the ESCO database [2]. Identifying the green skills needed for the future workforce and comparing them with those currently offered by European and national VET and HE institutions is essential for detecting skill gaps. To address these gaps and support the transition to a sustainable and regenerative economy, curricula should integrate green and digital skills along with transversal competencies such as critical thinking, problem-solving, adaptability, and systems thinking. Given the complexity of sustainability challenges, which are interconnected, multi-dimensional, and constantly evolving, it is also important to embed effective teaching practices such as project-based learning, real-world problem-solving, cross-disciplinary collaboration, and stakeholder engagement. These approaches help learners better understand and navigate the complexity of sustainable development in practical and impactful ways.

Sharing best practices among educational institutions will enable efficient and interactive learning experiences. To implement sustainability principles in the curriculum, the GreenComp competence area of "Embracing complexity in sustainability" should be followed to account for the complexity and

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multidimensionality of sustainability issues. This area focuses on equipping learners with systemic and critical thinking skills and encouraging them to reflect on how to better evaluate information and address sustainability challenges. Additionally, it analyses systems by identifying interconnections and feedback loops; framing issues as sustainability problems, which helps us understand the scope of a situation and recognize all stakeholders involved.

To help address this challenge and support teachers and trainers in integrating green skills into their curricula, the Green Training Toolkit is designed to promote the acquisition and development of both green and digital skills. By utilizing the identified green and transversal skills in each sector, along with best practices that promote holistic thinking in sustainability, the toolkit will provide a framework, including materials, exercises and activities that can help teachers to integrate green thinking into their lessons. This framework is designed to equip the future workforce with the skills needed to foster a sustainable society, offering trainers a comprehensive set of materials, exercises, and activities to aid in the training process. Leveraging existing programs in partner institutions, the Green Training Toolkit will facilitate the acquisition of green and transversal skills, creating a foundation for a more sustainable and resilient labour market.

2 Guideline for integrating green skills into the curriculum

By leveraging insights from previous blueprint projects, feedback from industry experts, and thorough analysis, the skill gaps identified in the six sectors studied (Additive Manufacturing, Automotive, Battery, Defence, Energy, and Maritime) are effectively targeted. Integrating best practices and sustainability principles into existing curricula will enhance the educational framework, preparing the workforce for emerging sector-specific occupations. The continuous improvement loop, facilitated by participant feedback during the piloting stage, ensures that the training toolkit remains dynamic and responsive to evolving industry needs. During the pilot phase, the training materials were refined based on the feedback collected from participants. Revisions were made to the content of the slides, and additional recommendations were incorporated into the worksheets (Annex 1) to enhance **the effectiveness of each best practice**. This strategic initiative is pivotal in driving sustainable development and fostering a skilled workforce ready to tackle future challenges.

The purpose of the toolkit is to equip educational institutions with the essential tools needed to provide the workforce with the green and transversal skills necessary for the transition to a sustainable future. The developed training material will equip participants with the fundamental green and transversal skills required for targeted occupations, enabling them to make a significant contribution towards achieving sustainability goals. The toolkit aligns with the training guideline (D3.2) and the guidance document for upskilling in green skills and practices (D3.3).

The sustainable element can be integrated into teaching by incorporating real-world sustainability challenges across subjects and learning activities. To effectively integrate green skills into the curriculum, training programs should focus on interdisciplinary sustainability integration, ensuring that sustainability concepts are embedded throughout various subject areas. Emphasis should be placed on practical, hands-on learning experiences that develop transversal skills such as critical thinking and problem-solving. Additionally, curricula should include components that focus on measuring and assessing environmental impact, enabling learners to understand and evaluate the consequences of

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actions on the environment. Given the pace of innovation, it is essential to prepare learners to adapt to rapid technological changes, equipping them with the agility and digital competencies required for evolving green job roles.

This involves not only incorporating content related to environmental, social, and economic sustainability but also applying pedagogical methods such as project-based learning, case studies, and interdisciplinary collaboration that encourage students to think systemically, critically, and ethically. By framing lessons around sustainability issues, educators can make learning more relevant while fostering the skills and mindsets needed to navigate and address complex, real-world problems. The process outlined in Figure 1 serves as a guideline for the integration of critical thinking, problem framing and system thinking into teaching. It is intended to assist trainers in effectively integrating the recommended green activities into their curricula.

Figure 1. Guideline used to aid trainers in integrating critical thinking, problem framing and system thinking into their teaching (determined in D3.3).

3 Training Materials – Trainer's Edition

Training materials developed by GREEN project were structured, allowing end-users (trainers, teachers, tutors) flexibility and adaptation to different target groups, classes or sectors. The Green Training Toolkit aims to be a powerful tool to help trainers integrate green skills into their daily lessons with students. As mentioned in D3.2 - GREEN training guideline, trainers are the most valuable and efficient drivers for the green transition and through them, learners can be prepared to integrate green thinking into their problem-solving and decisions in their daily life. Taking the GreenComp framework as a basis, all exercises are designed to stimulate and train the learner to use transversal competencies such as Systems thinking, Critical thinking, and Problem framing, including the GREEN factor (worksheets are included in Annex 1). The GREEN project aims to change the mindset of current and future workers by planting the seed of sustainable thinking through their learning process, regardless of their working sector.

The competence unit "*Pedagogical practices for a greener tomorrow: Trainer's edition*" is targeted at experienced trainers and should be developed in a collaborative and sharing context using a peer learning methodology. Training should employ a variety of interactive methods to ensure a rich learning

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experience. Participants will engage in:

- **Brainstorming Sessions**: To generate innovative ideas and solutions related to green education.
- **Constructive Discussions**: Facilitating critical thinking and the exchange of diverse perspectives on sustainability.
- **Showcase Practices**: Sharing and analysing successful sustainability initiatives and teaching practices.
- **Collaborative Projects**: Working in groups to design and implement green teaching strategies.
- **Practical Workshops**: Hands-on activities to apply sustainable practices in real-world scenarios.
- **Reflection Sessions**: Encouraging self-assessment and goal setting for continuous improvement in promoting sustainability.

This methodology ensures that trainers not only gain theoretical knowledge but also develop practical skills and strategies to effectively incorporate sustainability into their teaching practices. Table 1 and 2 summarize the topics and the learning outcomes of a Train-the-Trainer workshop "*Pedagogical practices for a greener tomorrow: Trainer's edition*".

Table 1. *Example of competence unit for trainers and educators in VET and educational institutions (trainers' edition)*

Competence Unit PEDAGOGICAL PRACTICES FOR A GREENER TOMORROW: TRAINER´S EDITION	CONTACT HOURS*	WORKLOAD
SUBJECT TITLE		
Sustainability and Education	2	4
Educator's role in the GREEN Transition	2	4
Sustainability principles and GREEN thinking training practices integration	2	4
Competence-oriented approach – Experimental session	6	13
Total	12	25
CREDITS	1	

*These are recommended contact hours, which must be adjusted to the learning context and environment.

Table 2. *Learning outcomes for the cross-sectorial competence unit "For a greener tomorrow: Trainers' edition*

PEDAGOGICAL PRACTICES FOR A GREENER TOMORROW: TRAINER´S EDITION	
COMPETENCE UNIT	LEARNING OUTCOMES
KNOWLEDGE	Factual and theoretical knowledge of the principles and applicability of: • Education Impact on sustainability • Sustainability and Green practices implementation on education • Competence-oriented approach for teaching and learning about environmental sustainability. • Definition of an environmentally conscious educator • Active methods of engaging learners to promote green thinking and innovation.

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	• Cooperation and partnerships with colleagues, businesses, and other stakeholders to advance environmental sustainability. • Practical experience in green initiatives and sustainable development
SKILLS	• Define the role of an eco-conscious educator detailing the impact of education on a GREENER mindset. • Establish an ecological approach to problem-solving and decision-making as a criterion for evaluating student learning. • Develop pedagogical strategies aligned with sustainable approaches to teaching STEM topics, considering their environmental impact and benefits as well as their limitations. • Integrate sustainability and green thinking into curricula, inspiring relevant stakeholders to support the adoption of sustainable teaching practices. • Use active methods to involve students in promoting ecological creativity and innovation. • Foster co-operation and partnerships with colleagues, companies/industry, and other stakeholders to promote the principles of sustainability. • Engage in practical experiences that promote green initiatives and sustainable development. • Set long-, medium-, and short-term objectives for integrating sustainability and green thinking into their own training and teaching activities, prioritising actions that contribute to environmental conservation and sustainable development.

