Green Growth

Methodological report:

Adopting the circular economy in construction VET centres

Green Growth

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Executive Summary

From the Green Growth project and starting from the basic units that compose it, the training centers take a first step from the project itself with the commitment to move towards a greener construction, towards the use of waste , towards a construction as circular as possible by applying in our centers part of the lessons learned throughout the project.

The Strategic Roadmap for the Upgrading of the Construction Sector Training in Energy Efficiency, Renewable Energy, and Nearly Zero Energy Buildings provides a comprehensive framework for transforming the construction sector in Germany, Spain, Slovenia, Italy and Belgium towards sustainable practices. The roadmap aims to address the challenges faced by the sector in adopting energy-efficient and renewable energy solutions, while promoting the concept of nearly zero energy buildings.

Brief overview of the roadmap's purpose and objectives:

1. Enhancing Skills: The roadmap focuses on improving the skills and knowledge of professionals in the construction sector, including architects, engineers, contractors, and technicians, to effectively integrate energy efficiency and circular economy into the construction projects.

2. Promoting Best Practices: The roadmap promotes the dissemination and adoption of best practices in the construction industry, encouraging the use of sustainable materials, efficient construction techniques, and innovative design approaches.

3. Facilitating Collaboration: The roadmap emphasizes the importance of collaboration between the construction sector and vocational education and training (VET) schools/centers, fostering partnerships to develop and deliver high-quality training programs aligned with industry needs.

4. Supporting Policy Development: The roadmap provides recommendations for policymakers to create an enabling environment through supportive regulations, incentives, and funding schemes that facilitate the widespread adoption of energy-efficient and renewable energy technologies in the construction sector.

Key Highlights:

- Identification of Skill Gaps: The roadmap conducts a comprehensive analysis of the current skills and knowledge gaps in the construction sector related to energy efficiency, and circular economy. This analysis forms the basis for targeted training and capacity-building initiatives.

- Stakeholder Engagement: The roadmap engages key stakeholders, including industry associations, VET schools/centers, government bodies, and industry practitioners, to ensure their active participation in the roadmap's implementation and alignment with industry needs.

- Roadmap Development Process: The roadmap is developed through a rigorous process involving extensive research, benchmarking against international best practices, and stakeholder consultations. This process ensures the roadmap's relevance, effectiveness, and feasibility.

- Prioritized Strategic Actions: The roadmap presents a set of strategic actions and initiatives that are prioritized based on their potential impact and feasibility. These actions cover areas such as curriculum development, training programs, knowledge-sharing platforms, management alternatives and policy recommendations.

- Monitoring and Evaluation: The roadmap includes a robust monitoring and evaluation framework to track the progress and impact of the roadmap's implementation. Regular assessments and feedback loops enable continuous improvement and adaptation of the roadmap's strategies.

By following this roadmap, the construction sector and VET schools/centres can enhance their capacity to meet the challenges of circular economy applied to the VET centres. The roadmap sets a clear path towards a sustainable and resilient construction sector, contributing to overall green growth objectives and the transition to a low-carbon economy.

The low demand for sustainable construction/reform is due, in addition to the high cost, to other causes, such as, mainly, the lack of knowledge about the savings, available materials and techniques, available public subsidies, etc.

This dissemination action would consist of collecting the most interesting and useful information from the ROADMAP for the user on sustainable construction and transmitting it with a pedagogical character.

1. Introduction

1.1 This chapter provides background information on the importance of energy efficiency, renewable energy, and nearly zero energy buildings in the construction sector. It highlights the growing need for sustainable practices in the industry to mitigate climate change, reduce carbon emissions, and promote resource efficiency. The chapter also outlines the challenges faced by the participating countries, namely Spain, Slovenia, Italy, Belgium, and Germany, in achieving energy efficiency and sustainable construction practices.

1.2 The ERASMUS+ Project: GREEN GROWTH: The chapter introduces the ERASMUS+ project, GREEN GROWTH, and provides an overview of its objectives and scope. It explains how the project aims to address the training needs and challenges in the construction sector related to energy efficiency and renewable energy. The project aims to make the **Circular Economy** a cross-cutting subjetc in construction training in order to reduce the industry's CO2 emissions. It is led by Fundación Laboral de la Construcción (Spain) and is being developed together with **six institutions** from five European countries: Germany, Belgium, Italy, Slovenia and Spain.