3.1 Example - Sustainability and Education

Objective: To dive into an important discussion about the role of education in achieving the Sustainable Development Goals (SDGs). Education is a powerful tool that can drive social change, economic growth, and environmental sustainability.

Description: In this activity, you will work in groups to explore how education impacts the specific SDGs assigned to you. You'll engage in thoughtful discussions about the ways in which education can address the challenges associated with each goal. Once you've evaluated the level of impact education has on your SDGs, you will visually represent this impact by placing your assigned goals on a distance chart. This will help us understand which SDGs are most influenced by education and encourage a collaborative dialogue on how we can enhance educational initiatives to further our progress toward these vital goals.

Outline

1. **Introduction:** Each group will receive one or more Sustainable Development Goals (SDGs) to focus on. The task is to discuss and evaluate the role of education in achieving these goals.
2. **Discussion:** Begin by having each group discuss **how education contributes to achieving the specific SDGs** they have been assigned. Consider the direct and indirect ways education can help address the issues behind each SDG.
3. **Impact Evaluation:** After the discussion, each group will evaluate **the level of impact education has on their assigned SDGs.** For example, does education play a crucial, moderate, or minor role in achieving that particular goal?

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4. **Distance Representation:** Once the group has decided how much impact education has, they will represent it by placing their SDGs on a chart (e.g., on a board or the floor). The placement should be based on the **distance from a central point representing education**:
    - **Close to the centre:** Indicates education has a **high impact** on achieving that SDG.
    - **Away from the centre:** Indicates education has a **lower impact** on achieving that SDG.
5. **Group Discussion:** After all groups have placed their SDGs, we will come together as a larger group to discuss the results. Each group will share their placements and the reasoning behind them, fostering a collaborative dialogue on the collective insights and implications of education's role in achieving the SDGs.

Figure 2. *Illustration of the "Sustainability and education" activity with all 17 SDG goals identified*

3.2 Guidelines - Educator's role in the green transition

Collaborative learning

Use a collaborative approach that combines self and group reflection, enabling learners to build knowledge together through meaningful discussions and integrate it as their own.

Educators are positioned to act as catalysts for the green transition, leveraging their influence across interconnected systems like schools, families, communities, and society at large. By embracing their roles as change agents, educators can initiate a cascade effect that extends beyond the school's walls. By embedding sustainable principles into their teaching, educators impact learners directly through the acquisition of new knowledge, skills, and attitudes that empower them to act sustainably in their daily lives and work. Indirectly, educators impact families and communities in general by sharing new insights and eco-conscious behaviours. Learners inspire other people around them. As sustainable practices become widespread, they create a cultural shift toward more responsible consumption, production, and environmental stewardship. This interconnectedness underscores the **systems-**

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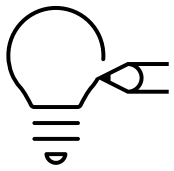
thinking approach: understanding that change in one part of the system can trigger broader, positive transformations across society.

Embracing a collaborative approach that combines self, and group reflection enables learners to collectively build and internalize knowledge, fostering meaningful discussions that strengthen their roles as active agents of change. This interconnected, reflective learning environment deepens systems thinking, reinforcing the understanding that sustainable practices adopted by individuals can initiate broader, positive transformations across society.

3.3 Guidelines - Sustainability principles and green thinking training practices integration



Training designers Challenge:

If you are designing a learning exercise/activity for your students try to include GREEN thinking. Make them use Systems thinking, Critical thinking, and Problem framing to solve the exercise from the point of environmental protection.

The GreenComp Framework is instrumental in systematically integrating green skills into existing curricula, providing educators with clear guidance to embed sustainability competencies effectively and purposefully into their teaching practices. An example of implementing sustainability through the GreenComp Framework, following the method outlined in Figure 1, can be seen in the following teaching approach.

This approach integrates sustainability and responsible innovation into software development and IT infrastructure by encouraging students to apply critical thinking, systems thinking, and problem-framing skills. Students are taught to critically assess existing digital products and development practices by examining their environmental impact, social responsibility, and economic implications. They explore sustainability challenges such as the excessive use of server resources, high battery consumption, large-scale data transfers, and the accumulation of digital waste. Through this lens, they are prompted to consider the environmental consequences of app development and IT infrastructure design, including energy use, carbon footprint, and e-waste generation. In addition, students analyse the interdependencies between the various phases of software development (planning, coding, testing, and maintenance) and reflect on their combined environmental and societal impact. Ethical and social concerns are also addressed, including data privacy, inclusive design, and the responsible use of AI, helping students recognize the influence of digital technologies on people's lives and well-being.

The aim is to help students view software development not merely as a technical task but as an activity with important environmental, social, and governance implications. By adopting this perspective,

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students are better prepared to create digital solutions that are not only innovative but also sustainable and ethically responsible.

Table 3. *Table showing the step-by-step procedure followed to implement an example of a course focusing on Data science in the green curriculum.*

Question	Critical thinking	Systems thinking	Problem Framing
How do I get this into my teaching?	Students can critically evaluate existing products and production methods in terms of their environmental impact, social responsibility, and economic viability.	Students can: Analyse the software development lifecycle as a system that involves planning, coding, testing, and maintenance. Identify interactions and dependencies between development phases and environmental impacts.	Students can: Articulate sustainability challenges in software development, such as overuse of server resources, electronic waste, and security issues, and work to identify solutions.
How do I see it in my teaching	Critically evaluate app development practices in terms of their impact on users' energy consumption, data usage, and overall environmental impacts.	Consider mobile app development as part of an ecosystem that involves user interaction, data transfer, and server infrastructure. Identify interactions between these components and the impact on resource usage.	Formulate sustainability challenges in app development, such as battery consumption, transfer of large amounts of data, and digital traces, and work to identify sustainable development methods and designs.
"In which part of my teaching can I implement this?" **Think ESG – Which of the three E, S or G is relevant in this subject? Where is the biggest effect?**	Environmental (E) Software Development and IT Infrastructure: Implementing energy-efficient solutions can have a significant positive impact on the environment, especially in an era of increasing digitalization and data consumption.	Social (S) Ethical Use of Data and AI: As computer science increasingly influences all aspects of life, it's crucial to ensure development is done responsibly and ethically, considering the diverse needs of society.	Governance (G) Data Governance and Privacy: In a world with growing data usage and cyber threats, proper management and protection of data are crucial for maintaining trust in technology and its applications.

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Can I influence the environment, socially or organizationally?	IT Governance and Compliance: Example: Teach students about IT governance frameworks (like COBIT and ITIL) and the importance of compliance with laws and regulations (such as GDPR). Activity: Include assignments where students develop governance policies for a hypothetical or real organization.	Sustainable Organizational Practices: Example: Introduce sustainable practices within an organization's IT department, such as e-waste recycling, paperless policies, and energy management. Activity: Conduct a class project to design a sustainable IT strategy for a company, including recommendations for reducing e-waste and energy consumption.	Organizational Change Management: Example: Teach principles of change management to help students understand how to implement and manage technological changes within organizations. Activity: Simulate organizational change scenarios where students must plan and execute a transition to a new technology or policy, addressing potential resistance and ensuring stakeholder buy-in.
Which tool should I use? Project/Case/discussion/ Hands On/ Reflection….? **Project: Develop a Sustainable Campus IT System**	Students design an energy-efficient IT infrastructure for the campus, including renewable energy sources and optimized server usage.	The system includes accessible features for students and staff with disabilities and ensures data privacy and ethical use of data.	Students create governance policies for maintaining the system, including compliance with relevant regulations and guidelines for sustainable practices.

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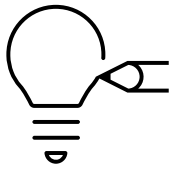
3.4 Guidelines - Competence-oriented approach – Experimental session



Peer learning approach:

Create a supportive environment in Train the Trainers sessions where trainers can openly discuss challenges and solutions, fostering collaboration and the exchange of diverse strategies to inspire innovation and collective growth.

Peer learning is a key element of the competence-oriented approach and a powerful tool for professional development, allowing trainers to share experiences, exchange insights, and collaboratively improve their teaching practices. Within a Train the Trainers session, fostering peer learning helps create a supportive community where trainers can openly discuss challenges and solutions. This approach not only enhances individual competence but also promotes the collective growth of the group by highlighting diverse strategies and perspectives. When trainers share their best practices, they inspire one another to innovate and adapt their methods, creating a ripple effect that enhances the learning experience for all involved.