We also emphasize the importance of international collaboration and knowledge exchange in promoting sustainable practices in vocational education and training (VET) centers.

1.3 Significance of Findings and Recommendations: This section highlights the significance of the project's findings and recommendations. It discusses how the project's research, stakeholder consultations, and best practices have informed the development of the roadmap for upgrading construction sector training. The chapter emphasizes how the roadmap serves as a valuable tool for VET centers across Europe, providing practical guidance and actionable steps for integrating energy efficiency and renewable energy principles into their training programs and centers. It underscores the transformative potential of green vocational schools and their role in driving sustainability in the construction sector.

1.4 Relation to the Last Project Output: The Roadmap: The chapter underlines the importance of the last project output, the roadmap, in guiding the implementation of sustainable practices in VET centers and the construction sector. It highlights how the roadmap consolidates the project's findings, recommendations, and strategic actions into a comprehensive plan for upgrading construction training. The chapter also underscores the roadmap's significance as a resource for other VET centers across Europe, enabling them to embark on a similar journey towards a circular economy and sustainable construction practices.

In summary, this chapter provides an introduction to the project context, highlighting the importance of energy efficiency and renewable energy in the construction sector. It explains the goals of the ERASMUS+ project GREEN GROWTH and its relevance to the participating countries. The chapter also emphasizes the significance of the roadmap as the project's key output and its potential for transforming VET centers and promoting sustainability in the construction industry.

2. Vision, Objectives and Methodology used.

This chapter outlines the methodology used for conducting terrain research focus groups in five European Union (EU) countries: Germany, Spain, Slovenia, Italy, and Belgium. The aim of the focus groups was to gather insights and recommendations for improving construction training centers and promoting circular economy principles within the construction sector. The chapter describes the vision statement, specific objectives, and goals of the research, followed by the detailed methodology employed in conducting the focus groups.

Vision Statement: The vision statement for the construction sector's transformation towards energy efficiency and renewable energy served as the guiding principle for the research. It emphasized the need to integrate circular economy principles into construction training and promote sustainable practices throughout the industry.

Specific Objectives and Goals: The research aimed to achieve the following objectives and goals through the roadmap:

1. Identify common areas for improvement in the delivery of practical training courses.

2. Develop a scheme of improvement proposals based on the findings and recommendations.

3. Design training solutions to promote circular economy principles.

4. Validate the proposals through focus groups composed of professionals from construction training centers.

5. Create a roadmap for the incorporation of circular economy principles in the delivery of construction courses.

Methodology: The methodology employed qualitative social research techniques to capture the approach and viability of initiatives in training centers and construction training. A group of experts with heterogeneous profiles, but focused on enhancing the efficiency of training centers, was assembled. The following steps were followed:

1. Identification of Common Areas for Improvement: A workshop was conducted with the participation of all partners to create a common document, serving as a starting point for generating improvement proposals. This document facilitated the identification of common needs and areas requiring attention.

2. Improvement Proposals Scheme: The information gathered from vocational education and training (VET) providers, along with questionnaire results on training needs in circular economy from blue-collar workers, was analyzed by Sustainum. The analysis resulted in recommendations covering various topics, such as identifying common needs, workshop management improvements, waste management, and material recycling, including economic considerations.

3. Training Solutions for Circular Economy Principles: Each country evaluated the proposals through focus groups consisting of professionals from construction training centers, including representatives from training, procurement, maintenance departments, and trainers involved in practical courses. The focus groups validated the proposals based on their impact and feasibility within their respective centers.

4. Roadmap Creation: The results obtained from the above activities, including the improvement proposals scheme and the validation by focus groups, were used to shape a roadmap for the incorporation of circular economy principles in the delivery of construction courses. The roadmap encompassed priorities of training needs, awareness and dissemination actions, and recommendations for improvement.

5. Validation and Feedback: To ensure the relevance and feasibility of the proposals, the focus groups from all five countries came together to validate them in terms of impact and ease of implementation in their centers. The feedback collected from the focus groups was shared with CCIS CCBMIS in Slovenia and SUSTANIUM in Germany.