GREEN's suggestion for this session is to challenge each educator to prepare a “sharing moment” where they present to their peers one pedagogical best practice they use in their training sessions. The approaches shared by each partner are available in Annex 1 of this document, along with relevant resources to support other trainers in integrating green skills into their curricula.

4 Training materials – Trainee’s edition

4.1 Design of training material for trainees

Trainees typically represent the future workforce, whose success depends on acquiring skills that closely align with the targeted organization's specific needs, operational processes, and workplace realities. To effectively develop relevant training material, it is essential to thoroughly understand the organization's unique context, including employees' roles, responsibilities, and daily tasks, by conducting preliminary meetings. To foster effective collaboration between educational and industrial institutions, regular meetings should be held to identify and assess current workforce skill gaps as well as future industry needs. Furthermore, involving current workers from the targeted organization during the design phase enhances the applicability and effectiveness of the training, ensuring that the green skills introduced directly address the organization's evolving sustainability goals. To ensure these skills are effectively integrated and adopted by the trainees, the designer must have an in-depth understanding of the workers' profiles. Using the outcomes of the regular meetings, the training could be adapted to include industry-specific or even company-specific green skills that will be identified. Including this specific training in their curricula will require significantly more time for educational institutions but will be of significant value for the workers that will participate, helping them become significant contributors to

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the support of a sustainable future. In addition, educational institutions should also periodically review and update their curricula to incorporate best practices that actively engage participants and promote sustainability through Systemic Thinking, Critical Thinking, and Problem Framing. Moreover, embedding green skills in the daily activities of trainees and workers while also increasing workers' awareness of current sustainability issues was found to have the greatest impact according to various industry interactions conducted under the GREEN project such as desk research and focus groups. Finally, the training programs conducted for each organisation should be time-efficient, considering the limited availability of workers compared to learners.

The following competence unit and learning outcomes (see Tables 4-5) are designed to support trainers in developing a short workshop on sustainability. These elements serve as a framework to identify key topics to include in the curricula based on the findings from focus groups and the analysis presented in the Green Training Guideline (D3.2). This approach is flexible and can be adapted across all sectors, ensuring relevance and applicability in diverse training contexts. A presentation containing guidance for all trainers teaching sustainability can be found in Annex 2.

Table 4. *Example of a competence unit for the industrial sector (trainee's edition)*

Cross-Sectoral Competence Unit FOR A GREENER TOMORROW: TRAINEE´S EDITION	CONTACT HOURS*	WORKLOAD
SUBJECT TITLE		
Introduction to Sustainability	1	2
Circular economy principles	1	2
Waste management	1	2
Measuring and assessing environmental impact	1	2
Total	4	8
CREDITS	0	

*These are recommended contact hours, which must be adjusted to the learning context and environment.

Table 5. *Learning outcomes for the cross-sectorial competence unit "For a greener tomorrow: Trainee's edition*

FOR A GREENER TOMORROW: TRAINEE´S EDITION	
COMPETENCE UNIT	LEARNING OUTCOMES
KNOWLEDGE	Factual and theoretical knowledge of the principles and applicability of: • Understand the core principles and importance of sustainability • Recognize the role of green thinking in the industry. • Comprehend the impact of industrial activities on sustainable development • Knows waste reduction techniques and comprehends the importance of recycling and reuse • Understands the need to incorporate environmental impact assessment in the workplace

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SKILLS	• Promote sustainable practices within the organization • Identify opportunities for implementing circular economy models within the organization • Promote and apply a zero-waste attitude in the workplace • Apply methods and tools to reduce carbon footprint.

4.2 Example – Introduction to Sustainability

Objective: By linking SDGs to specific sector/professional profiles, students and workers will better understand the concrete steps they can take within their roles to contribute to global sustainability goals. The game encourages them to reflect on how their choices, projects, or innovations affect the SDGs, creating a deeper sense of responsibility and purpose in their work.

The following exercise is an adaptation from the Sustainable Development Goals board game, "Go Goals!" which was created and designed by the United Nations Regional Information Centre (UNRIC), in partnership with the artist Yacine Ait Kaci (YAK), creator of Elyx. The adaptation was made in the scope of the GreenWeld project. Participants will be asked questions related to AM and Welding in the context of SDGs. In the end the players have learned that it not possible to tackle all SDGs at once, some are closer to their area of intervention than others, alone they will not be able to achieve them, time is a finite resource and action is urgent, there will be pioneers who will need to lead the way.

Figure 3. *Gaming board of the adapted version of the Sustainable Development Goals board game, "Go Goals!"*

Game Overview: The SDG Go-Goals game can be customized to include sector-specific questions and challenges, helping participants understand how their work aligns with, supports, or potentially hinders the achievement of the 17 SDGs. This will bring greater relevance to each player, connecting the broader goals to their day-to-day actions and responsibilities.

Setup:

1. Divide participants into small groups.
2. Each group or individual will have a Token and play at a time rolling the dice
3. Every time a token falls into an SDG space, it needs to answer a question.

Scoring System: When answering questions, participants will score points based on the correct answer.

Reflection and Impact Mapping: After completing a round, each group should place their answered

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SDGs on a chart or impact map.

Cross-Sector Discussion: Once the game concludes, bring all groups together for a larger discussion. Have each group briefly explain the connections they identified between their role and the SDGs. This promotes understanding and highlights areas where we can work together to amplify their impact.

As an example: addressing SDG 1, prepare a Quiz as in Figure 4.

To be played individually, with a cooperative approach. Each participant has a token, but the goal is to fulfil a set of challenges, joining efforts from all players as a group. This adaptation is of special interest to play with participants from the same organization.

1. Every time a token falls into an SDG space, the participant should propose a proposal of action to support this SDG in their organization.
2. The rest of the team can support the participants, providing information on the targets of the SDG, and helping to develop a proposal.
3. This can be combined by introducing questions in some of the other spaces of the game
4. At the end of the game, the group will have collected a list of possible actions to develop in their organization, addressed at supporting SDG
5. This list can be used to select sustainability measures to be better described, and categorized in other working sessions

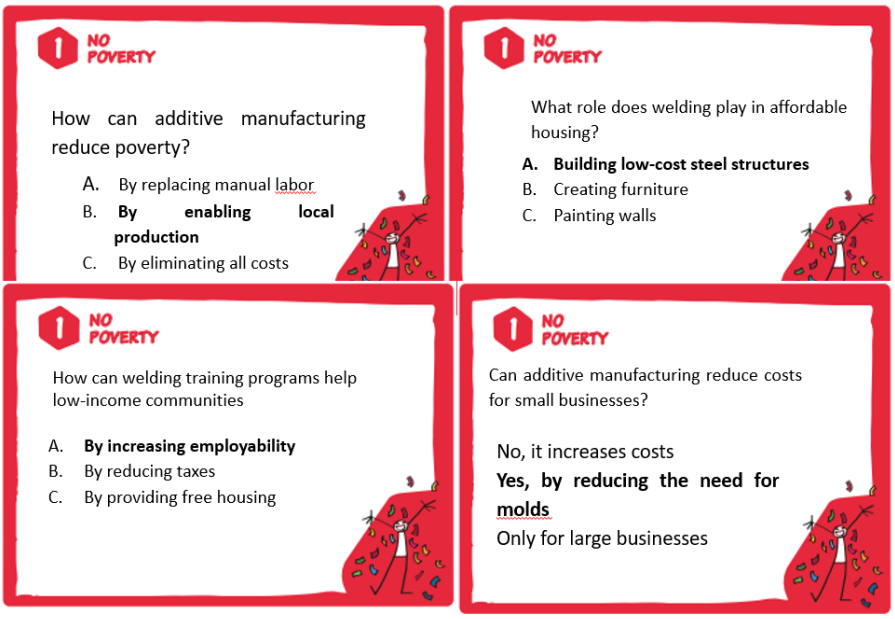

Figure 4. *Examples of questions used for SDG1-No Poverty*

Example of customization - Industrial pilot in Spain

The game was specifically designed to engage participants with all 17 SDGs by encouraging them to propose actionable measures they could apply in their daily professional lives. Conducted in small teams of five and limited to a 45-minute session, the activity fostered meaningful debate and reflection, resulting in 51 practical ideas tailored to an engineering office environment. This customized approach successfully raised awareness, strengthened collective responsibility, and helped participants link green skills to real-world actions at both individual and team levels. Participants left the session with a clearer understanding of the importance of green skills, practical strategies to reduce environmental impact, and a genuine interest in making sustainable contributions. To reinforce their commitment, each participant signed a personal commitment, establishing a foundation for long-term engagement and future follow-up.