Conclusion: The methodology employed a comprehensive approach, combining workshops, analysis, validation through focus groups, and collaboration between partner organizations. This facilitated the development of improvement proposals,

training solutions, and a roadmap for the integration of circular economy principles into the delivery of construction courses. The chapter provided an overview of the research methodology used in each EU country, paving the way for promoting sustainable practices and enhancing the circularity of the construction sector.

3. Terrain outcomes and validation – Focus Groups Findings

This chapter presents the results and validation of field research (focus groups) carried out in the five EU countries: Germany, Spain, Slovenia, Italy, and Belgium. The focus group findings are analyzed to identify and describe key stakeholders in the construction sector and vocational education and training (VET) schools/centers. Furthermore, their roles, interests, and potential contributions to the implementation of the roadmap are examined. The chapter also highlights the different approaches and solutions implemented by VET center consortium staff and external representatives from other VET centers.

3.1 Identification and Description of Key Stakeholders: This section provides an overview of the key stakeholders involved in the construction sector and VET schools/centers. Stakeholders may include construction companies, public institutions, educational institutions, trainers, students, industry associations, and regulatory bodies. Each stakeholder's role, interests, and potential contributions to the implementation of the roadmap are examined in detail. The aim is to create a comprehensive understanding of the diverse stakeholders and their significance in driving sustainable practices within the construction sector.

3.2 Analysis of Stakeholders' Roles, Interests, and Contributions: In this section, the roles, interests, and potential contributions of key stakeholders are analyzed in relation to the implementation of the roadmap. Stakeholders' perspectives, expertise, and resources are considered to determine how they can actively contribute to promoting circular economy principles in construction training. The analysis focuses on identifying potential synergies and collaborations between stakeholders to maximize the impact of the roadmap and foster a sustainable construction industry.

3.3 Approaches and Solutions Implemented by VET Center Consortium Staff and External Representatives: This subsection showcases the different approaches and solutions implemented by the VET center consortium staff and external representatives from other VET centers. It highlights the innovative practices, initiatives, and strategies adopted by these stakeholders to integrate circular economy principles into their training programs. Examples of successful implementation, challenges faced, and lessons learned are discussed, providing valuable insights for other VET centers seeking to enhance their sustainability practices.

Conclusion: The terrain outcomes and validation of the focus group findings shed light on the key stakeholders involved in the construction sector and VET schools/centers. The analysis of their roles, interests, and potential contributions

helps to identify opportunities for collaboration and synergy. By showcasing the approaches and solutions implemented by VET center consortium staff and external representatives, this chapter serves as a source of inspiration and practical guidance for implementing circular economy principles in construction training. The findings contribute to the overall goal of fostering a sustainable and circular construction industry across the EU countries involved in the research.

In continuation we introduce the different approaches and solutions that have been taken by VET center consortium staff and external invited other VET center staff representative.

4. Analysis of Training Needs

Focuses on the analysis of training needs in the construction sector, specifically related to circular management of the VET centres. Assessing the current skills and knowledge gaps within the sector. Proceeding to identify specific training needs and requirements for different professional profiles involved in the construction industry.

4.1 Assessment of Current Skills and Knowledge Gaps: In this section, an assessment is conducted to determine the existing skills and knowledge gaps in the construction sector. The assessment takes into account the evolving nature of the industry and the need for professionals to adapt to new energy efficiency standards, renewable energy technologies, and nearly zero energy building practices. Through surveys, interviews, and data analysis, the current state of skills and knowledge in the sector is examined, highlighting areas where improvement is needed.

4.2 Identification of Training Needs and Requirements: Building upon the assessment conducted in the previous section, this section identifies specific training needs and requirements for different professional profiles within the construction sector. The aim is to pinpoint the skills, knowledge, and competencies that professionals should possess to effectively contribute to energy efficiency, renewable energy integration, and the construction of nearly zero energy buildings. The identified training needs will serve as a foundation for developing tailored training programs and courses.

4.3 Tailoring Training Programs to Address Identified Needs: Once the training needs and requirements are identified, this section explores strategies for tailoring training programs to address the identified gaps. It discusses the importance of designing comprehensive and targeted training initiatives that cater to the diverse professional profiles within the construction sector. The chapter also highlights the significance of incorporating hands-on practical training, theoretical knowledge, and experiential learning opportunities to enhance the effectiveness of the training programs.