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4.3 Example – Circular economy principles

Objective: By the end of the activity, participants will be able to explain the principles and benefits of a circular economy, recognize the environmental drawbacks of the current linear economic model, apply the 7Rs model to extend the lifecycle of products and improve sustainability in their work environments. This activity aims to introduce participants to the principles of a circular economy, emphasizing its benefits and the importance of transitioning from a linear to a circular model. Through engaging discussions, informative videos, and real-life examples, participants will gain a clear understanding of how circular economy principles can extend the lifecycle of everyday products and working environments. By the end of the activity, participants will think creatively about implementing these principles in their contexts.

Outline:

- **Introduction to the Current Economic Model and Its Environmental Impact:** Begin with a brief overview of the traditional linear economic model and its detrimental effects on the environment. Highlight the need for a shift to sustainable practices.
- **Video Presentation and Discussion:** Show a short, informative video explaining the principles of a circular economy. Facilitate a group discussion to reflect on the key messages of the video and encourage participants to share their thoughts and insights.
- **The 7Rs Model Application:** Introduce the 7Rs of a circular economy (Reduce, Reuse, Recycle, Repair, Refurbish, Remanufacture, and Rethink). Challenge participants to brainstorm practical ways to apply these principles in their workplace or daily routines. Provide enough time for discussion and exchange of ideas.
- **Actions for Transitioning to a Circular Economy:** Conclude by discussing actionable steps and strategies to promote a successful transition to a circular economy. Encourage participants to consider how they can contribute to this change individually and collectively.

A brief presentation containing this material can be found in Annex 2.

4.4 Example – Waste management

Objective: By the end of this activity, participants will understand the basics of waste management and its critical role in promoting sustainability. They will be able to accurately identify and sort various types of waste into appropriate categories, recognizing common barriers that hinder the recycling of certain products. Additionally, participants will propose practical solutions to address these recycling challenges. Finally, they will analyse key drivers shaping the future of waste management and clearly identify their roles in fostering positive and meaningful change.

This activity is designed to inform participants about waste management processes and the reasons some products cannot be recycled. Through an introduction, an engaging waste-sorting activity, and a thought-provoking discussion, participants will develop a deeper understanding of current waste management practices. The activity aims to raise awareness about the importance of proper waste sorting and equip participants with the knowledge to choose and use products that can be recycled.

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Outline:

- Introduction to Waste Management and Its Importance: Begin with a brief overview of waste management, highlighting its environmental and societal importance. Explain how proper waste disposal and recycling contribute to sustainability.
- Waste Sorting Activity: Engage participants in a hands-on waste-sorting exercise. Present various items and challenge participants to decide which bin each item belongs to (e.g., recyclable, organic, e-waste). This activity will improve participants' understanding of waste categories and sorting requirements.
- Discussion on Recycling Challenges: Facilitate a discussion about the factors that prevent certain products from being recycled, such as material composition, contamination, or lack of recycling infrastructure. Encourage participants to brainstorm ways to minimize the use of non-recyclable materials or explore alternative solutions for handling these items.
- Drivers of Change in the Waste Management Sector: Conclude the activity by analysing the key drivers of change in waste management, such as technological advancements, policy shifts, or societal behaviours. Discuss how participants can contribute to or adapt to these changes.

A presentation containing this material can be found in Annex 2.

4.5 Example - Measuring and assessing environmental impact

Example 1: Ecological Footprint Calculator

This activity introduces the concept of the ecological footprint and involves participants in calculating it. It concludes with a debate about the best practices to reduce our ecological footprint. There are several websites available to calculate our ecological footprint, helping us to understand the environmental impact of our lifestyle and identify ways to improve it.

Example: https://www.footprintcalculator.org/home/en . This website is available in English, Deutsch, Spanish, French, Italian, Portuguese, Hindi, and simplified Chinese, and it also provides graphics and allows users to add details to improve accuracy. Results are expressed in the number of planets that would be necessary to support his lifestyle.

1. Introduction (15 minutes)

- **Explanation of the Concept:** The facilitator will start by explaining what the ecological footprint is and the concept of biocapacity, emphasizing the impact of everyday activities on the environment.
- **Calculation Method:** Introduce the basic method of calculating an ecological footprint, providing examples of common activities (e.g., transports, electricity/water use, food consumption, clothes, etc) and their associated carbon emissions, use of land and water, and energy. We recommend giving information sheets with this data.

2. Personal Calculation (20 minutes)

- The calculation is done by answering the questions on the online calculator, individually or in groups.

3. Group Discussion (25 minutes)

- **Sharing Results:** Participants will share their calculated ecological footprints with the group.

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Each participant will write their total footprint on a large board or flip chart.

- **Reflection:** The facilitator will lead a discussion on the findings. Participants will reflect on which activities contributed the most to their ecological footprint and discuss potential changes they can make to reduce it.
- **Collective Impact:** Emphasize the collective impact of small changes by showing how even minor adjustments in daily habits can significantly reduce the overall ecological footprint.

4. Conclusion: The activity concludes with a summary of the key points discussed and a reminder of the importance of reducing our ecological footprint. Participants will be shown some websites where they can find additional information or watch videos. Participants will be encouraged to share what they have learned with their families and friends to amplify the impact of the educational activity.

Example 2: Measuring the environmental impact of buildings and techno-economic analysis of sustainable heating and cooling technologies in buildings

The main objective is for students to critically assess the techno-economic feasibility of sustainable heating and cooling systems, considering factors such as operational and installation costs, seasonal performance, lifecycle analysis, and levelized cost of heat. This teaching approach aims to develop students' critical thinking, systems thinking, and problem-framing skills by engaging them in the evaluation of sustainable heating and cooling technologies, particularly focusing on heat pumps. Students are encouraged to explore how different variables, such as climate, thermal loss coefficients, and domestic hot water consumption affect building energy demand and the performance of sustainable technologies. By identifying key issues such as payback periods, efficiency under different seasonal conditions, and the limitations of current housing infrastructure, students learn to frame problems in real-world contexts.

Students research and present solutions using tools like Excel to analyse costs and performance across different climates and building types. Real-world examples are used to spark discussion on policy incentives, governance, and ESG (Environmental, Social, and Governance) aspects, emphasizing the broader impact of sustainable technologies. Environmental benefits include reduced energy consumption and lower greenhouse gas emissions, while social aspects focus on equity, affordability, and community health. Governance topics such as ethical standards, regulatory compliance, and stakeholder engagement are also incorporated to provide a comprehensive understanding of sustainability challenges and solutions in the energy sector. As part of their learning, students are taught how to measure energy consumption in buildings, gaining hands-on experience in understanding where and how energy is used.

This practical component helps them connect theoretical knowledge with real-world applications. They also explore how renovations and upgrades, such as improved insulation, window replacements, or more efficient heating systems, can significantly reduce energy losses and improve overall building performance.

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5 Conclusion

The examples and guidelines developed for the competence units presented in the Green Training Toolkit (i.e. “Pedagogical Practices for a Greener Tomorrow: Trainer’s Edition” and the “Cross-Sectorial Competence Unit: Trainee’s Edition”) provide a structured and strategic foundation for embedding sustainability into education and vocational training. These units are designed to address the needs of both trainers and trainees, enabling trainers to use effective teaching methods while equipping trainees with fundamental knowledge and skills essential for the green transition.

The trainer-focused unit offers a comprehensive framework that promotes active peer learning, the integration of green thinking into curricula, and the development of sustainability-driven pedagogical strategies. It also includes an experiential, competence-oriented session, which further reinforces hands-on learning and the practical application of green principles. Meanwhile, the cross-sectorial unit for trainees delivers core sustainability topics such as circular economy principles, waste management, and environmental impact assessment, laying the groundwork for more specialized or sector-specific training. Together, these units serve not only as independent educational components but also as adaptable independent modules that can be tailored across sectors. They reflect the multidimensional nature of green skills combining environmental, digital, and transversal competencies and align closely with the GreenComp framework, particularly the area of “Embracing Complexity in Sustainability.” All examples shared by the current members of the Green VET Network are shared in Annex 1 of this document.

In the long term, the Green Training Toolkit will continue to evolve to meet the changing needs of society and support a sustainable future. By embedding the complexity and dynamic nature of sustainability into education, it will serve as a flexible and scalable platform. Its modular design allows for future enhancement through collaboration with external stakeholders, including both universities and VET institutions, while also meeting with industrial partners to integrate green thinking into the daily life of their workers. By incorporating additional materials, real-world case studies, and innovative practices from partner organizations, the toolkit can act as a guideline for trainers to integrate green skills into their curricula. Moreover, the peer learning methodology embedded in the trainer’s competence unit ensures a continuous feedback loop, supporting the organic growth and refinement of teaching practices.