4.4 . Collaborative Approaches and Stakeholder Involvement: This section emphasizes the importance of collaborative approaches and stakeholder involvement in addressing training needs within the construction sector. It highlights the role of public institutions, educational institutions, construction companies, industry associations, and other relevant stakeholders in supporting and delivering the

required training programs. The chapter explores potential partnerships and collaborations that can foster knowledge exchange, shared resources, and joint efforts in promoting sustainable practices through effective training.

Conclusion: The analysis of training needs provides valuable insights into the skills and knowledge gaps within the construction sector related to energy efficiency, renewable energy, and nearly zero energy buildings. By identifying specific training requirements for different professional profiles, this chapter serves as a basis for developing targeted and effective training programs. The chapter emphasizes the importance of collaborative approaches and stakeholder involvement in addressing these needs and fostering a skilled workforce capable of driving sustainable practices in the construction industry.

5. Roadmap Development Process

Outlines the methodology used in the roadmap for the incorporation of circular economy principles in the construction sector's training practices. It describes the various steps taken, including stakeholder consultations, research, and the incorporation of best practices. Additionally, provides an overview of the timeline and key milestones for the implementation of the roadmap.

5.1 Methodology for Roadmap Development: In this section, the methodology employed for developing the roadmap is described in detail. It highlights the importance of stakeholder consultations and their active involvement in shaping the roadmap. The chapter explains how input from construction sector stakeholders, vocational education and training (VET) schools/centers, and other relevant actors was gathered through workshops, interviews, and surveys. The methodology also includes an extensive research component, examining existing frameworks, policies, and best practices in circular economy training within the construction sector.

5.2 Stakeholder Consultations: This section delves into the stakeholder consultations conducted during the roadmap development process. It outlines the key stakeholders involved, such as representatives from VET schools/centers, construction companies, public institutions, industry associations, and sustainability experts. The chapter discusses how their input and insights were collected through workshops, focus groups, and individual interviews. It emphasizes the collaborative nature of the consultations and the efforts made to ensure diverse perspectives and expertise were incorporated into the roadmap.

5.3 Research and Best Practices: In this section, the chapter highlights the importance of research and the integration of best practices in developing the roadmap. It describes the comprehensive review of existing literature, frameworks, and policies related to circular economy principles in the construction sector's training practices. The chapter also explores successful case studies and examples of best practices from both national and international contexts. These research findings and best practices were analyzed and adapted to suit the specific needs and context of the five EU countries involved.

5.4 Timeline and Milestones: This section provides an overview of the timeline and key milestones for the implementation of the roadmap. It outlines the different phases and activities planned, along with their anticipated timeframes. The chapter highlights the iterative nature of the roadmap's development, emphasizing the need for regular review and adaptation to ensure its effectiveness and relevance over time. The milestones serve as guideposts for monitoring progress and assessing the achievement of specific objectives and goals outlined in the roadmap.

Conclusion: The roadmap development process employed a robust methodology that incorporated stakeholder consultations, research, and best practices. The collaborative nature of the process ensured that diverse perspectives and expertise were considered, resulting in a comprehensive roadmap for the incorporation of circular economy principles in the construction sector's training practices. The timeline and milestones outlined in this chapter provide a structured framework for the implementation of the roadmap, enabling tracking of progress and the realization of the desired transformation in the construction sector's training approaches.

6. Strategic Actions and Priorities

The priorities of training needs are identified, and the actions are prioritized based on their potential impact and feasibility. This chapter outlines the key steps to be taken in order to achieve the objectives and goals set forth in the roadmap.

6.1 Priorities of Training Needs: In this section, the chapter highlights the priorities of training needs identified through extensive research, stakeholder consultations, and assessments of the current skills and knowledge gaps in the construction sector. It outlines the specific areas where training is needed to enhance energy efficiency, utilize renewable energy sources, and promote the concept of nearly Zero Energy Buildings. These priorities serve as a foundation for the strategic actions and initiatives that will be undertaken.

6.2 Strategic Actions and Initiatives: This section presents a comprehensive list of strategic actions and initiatives that are crucial for upgrading the construction sector's training in EE, RES, and nZEB. Each action is described in detail, outlining its objectives, expected outcomes, and key activities involved. The actions encompass various aspects, including curriculum development, training program enhancements, capacity building, collaboration with industry stakeholders, and the integration of practical experiences and case studies.

6.3 Prioritization of Actions: To effectively allocate resources and prioritize efforts, the chapter discusses the prioritization of the strategic actions and initiatives. A systematic approach is employed, considering both the potential impact and feasibility of each action. The potential impact refers to the magnitude of the expected benefits and outcomes, while feasibility assesses the practicality and attainability of implementing the action within the given context. The chapter provides insights into the decision-making process and criteria used to determine the prioritization of actions.

6.4 Implementation Framework: This section outlines an implementation framework for the strategic actions and initiatives. It highlights the need for collaboration among various stakeholders, including VET schools/centers, construction companies, public institutions, industry associations, and sustainability experts. The chapter emphasizes the importance of setting clear objectives, establishing timelines and responsibilities, and monitoring progress throughout the implementation process. It also addresses potential challenges and suggests mitigation strategies to ensure successful execution.

Conclusion: The strategic actions and priorities identified in this chapter provide a roadmap for upgrading the construction sector's training in energy efficiency, renewable energy sources, and nearly Zero Energy Buildings. By addressing the identified training needs and focusing on high-impact and feasible actions, the construction sector can enhance its capacity to meet sustainability goals and contribute to a greener and more energy-efficient future. The implementation framework serves as a guide for stakeholders to collaborate and work towards achieving the objectives and goals outlined in the roadmap.

7. Implementation and Monitoring

This chapter outlines the guidelines for implementing the roadmap developed for improving energy efficiency and renewable energy training in the construction sector. It defines the responsibilities, resources and coordination mechanisms needed for effective implementation. The chapter also discusses the monitoring and evaluation criteria to assess the progress and effectiveness of the Roadmap. In addition, it highlights the awareness-raising and transformation potential of vocational training centres (VET) and presents strategies for awareness-raising and dissemination activities to promote the transition to a sustainable construction industry.

7.1 Guidelines for implementation: This section provides guidelines to support the implementation of the Roadmap. It defines the roles and responsibilities of the different actors involved, including VET centres, public institutions, industry associations and other relevant organisations. The chapter highlights the need for coordination and cooperation between these actors to ensure a coherent and effective implementation process. It also discusses the allocation of financial and human resources and emphasises the importance of developing a clear implementation plan with defined timelines and milestones.

7.2 Monitoring and evaluation: Monitoring and evaluation criteria are identified to track the progress and effectiveness of the Roadmap. This section defines key performance indicators (KPIs) and metrics to measure the results and impact of the actions implemented. It emphasises the need for regular monitoring and evaluation to identify any gaps or areas that require adjustments or additional support. The chapter also highlights the importance of feedback loops and continuous improvement in the implementation process.

7.3 VET Centres Awareness and Transformation Potential: This section addresses the awareness and transformation potential of the VET Centres in the building sector. It highlights the importance of the VET centres as a driver for change and

innovation in training practise. The chapter discusses the need to raise awareness of the importance of energy efficiency, renewable energy and sustainable construction practises among the staff, trainers and learners of the VET centres. It highlights the potential of VET centres to serve as models of sustainability and presents examples of good practise and success stories.

7.4 Awareness and dissemination activities (ACD): To promote the transition to a sustainable construction industry, this section focuses on defining the content, format and frequency of awareness-raising and dissemination activities. Stakeholder awareness-raising strategies are presented, including workshops, seminars, webinars and training programmes. The chapter also emphasises the importance of using different communication channels such as websites, social media, newsletters and industry events to disseminate information and share knowledge on sustainable construction practises. It highlights the need for continuous learning and capacity building to support the transformation of the construction sector.

Conclusion: The chapter on implementation and monitoring provides guidance for the effective implementation of the roadmap developed for improving energy efficiency and renewable energy training in the construction sector. By defining responsibilities, allocating resources and establishing coordination mechanisms, stakeholders can work together to achieve the objectives outlined in the Roadmap. Monitoring and evaluation criteria ensure that progress is measured and adjustments are made as needed. Recognising the awareness and transformation potential of VET centres and implementing awareness-raising and dissemination activities can accelerate the transition to a sustainable construction industry.