As sustainability challenges become increasingly complex and dynamic, educational strategies must also continuously evolve to effectively address them. By promoting systems thinking and critical reflection and integrating green and digital skills, the toolkit serves as a critical framework for developing an adaptive, future-oriented workforce. Such an approach ensures that workers are not only equipped to respond to emerging sustainability demands but are also empowered to lead transformative change toward sustainable development.

6 References

[1] OECD, E.C. for the D. of V. Training, Greener Skills and Jobs, (2014). https://www.oecd-ilibrary.org/content/publication/9789264208704-en.

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[2] Directorate-General for Employment, Social Affairs and Inclusion, ESCO, (2024). https://esco.ec.europa.eu/en (accessed July 11, 2024).

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Annex 1 - Work Sheets

The following annex is used to include all the best practices used to support trainers in the acquisition of green skills. The best practices were shared between the educational institutions included in the project (CETMAR, EWF, MERCANTEC, UCY, VSB) and the external partners that became part of the GREEN VET Network during the Train-the-Trainers session. The partners that participated were ISQ, Universidade da Coruña, Academia de Formação, (ATEC), AMbitious, CIFP Ferrolterra and Public School of Advanced Vocational Training SAEK Egaleo.

A1 - Top ten items in beach litter

Context/ Framework	Educational and awareness material was developed by CETMAR for the Clean Atlantic project. It can be used in formal and non-formal contexts to raise awareness on the persistence of litter in the marine environment.
Target group	This activity is designed to be adaptable for all ages, from elementary to high school students and adult education. In this case, it was developed with a heterogeneous group, including teachers and project managers, in the Train the Trainers session of the GREEN project – Nicosia 2024
Learning Outcomes	The most relevant Learning Outcomes are: • Acknowledge the impact of litter on the marine environment and point out best practices to reduce it. • Ability to identify the most common types of plastic single-use litter items found on beaches.
Impact	This activity fosters observation skills and collaboration among participants, promoting the adoption of more sustainable practices in daily life.
Activity Description	A box filled with beach sand in which the top-ten single-use plastic items are buried is shown to the audience. Participants are invited to dig in the sand with their hands while having their eyes covered, looking for plastic items. Once they find something, they are asked to identify it by touch. After the identification, the eye coverer can be removed, and the facilitator starts a debate with the participants about the number of this type of item in marine litter (ranking it in the top-ten list of single-use plastic items) and the duration they guess that this item may have in the marine environment. The discussion can also focus on the origin of these pieces of litter and best practices to avoid their arrival in the natural environment. **1. Introduction (5 - 10 minutes)** • **Explanation of the Problem:** The facilitator will start by briefly explaining the problem of marine litter and its impact on the environment, marine life, and human health. Some of the most impactful materials found on beaches

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	can be shown during this presentation (very old bottles with the date of the product) **2. Sand Search (15 -20 minutes or more)** • **Preparation:** Request a group of volunteers to dig in the sand boxes and cover their eyes. • **Search:** Participants will search for the debris in the sand, and once they find something, they will try to identify it by touch. The observers can support them. • **Group Discussion:** Once all objects are found, the facilitator launches a debate with the whole group, asking questions as: ○ *How frequently do you think we find this item on the beach? (From 1 to 10, 1 is the most abundant, and 10 is the least).* ○ *How much time do you think it can last in the marine environment?* ○ *How do you think this item has arrived at the beach? (i.e. have you ever seen someone cleaning his or her ears on the beach?)* ○ *How could we avoid the arrival of this item in the natural environment? Could/should we replace it with a re-usable item?* • **CONCLUSIONS:** The activity concludes with a reminder of the importance of caring for our beaches and oceans. The principle of 5 R to promote sustainability is presented: refuse, reduce, reuse, repair & recycle**.** Examples of how they can develop these in their daily life are discussed. • Participants will be shown some websites where they can find additional information or watch videos. They are also invited to share what they have learned with their families and friends to broaden the impact of the educational activity.
Materials/Resources	1 - **CleanAtlantic project Factsheets** about the Top ten single-use plastic items found in European beaches. The folder also includes some supporting materials to illustrate the activity in the following languages: • English: https://www.cleanatlantic.eu/wp-content/uploads/2019/07/ENG-V2.zip • Spanish: https://www.cleanatlantic.eu/wp-content/uploads/2019/07/ES-V2.zip • Galician: https://www.cleanatlantic.eu/wp-content/uploads/2019/07/GAL-V2.zip • French: https://www.cleanatlantic.eu/wp-content/uploads/2019/07/FR-V2.zip • Portuguese: https://www.cleanatlantic.eu/wp-content/uploads/2019/08/PT.zip 2 - **One or more boxes with sand** (if possible, beach sand; please note that you may require permission to extract it from nature; commercial garden sand is also suitable). The boxes should be big enough to dig on them with the hands. Depending on the number of participants and the size and number of boxes, the experience can be run with several persons at the same time. 3- **Several types of commonly found beach debris** to dig in the sand box (straws, cups, cigarette butts, cotton bud sticks, cutlery, plastic bottles, plastic bags, wet wipes, caps and lid sand plastic bottles). Further litter items can be used to present the type of materials found in beaches during the introduction. 4_**Eye coverers** (2 to 4, depending on the number of volunteers participating at

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	the same time) 5_Notebooks and pencils for notes (optional, depending on the age group)
Allocated Time 	It's suggested a minimum of 20 minutes, extendable up to 1 hour.
Recommendations 	Sand should not be removed from beaches unless there is a specific permit, so another type of sand should be used for this activity. The activity can be combined with a field trip to the beach to collect the marine litter, so this time and the necessary resources to reach the beach should be added when organizing the activity A 3rd point could be added in the description of the activity to promote: • **Individual Reflection:** Participants will write down their reflections on what they learned, how they feel about it, and what actions they can take in their daily lives to reduce marine debris. • **Plenary Discussion:** Gather all groups to discuss individual and group reflections. The facilitator will promote a discussion on possible solutions and actions that can be implemented personally and within the community to reduce beach debris. A 4th point could also be included in the description of the activity to evaluate the performance of the participants: • **Active Participation:** Evaluate the active participation and enthusiasm of participants during the search and discussions. • **Understanding of Concepts:** Through questions and answers, verify that participants have understood the impact of each type of debris. • **Action Proposals:** Assess the ideas and proposals from participants to reduce marine debris and their personal commitment to the environment.
Organization/ Authors 	CETMAR - Centro Tecnológico del Mar

A2 - Ecological Footprint Calculator

Context/ Framework 	It can be used in a classroom, in person or online, in a partner's project meeting, and any learning or research centre/situation. This activity can be done individually or in groups. It can also be proposed to online participants during hybrid events while the in-person participants engage in activities requiring physical presence.

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Target group 	This activity is accessible for people with elementary calculation and IT knowledge. In this case, it was developed with a heterogeneous group, including teachers and project managers, in the Train the Trainers session of the GREEN project – Nicosia 2024 .
Learning Outcomes 	The most relevant Learning Outcomes are: • Acknowledgement of the concept of the ecological footprint and best practices to reduce it. • Ability to identify our daily life activities impacting the most in the environment and how to modify them to minimize our footprint.
Impact 	Raise awareness among students/participants about the concept of ecological footprint and help them understand how their daily activities contribute to it. The impact can be seen in the skills and knowledge improvement to: 1. Define and explain the concept of ecological footprint. 2. Teach participants how to calculate their personal ecological footprint. 3. Encourage self-reflection on daily habits and their environmental impact. 4. Promote sharing and discussion to foster a collective understanding of ecological footprints. This activity also fosters sharing and discussion among participants, promoting the adoption of more sustainable practices in daily life.
Activity Description 	This activity introduces the concept of the ecological footprint and involves participants in calculating it. It concludes with a debate about the best practices to reduce our ecological footprint. There are several websites available to calculate our ecological footprint, helping us to understand the environmental impact of our lifestyle and identify ways to improve it. Example: https://www.footprintcalculator.org/home/en This website is available in English, Deutsch, Spanish, French, Italian, Portuguese, Hindi, and simplified Chinese, and it also provides graphics and allows to add details to improve accuracy. Results are expressed in the number of planets that would be necessary to support his lifestyle. **1. Introduction (15 minutes)** • **Explanation of the Concept:** The facilitator will start by explaining what the ecological footprint is and the concept of biocapacity, emphasizing the impact of everyday activities on the environment. • **Calculation Method:** Introduce the basic method of calculating an ecological footprint, providing examples of common activities (e.g., transports, electricity/water use, food consumption, clothes, etc) and their associated carbon emissions, use of land and water, and energy. Distribute information sheets with this data. **2. Personal Calculation (20 minutes)** • The calculation is done by answering the questions on the online calculator, either individually or in groups. **3. Group Discussion (25 minutes)** • **Sharing Results:** Participants will share their calculated ecological footprints with the group. Each participant will write their total footprint on a large board or flip chart.