8. Conclusion

This concluding chapter provides a summary of the key points addressed in the Roadmap for Improving Energy Efficiency and Renewable Energy Training in the Construction Sector. It highlights the actions taken to promote circular-friendly vocational training centres (VET), develop the circular economy skills of trainers and VET managers, raise awareness of the circular economy among VET staff and students, and establish targeted categories and monitoring indicators. In addition, this chapter highlights the importance of international cooperation between VET centres and schools in the construction sector. It concludes with recommendations for continuous improvement in achieving the objectives of the Roadmap.

8.1 Summary of the Roadmap: The Roadmap presents a comprehensive plan for the transition of education practises in the construction sector towards energy efficiency and renewable energy. It emphasised the importance of introducing circular-friendly management approaches in VET centres, improving the circular management skills of trainers and VET managers, and promoting awareness of the circular economy among VET staff and students. The roadmap also identified targeted categories for interventions and set monitoring indicators to track progress and measure the impact of implemented interventions.

8.2 Importance of international collaboration: International collaboration between VET centres and schools in construction is paramount to driving sustainable change in the sector. Sharing best practises, exchanging knowledge and fostering partnerships across borders can accelerate the adoption of energy-efficient and circular construction practises. Joint initiatives can foster innovation, improve capacity building and create a global network of sustainable building education professionals. By working together, VET centres and schools can address common challenges, share resources and help advance the construction industry's sustainability goals.

8.3 Recommendations for continuous improvement: To ensure continuous improvement in achieving the Roadmap goals, several recommendations are made. These recommendations are addressed to public institutions, educational institutions, construction companies and other actors in the construction sector. They go beyond purely educational aspects and encompass broader areas of improvement.

The recommendations include: Strengthen policy support: Public institutions should develop and enforce policies that promote energy efficiency, renewable energy and circular economy in the construction sector. These policies should incentivise training centres and companies to adopt sustainable practises and provide financial support for capacity building and innovation.

-Cooperation and knowledge exchange: Educational institutions and construction companies should actively participate in international cooperation and knowledge exchange initiatives. This includes participation in conferences, workshops and networks to share best practises, learn from each other's experiences and promote innovation in sustainable construction education.

-Industry involvement: Construction companies should be actively involved in the education process by contributing to the qualification requirements, supporting practical training opportunities and offering internships or apprenticeships for VET students. This collaboration between industry and education ensures that training programmes are aligned with industry needs and facilitate a smooth transition from training to employment.

-Continuous evaluation and improvement: The measures implemented should be regularly monitored and evaluated to assess their effectiveness and identify areas for improvement. Feedback from stakeholders, including trainers, VET managers and students, should be sought and incorporated into the ongoing development and refinement of training programmes.

Conclusion: The Roadmap presents a comprehensive and strategic approach to improving energy efficiency and renewable energy training in the construction sector. By adopting circular-friendly management practises, developing circular economy skills, raising awareness and establishing monitoring indicators, the construction industry can make the transition to sustainability. International cooperation between centres and schools of construction VET plays a crucial role in sharing knowledge and promoting innovation. By implementing the recommendations for improvement and continuously assessing progress, stakeholders can ensure the successful implementation of the roadmap and contribute to a more sustainable future for the construction sector.

Circular-friendly managed vocational educational training VET centre

Suggestion of actions to be taken within the VET center:

1. Develop a comprehensive circular economy strategy:

- Establish a clear and detailed strategy that outlines the VET center's goals, objectives, and actions for integrating circular economy principles into its operations and training programs.

2. Integrate circular economy principles into the curriculum:

- Modify existing vocational training programs to include modules and courses that emphasize circular economy concepts.
- Incorporate topics such as sustainable resource management, waste reduction, and eco-design principles into the curriculum.

3. Foster partnerships and collaborations:

- Establish partnerships with local businesses, industry experts, and organizations working on circular economy initiatives.
- Collaborate on projects, invite guest speakers, and provide students with opportunities to gain practical experience and exposure to circular practices.
- Collaborate with industry stakeholders: Foster partnerships and collaborations with construction companies, suppliers, and industry associations that promote circular economy practices. Exchange knowledge, share best practices, and explore opportunities for joint projects.
- Seek partnerships with industry stakeholders and organizations to secure resources and support for implementing circular economy initiatives.
- Engage with SMEs and innovative solutions providers: Foster relationships with small and medium-sized enterprises (SMEs) that offer innovative circular economy solutions for the construction industry. Collaborate with these companies to share knowledge, provide training opportunities, and explore joint projects.

4. Establish internal working groups:

- Create internal working groups within the VET center to address circular economy initiatives.
- Bring together trainers, VET managers, and other stakeholders to develop and implement circular economy strategies.

- Identify areas for improvement, share best practices, and integrate circular principles into training programs and daily operations.

5. Encourage research and innovation:

- Promote research and innovation in the field of circular economy within the VET center.
- Support students and staff in developing innovative solutions, such as sustainable product designs or circular business models.

6. Develop action sheets and guidelines:

- Create action sheets and guidelines tailored to each occupation or professional qualification within the VET center.
- Provide practical guidance on how to implement circular economy practices in different construction sectors.
- Outline specific actions, techniques, and considerations related to materials, waste management, energy efficiency, and sustainable construction techniques.
- Avoid product obsolescence and inability to repair/remanufacture.

7. Seek funding opportunities:

- Explore funding opportunities provided by national and European programs dedicated to promoting sustainable practices in the construction sector.

8. Implement resource and waste mapping:

- Conduct a thorough assessment of resource consumption patterns and waste generation within the VET center. This mapping exercise will help identify areas for improvement and guide the implementation of targeted measures.

9. Optimize waste management:

- Implement effective waste segregation practices, including recycling, composting, and responsible disposal. Raise awareness among staff and students about the importance of proper waste management and provide adequate infrastructure and resources to support these efforts.

10. Promote sustainable material choices:

- Encourage the use of durable, reusable, upgradable, and repairable materials in training programs and construction projects. Provide guidance on selecting environmentally friendly construction materials and promoting sustainable procurement practices.

11. Promote energy efficiency:

- Identify energy-saving opportunities within the VET center, such as upgrading heating systems, improving insulation, and optimizing lighting. Encourage the use of energy-efficient appliances and technologies.

12. Explore renewable energy options:

- Assess the feasibility of installing renewable energy systems, such as solar panels or heat pumps, to generate electricity and heat within the VET center. Explore potential partnerships with renewable energy suppliers and seek available funding or grants.

13. Monitor and reduce carbon footprint:

- Calculate the VET center's carbon emissions and develop strategies to reduce its environmental impact. This can involve measures such as monitoring energy consumption, waste generation, and transport emissions and setting targets for reduction.

14. Promote digitalization and paperless practices:

- Implement digital systems and tools to minimize paper usage, such as digital distribution of technical drawings and electronic document management. Encourage the use of digital platforms for communication, collaboration, and information sharing.

15. Establish monitoring and evaluation mechanisms:

- Implement a system to regularly monitor and evaluate the progress of circular economy initiatives within the VET center. This can involve setting key performance indicators (KPIs), tracking resource consumption, waste generation, and energy efficiency, and reporting on the results periodically.

Barriers:

1. Limited awareness and understanding:

- Many VET staff and students may have limited knowledge and understanding of the circular economy.
- Overcoming this barrier requires awareness campaigns, training sessions, and information dissemination to educate stakeholders about the benefits and opportunities of circular practices.

2. Resistance to change:

- Introducing new concepts and practices can be met with resistance from staff and students who are accustomed to traditional approaches.
- Addressing this barrier involves providing training, showcasing successful case studies, and emphasizing the long-term benefits of circular economy principles.

3. Lack of legal obligations or commitments:

- The absence of legal obligations or commitments regarding sustainable building practices can hinder their adoption.
- Advocacy for policy changes and regulations can help create a supportive framework for implementing circular economy principles.

4. Limited availability of resources and funding:

- The lack of resources and funding can impede the implementation of circular economy initiatives.
- Exploring funding opportunities provided by national and European programs and forming partnerships with industry stakeholders and organizations can help overcome this barrier.

5. Lack of a national action plan for green transformation of VET centers:

- The absence of a national action plan specifically addressing the green transformation of VET centers can hinder progress.
- Advocacy for the development and implementation of a comprehensive national action plan can provide guidance and support for VET centers in adopting circular economy practices.