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	• **Reflection:** The facilitator will lead a discussion on the findings. Participants will reflect on which activities contributed the most to their ecological footprint and discuss potential changes they can make to reduce it. • **Collective Impact:** Emphasize the collective impact of small changes by showing how even minor adjustments in daily habits can significantly reduce the overall ecological footprint. **Conclusion:** The activity concludes with a summary of the key points discussed and a reminder of the importance of reducing our ecological footprint. Participants will be shown some websites where they can find additional information or watch videos. Participants will be encouraged to share what they have learned with their families and friends to amplify the impact of the educational activity.
Materials/Resources 	• Computer, smartphone or calculator • Presentation defining the ecological footprint concept, including examples of common activities and their footprint and good practices to reduce it. An example of presentation is available on the Module 2 of the Green Skills Course for VET Teachers Professional Development from the Green diving project (https://green-diving.eu/achievements-results/); available in English, Deutsch, Spanish, Galician, Portuguese and Latvian. A large board or flip chart for group discussion (optional)
Allocated Time 	It's suggested a minimum of 20 minutes, extendable up to 1 hour.
Recommendations 	A 4th point could also be included in the description of the activity to evaluate the performance of the participants: • **Active Participation:** Evaluate the active participation and engagement of participants during the calculations and discussions. • **Understanding of Concepts:** Through questions and answers, verify that participants have understood the concept of ecological footprint and how to calculate it. **Action Proposals:** Assess the ideas and proposals from participants on how to reduce their ecological footprint and their personal commitment to making these changes.
Organization/ Authors 	CETMAR - Centro Tecnológico del Mar

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A3 - Techno-economic analysis of sustainable low-carbon heating and cooling solutions in buildings

Context/ Framework	The transition to sustainable low-carbon heating and cooling solutions in buildings is a vital step toward mitigating climate change and ensuring energy efficiency. This module emphasizes the importance of integrating technological innovation with economic feasibility to promote solutions that are both environmentally and financially sustainable. By fostering a deeper understanding of these approaches, we aim to empower individuals and organizations to make informed decisions that contribute to reducing carbon emissions, achieving energy savings, and supporting the UN's Sustainable Development Goals.
Target group	HE Students Young professionals and engineers Building owners and managers Energy consultants Policy makers / regulators
Learning Outcomes	After this activity students will be able to: • Determine thermal loss coefficient of buildings considering materials, insulation, air tightness, and other factors. • Specify temperature requirements for different building applications. • Estimate heating and cooling degree days for different locations and design days. • Estimate energy consumption for domestic hot water. • Size heating and cooling systems based on building calculations and demand estimates. • Size radiators to ensure adequate heating throughout the year. • Calculate operational costs for low-carbon heating and cooling solutions. • Perform techno-economic comparison of heat pumps vs. boilers. • Analyse available water heat pump options, including costs, thermal capacities, and performance at different water temperatures. • Calculate the seasonal performance of heat pumps for various times of the year and demand settings. • Calculate electrical consumption for heating, cooling, and hot water. • Estimate total consumption and overall coefficient of performance for each heat pump option. • Calculate the payback period for each heating and cooling system option based on current conditions. • Conduct sensitivity analysis considering different boiler efficiencies, taxes, and interest rates. • Calculate the levelized cost of heat (LCOH) for each heat pump option.
Impact	• Participants will gain a deeper understanding of heat pumps, enabling them to make informed decisions about energy-efficient heating and cooling solutions.

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	• By applying their knowledge, participants can help lower energy use and operational costs in their projects. • Effective system design and optimization can lead to substantial savings on energy bills and operational expenses. • Participants can increase awareness about energy efficiency and sustainability, promoting these practices within their communities. • Improved expertise in heat pumps will contribute to the development of better practices and policies in the industry.
Activity Description	In this activity, students explore the role of heat pumps in the context of the energy transition, particularly for meeting heating needs in buildings. The session begins with a brief introduction to the challenge of reducing emissions from space and water heating and the importance of integrating sustainable solutions alongside electricity generation. Students learn the basic principles of how heat pumps work and why they are considered an energy-efficient alternative. They then complete a practical task using Excel to estimate the heating requirements of a single-family home in Cyprus, using real satellite data. Following this, students perform a simple techno-economic comparison of heat pump models from different manufacturers, calculating payback periods based on current fuel and electricity prices. The activity concludes with a class discussion on possible policy measures that could support the adoption of heat pumps, such as subsidies or fuel taxation.
Materials/Resources	• Software (Microsoft Excel) • Online databases (manufacturer and weather websites) • Calculator (calculations) • For presentations, see Annex 2 **Excel files** Part1.xlsx Part2.xlsx
Allocated Time	It's suggested 5 hours activity to reach the mentioned learning outcomes.
Recommendations	• Be proficient in using Excel • Break down complex topics • Engage participants in discussion • Analyse and discuss various policies, prices, taxes and how those affect the comparisons • Encourage group work (different groups can size technologies for different building types)
Organization/ Authors	University of Cyprus / Andreas Olympios

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A4 - Team Competition based on sustainability values

Context/ Framework	Integration of Recommendation 1 of GREEN Project D3.3 – Prompting learners to question the sustainability implications of proposed production solutions considering factors such as resource usage and emissions. This best practice is an example of how a trainer in AM designer training program can integrate green thinking into his/her teaching materials.
Target group	Additive Manufacturing Designers Students
Learning Outcomes	Participants will be able to: • Integrate sustainability principles into their problem solutions. • Critically discuss and decide about the best material to be used in the designing process.
Impact	This exercise will give students an awareness of sustainability principles and will prompt them to use green thinking when solving problems.
Activity Description	**Competition concrete example**: Share the bellow challenge with your students, and ask them for possible solutions: *"Orbea wants to produce a new frame for bikes and asked our centre to come up with a solution. There are two aspects to take into consideration: resource usage and emissions during production. Also, they want to assess the expected lifetime of the frame, as this is expected to last. The team with the best solution package, "resource + emissions + durability" will have its frame further investigated to go onto Orbea's production lines!"*
Materials/Resources	Examples of videos: Openbike is a project by Arquimaña The Top Bicycles Made With 3D Printing For PowerPoint material, see Annex 2
Allocated Time	In the classroom: 1 hour Interaction with company: 3 hours Autonomous project development: 3 months
Recommendations	• Bring cases learners can relate to • Show similar products in the topic and expose the sustainability implication of the change • Identify sustainability principles that do not derive directly from design: example – riding a bike is more sustainable than using a car • Use a challenge/competition to motivate learners • Promote collaborative behaviour and discussion in the students' group
Organization/ Authors	EWF – European Federation for Welding, Joining and Cutting - Rita Bola

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A5 - Life Cycle Approach for Green Automotive

Context/ Framework 	The understanding of the potential environmental impacts and overall sustainable approach is a part of the strategy in the Automotive/mobility ecosystem. The automotive industry is committed to environmental goals, including carbon neutrality by 2050. The shift to green mobility, along with rapid technological developments, is causing an unprecedented transformation of the automotive industry and a restructuring of the overall ecosystem. Life Cycle Assessment Manager's expertise and assessment capabilities contribute to the green transition by driving sustainable decision-making, promoting innovation, and supporting the adoption of environmentally friendly practices throughout the entire life cycle of products and systems. Targeting university students, trainees, and industry practitioners, the training aims to build awareness and competence in sustainability principles, lifecycle analysis, and critical thinking about energy and resource efficiency. Key topics include the foundational principles of life cycle assessment (LCA), its practical application in automotive development, and the nuances of carbon footprint analysis depending on energy sources. The course uses tools like MOOC aLIFEca – a virtual online training and interactive tool from the Alternative Fuels Data Centre to guide learners through case studies and practical exercises.
Target group 	university students trainees trainers practitioners
Learning Outcomes 	The students will: • Be aware of approaches for green automotive. • Be aware of the environmental impact assessment of electric, fuel cell, petrol, or diesel vehicles. • Be more skilled in green transition in automotive. • Understand the basic principles of environmental impact assessment. • Be more familiar with the topics of sustainability and green approaches in the automotive.
Impact 	The concept and critical thinking on green transition in the automotive industry will be developed. The topics of sustainability goals will be introduced, spread and applied into tuition related to the automotive.
Activity Description	The activity objective is to present a lifecycle approach in automotive. It aims to introduce life cycle assessment in the automotive. The activity should start by introducing the topic of life cycle analysis (what it is, why it is used, where it is

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	applied, how to interpret the results and what misunderstandings can occur). The basic terminology should be explained (such as environmental categories, function unit, system boundary, and approach), and practical examples (software tools, case studies) should be presented. It is important to clarify that the carbon footprint of innovative technologies (e.g. Electric vehicles) depends on energy sources. For intensive training, it is possible to use a training aLIFEca: Virtual Online on Life Cycle Assessment in Automotive https://project-alifeca.eu/ and go through its chapters: • Introduction to Life Cycle Assessment and Sustainability • LCA in Automotive: Conventional Fuel Vehicles • LCA in Automotive: Alternative Fuel Vehicles Tools for LCA and Environmental Impact Assessment
Materials/Resources 	• a laptop with an internet connection. If software tools for LCA are available, it will contribute to practical training. • Virtual Open Online Course on Automotive Life Cycle Assessment (aLIFEca), https://project-alifeca.eu/ • an LCA tool of Alternative Fuels Data Centre, https://afdc.energy.gov/vehicles/electric-emissions Life Cycle Assessment Interactive Tool, https://www.greenncap.com/lca-tool/
Allocated Time 	2 hours for the introduction of green transition in automotive and sustainability goals, 16 hours for MOOC aLIFEca 8 hours for other materials and resources at mentioned web sites
Recommendations 	It is recommended to analyse vehicle development as a system that involves raw material extraction, distribution, vehicle production, vehicle operation, vehicle recycling and vehicle disposal. Then, it will implement critical thinking on existing vehicles' development in terms of their energy consumption and resource efficiency. It is recommended to pay attention to energy sources for electricity generation (for illustration, it is recommended to use data provided by the Alternative Fuels Data Centre (AFDC): https://afdc.energy.gov/vehicles/electric-emissions or the interactive tool https://www.greenncap.com/lca-tool/)
Organization/ Authors 	VSB-TUO – Technical University of Ostrava - Simona Jursova

A6 - Demonstrations and simulations of PV systems and battery

Context/ Framework 	Involves the practical demonstration and simulation of photovoltaic (PV) systems and battery storage technologies, utilizing PVsyst software as a primary analytical tool. Within this framework, learners will gain hands-on experience by modelling, simulating, and evaluating different PV configurations, system sizing, energy production, and battery storage integration. This module emphasizes an applied, competence-based approach, enabling participants to practical understand system performance, optimization, and the real-world implications

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	of solar energy solutions through scenario-based simulations and interactive demonstrations in PVsyst.
Target group 	Energy professionals, engineering graduates (civil, mechanical, electrical etc.), renewable energy enthusiasts, people who are interested in installing PV systems in their homes
Learning Outcomes 	Participants will engage in practical exercises using PVsyst software to simulate photovoltaic (PV) systems integrated with battery storage. They will work through different scenarios, comparing system configurations, sizing methodologies, and performance analyses. Through interactive demonstrations, participants will interpret simulation outputs, discuss optimization strategies, and collaboratively identify solutions to enhance system efficiency and sustainability.
Impact 	• **Effectively navigate and utilize PVsyst software** for modelling and simulating photovoltaic (PV) systems and battery storage technologies. • **Evaluate various PV system configurations**, assessing system sizing, expected energy yield, performance ratio, and economic viability. • **Integrate and analyse battery storage solutions** within PV system simulations to determine their impact on energy autonomy and system efficiency. • **Interpret simulation results accurately**, identifying potential issues, optimizing system designs, and proposing appropriate improvements. **Demonstrate competence in scenario-based analysis**, applying practical insights from simulations to real-world decision-making and sustainable energy planning.
Activity Description 	The designed activity significantly enhances participants' practical understanding of photovoltaic (PV) systems and battery storage solutions by providing hands-on experience with PVsyst simulations. By working through realistic scenarios, participants develop the analytical skills needed to optimize renewable energy systems effectively. integrating discussions on Sustainable Development Goals ensures that participants recognize the broader impact of their work, ultimately promoting a sustainability mindset and empowering them to implement meaningful, eco-conscious decisions in their professional roles.
Materials/Resources 	Computer Notebook The user manual can be found in Annex 2.
Allocated Time 	It's suggested that 4 hours activity to reach the mentioned learning outcomes
Recommendations 	It is recommended to explicitly integrate the Sustainable Development Goals (SDGs) into this course by linking practical activities, such as simulations and demonstrations of PV systems and battery storage, to relevant goals, notably SDG 7 (Affordable and Clean Energy), SDG 9 (Industry, Innovation, and Infrastructure), SDG 12 (Responsible Consumption and Production), and SDG 13 (Climate Action). Facilitating reflective discussions and exercises that allow

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	participants to evaluate and articulate how their simulated designs and solutions directly support these global objectives will significantly enhance participants' green thinking. Additionally, encouraging participants to reflect on how their professional practices can actively advance these SDGs will strengthen their commitment to sustainability beyond the course context.
Organization/ Authors	UCY – University of Cyprus - Demetris Marangis

A7 - From GREEN skills and SDG goals to everyday goals

Context/ Framework	Involves a practical review and understanding of the necessity of the green transition. This is based on a basic knowledge of the SDGs and also a way to find more information about the SDGs. Participants are met with an expectation of wanting to use the 21st-century skills in critical thinking, problem-solving, and systems thinking. The goal is that the participants, after the course, can start thinking more sustainably and confidently seek out information on sustainability in the future
Target group	Teachers, Trainees, Students, Sustainable coordinators, Employees
Learning Outcomes	Equipping the European workforce with the necessary skills and knowledge to address the skills gaps and move towards a sustainable future.
Impact	Integrate the green skills, SDGs and the training modules into Vocational Education and Training (VET)
Activity Description	 The session begins with a brief introduction to the purpose and a description of the day's objectives. Follow-up times are agreed upon and scheduled.

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	The first part focuses on providing participants with a fundamental understanding of the necessity of the green transition. They should gain a basic knowledge of the SDGs and know where to find more information. Participants should also learn about critical thinking, problem-solving, and systems thinking. This will help them to start thinking more sustainably during the design phases. It will also empower them to confidently seek out information on sustainability in the future. Participants will start filling out the forms; it's important that they gain a fundamental understanding of the content of the forms and how to complete them. In the follow-up sessions, their progress in the forms will be reviewed, and any questions or uncertainties will be clarified.
Materials/Resources	SDG cards and material to download: Communications materials - United Nations Sustainable Development Access to THE 17 GOALS | Sustainable Development (un.org) Maybe you can find local targets and indicators for the SDGs. Sustainable questions form template: Sdg Form.docx Sustainable questions form with examples: SdgFormExample.docx Critical-, system thinking and problem framing questions form: CriticalThinking and sustainablety Form Ex Critical-, system thinking and problem framing questions form with examples: CriticalThinking and sustainablety Form.dc PPT Presentation (customize for your own workshop or use as it is): A7 - From GREEN skills and SDG goals to everyday goals

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	Train the Trainer.pptx
Allocated Time	5 – 6 hours main course 3 – 4 hours follow-up
Recommendations	Make sure that participants have their own pc to the main course. Send forms and link to SDG after the first part of the day. Keep it digital. **For the trainer:** Ensure that you have the required knowledge and information about the subjects before the workshop.
Organization/ Authors	MERCANTEC, Denmark/ Steen Kongsøre stko@mercantec.dk

A8 - GREEN CAMPUS – Waste Characterization

Context/ Framework	Green Campus is a global action of the university to promote actions in the field of sustainability such as: • Optimization of water and energy consumption. • Reduction of waste generation and selective collection. • Atmospheric, acoustic and light pollution. • Sustainable mobility. • Healthy eating. • Urban Garden • Composting • Social Awareness • Green purchasing, fair trade and responsible consumption. • Participation, awareness and environmental volunteering. • Greening the curriculum in teaching and research
Target group	Bachelor students All university Community
Learning Outcomes	Participants will be able to: • Acknowledge the importance of proper sorting for proper recycling • Read and interpret product recycle labels Identify the impact of bad waste characterization on the recycling process
Impact	• Know the proper characterization of waste and its classification

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	• Know the importance of proper sorting for proper recycling.
Activity Description 	1. **Tour and Observation**: Begin with a guided tour to visit recycling stations around the school. Encourage students to observe the types of waste disposed of, examine how waste is being separated by the school community, and document their findings with photos and notes. 2. **Group Reflection and Discussion**: Back in the classroom, students will work in groups to discuss their observations. They should reflect on any issues they notice with waste sorting, such as misplaced items or lack of clear separation. 3. **Problem Identification and Solution Brainstorming**: Challenge students to identify specific problems with current waste management practices. Encourage them to brainstorm solutions that could improve waste characterisation and promote better recycling habits. 4. **Developing and Implementing an Improvement Plan**: Guide students to create a practical improvement plan, which could include clearer signage, educational campaigns, or reorganizing recycling stations. Support them in implementing these ideas, monitoring their effectiveness, and suggesting adjustments where needed.
Materials/Resources 	Gloves Paper and pen Cameras (or smartphones) worksheets to log different types of waste they observe
Allocated Time 	It's suggested 2 to 4 hours of activity is needed to reach the mentioned learning outcomes
Recommendations 	After the observation, guide students in analysing their findings and identifying areas for improvement. Facilitate a brainstorming session where they can suggest practical solutions, from enhancing signage to organizing educational campaigns. Involve students in the implementation of their improvement plan. Assign roles, such as creating educational posters or giving short presentations, to help them take responsibility for the school's recycling program. This can deepen their commitment to sustainability.
Organization/ Authors 	Universidade da Coruña

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A9 - Energy Efficiency in Buildings

Context/ Framework 	Energy economy
Target group 	VET Students / Renewable Energy Technicians
Learning Outcomes 	Participants will be able to: • Analyse and take into account local circumstances when dealing with sustainability issues. • Correlate primary energy and CO2 emission
Impact 	Students realize the role of primary energy, CO2 emissions and the investment cost, and how important it is to save on energy looking only numbers
Activity Description 	1. Students determine thermal losses and energy needs 2. Upload data on the program 3. Students suggest solutions for building energy upgrades and combination Comparison of their solutions regarding primary energy, CO2 emissions, investment and the payback time.
Materials/Resources 	Building cut our drawings Follow the presentation for trainers, “Sharing Moment: Trainers’ best practices and tools for a successful implementation of training activities in VET and industrial contexts”
Allocated Time 	We suggested a minimum of 4 hours.
Recommendations 	Instead of SW update, there are website available for free calculation. Bill savings simulator | Climate Council For supporting material, see Annex 2.
Organization/ Authors 	SAEK Egaleo/ St. Leivadara & F. Agrafioti

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A10 - Additive Manufacturing training in a virtual reality (VR)

Context/ Framework	To present a sustainable solution for AM training: Interactive training to operate additive manufacturing systems and peripherals
Target group	Age-independent: anyone who wants to improve their skills and knowledge in AM with a focus on metal. From beginners to advanced users (EQF 3 to 5) Industry and research institute employees, students, and trainees
Learning Outcomes	Participants will be able to: Operate in real AM machines after operating in virtually systems very realistically.
Impact	Interactive learning by performing several tasks.
Activity Description	The participants operate several AM Machines to improve their knowledge and skill in the field of additive manufacturing without the need for physical resources.
Materials/Resources	• Digital: Laptop or PC + Login access • VR: Gaming laptop or PC + Login access + VR-glass • New content: (Rendered) CAD data, videos and explanations.
Allocated Time	It is suggested 1 hour minimum
Recommendations	• Use of digitization, virtualization and new software tools • Find **the right balance** between theory, practice and VR • Short break after 20 minutes
Organization/ Authors	Toolcraft AG, Ambitious / Tim Olschewski

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A11 - A commitment to a better World | An SGDs awareness

Context/ Framework	We are going through a critical moment in terms of the sustainability of our planet, which jeopardizes the continuity of future generations and the Earth as we know it. In this sense, we urgently need to change the way we live. But before we adopt more sustainable behaviours or ecological models and practices, it's essential to work on our openness to change in favour of a more integrated and effective change. This activity aims to raise awareness of the SDGs and the urgent need to adopt behaviours that contribute to achieving them.
Target group	With the right adaptations, this type of activity can be applied to everyone, from 8 to 88 years old.
Learning Outcomes	Participants will be able to acknowledge the need to implement sustainable and eco-conscious behaviours into their daily activities in all contexts (work, home, etc.)
Impact	Raise awareness of: • The importance of SDGs The role and responsibility of each one of us in the change needed to ensure the sustainability of the planet
Activity Description	This activity begins with an impactful presentation/video about the consequences that the way we live today has on the planet and how this could jeopardize future generations. It then alerts us to the need to adopt more sustainable behaviours and models and to the importance of SDGs. Peer reflections are then proposed on how organizations and communities can contribute to achieving the SDGs. Finally, an individual reflection is proposed, highlighting the role and responsibility of each of us on this path. To increase individual commitment to this process of change, it is proposed that the result of this individual reflection be placed in an envelope, to be sent by post by the trainer. The aim is to remind everyone of their individual commitment at a later date.
Materials/Resources	Pc/laptop Internet cards/paper Envelopes addressed to learners PPT presentation 7_ISQ_SGDs awareness.pptx
Allocated Time	30 min

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Recommendations 	The impactful messages presented at the beginning must be adjusted to the target audience and the context in which the activity is being developed (a given sector, a specific company...) The questions that guide the proposed reflections should also be adjusted to the intended objectives/level of change.
Organization/ Authors 	ISQ / Lara Serra

A12 - Entrepreneurship Project (a project-based learning approach)

Context/ Framework 	The project consists in the development, during the school year, of a product/service by the trainees. To this end, a framework has been developed that allows them to go through various phases, from ideation to prototyping. One of the main objectives is that the projects developed are meaningful to the trainees and can be implemented in the community where they live, such as at school, in the neighbourhood, or in social, sports or cultural associations. To do this, trainees are challenged to look at the community and identify problems or needs that could be addressed by the projects they will develop. This model aims to develop students' skills such as teamwork, collaboration, critical thinking, problem-solving, autonomy and creativity.
Target group 	1st and 2nd year students from EQF Level 4
Learning Outcomes 	Participants will be able to: · Apply their understanding of the SDGs to real-world contexts. · Apply and enhance their critical thinking and problem-solving skills, identifying and addressing challenges within their projects. Transversely, participants will: · Improve their ability to work effectively within teams, communicate their ideas clearly, manage conflicts constructively, and coordinate tasks to achieve a shared project goal.
Impact 	From this project, we highlight the following positive impacts: · Motivation on the part of the trainees to create something meaningful that can be applied in the community. · Development of communication and teamwork skills. · Application of knowledge in a real context: Deepening their knowledge of the SDGs by applying them to projects.

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Activity Description 	Step 1 - Creating teams - Students form teams of 3 to 5 members Step 2 - Platform registration - Students register on the digital project management platform, in this case, created in the Miro software. On this platform, the teams will find a space with all the instructions for developing the project, as well as a space where they can idealize the project. Step 3 - Brainstorming - Based on the research carried out in the surrounding community and/or the school, as well as the SDGs, the students discuss the ideas that have been formed until they arrive at a final idea that will be materialized in the project they will develop Step 4 - Project development - This is the phase where the project is developed. With the help of trainers from the various areas (technical and non-technical), the trainees develop their products/services. In addition to production, the trainees regularly present reports on the state of development of the projects as well as prepare presentations and communications about them, allowing the mobilization of knowledge acquired in the different curricular areas. Step 5 - Prototyping - Whenever possible, and using the academy's existing resources, students create prototypes of their projects so that they can visualise and present the results of their work to the community in the most real way possible.
Materials/Resources 	Depends on each project that each team wants to develop after the research carried out on the community. As an example of this learning approach
Allocated Time 	Duration can vary based on the chosen project, lasting a full year, a semester, or a designated training period.
Recommendations 	Very clear definition of the project's steps and the roles of everyone involved so that there is no doubt about who has to do what at different times. Giving constant feedback to the students as a way of understanding the status of the projects and gauging the motivation of the trainees.
Organization/ Authors 	ATEC / Tiago Gonçalves

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