6. Work overload of maintenance and cleaning staff:

- The additional workload associated with implementing circular economy practices can be challenging for maintenance and cleaning staff.

- Adequate training, support, and resource allocation can help alleviate this barrier and ensure smooth integration of circular practices.

7. Limited space for waste storage:

- Insufficient space for waste storage can create challenges in implementing effective waste management practices.
- Exploring innovative solutions, such as waste segregation techniques and partnerships with waste management companies, can help overcome this barrier.

Challenges:

1. Designing a comprehensive global strategy on sustainable construction:

- Consider multiple aspects, such as energy efficiency, renewable energy integration, and promotion of nearly zero energy buildings.
- Collaboration with industry associations, government bodies, and international partners is crucial to gain insights and best practices.

2. Implementing regulations and compliance:

- Ensuring adherence to regulations and compliance with sustainable construction standards can be challenging.
- Establishing clear guidelines, providing training, and conducting regular audits can help overcome this challenge.

3. Overcoming resistance to change and ingrained habits:

- Addressing resistance to adopting sustainable practices and changing ingrained habits within the construction sector is crucial.
- Providing training, showcasing successful case studies, and emphasizing the long-term benefits of sustainable construction can help overcome this challenge.

4. Securing funding for sustainable construction initiatives:

- Lack of specific funding for green transformation can hinder the implementation of sustainable construction practices.
- Exploring funding opportunities provided by government programs, grants, and partnerships can help overcome this challenge.

5. Availability of knowledgeable trainers and experts:

- Finding trainers and experts who are well-versed in sustainable construction practices can be a challenge.
- Establishing partnerships with organizations and institutions that can provide expertise and training can help address this challenge.

6. Integration into the curriculum:

- Integrating circular economy concepts into the existing curriculum requires curriculum revision, coordination, and alignment with accreditation requirements.
- Close collaboration between staff, curriculum developers, and accrediting bodies is necessary to effectively integrate circular economy principles.

7. Availability of sustainable and circular products:

- Sourcing sustainable and circular products may be challenging due to limited availability in the market.
- Building partnerships with sustainable companies, recycling organizations, and local suppliers can help ensure a continuous supply of circular materials and resources.

8. Overload of work for maintenance and cleaning staff:

- Implementing sustainable construction practices can result in an increased workload for maintenance and cleaning staff.
- Adequate support, training, and resource allocation can help mitigate the workload and ensure smooth integration of sustainable practices.

9. Lack of specific funding for green transformation:

- The absence of dedicated funding for green transformation can pose a challenge to implementing sustainable construction initiatives.
- Advocacy for specific funding programs and initiatives can help overcome this challenge.

10. Resistance to change and lack of interest to collaborate by companies:

- Some companies may show resistance to change and lack interest in collaborating on sustainable construction initiatives.
- Building awareness, showcasing the benefits, and fostering partnerships with willing companies can help address this challenge.

11. Overload of work for maintenance and cleaning staff:

- Implementing sustainable construction practices can increase the workload for maintenance and cleaning staff.

- Adequate support, training, and workload management strategies can help alleviate this challenge.

12. Lack of specific funding for green transformation:

- The absence of dedicated funding for green transformation can hinder the implementation of sustainable construction practices.
- Advocacy for specific funding programs and initiatives can help address this challenge.

Circular economy competences for trainers and VET managers

Suggestion of actions to be taken within the VET center:

1. Incorporate circular economy principles into the curriculum:

- Revise the existing vocational training curriculum to integrate modules and courses dedicated to circular economy concepts, sustainable construction techniques, waste management, and resource efficiency.
- Ensure alignment with accreditation requirements and coordination between different departments.

2. Develop practical training opportunities:

- Create experiential learning opportunities that allow students to apply circular economy principles in real-world settings.
- Organize field trips to companies implementing circular practices, where students can observe and learn from these experiences.

3. Provide training for trainers and VET managers:

- Develop training programs specifically tailored for trainers and VET managers, covering topics such as resource optimization, waste reduction, materials reuse, and sustainable construction practices.
- Offer regular workshops, seminars, and online courses to ensure ongoing professional development in the field of circular economy.

4. Establish an internal working group:

- Form an internal working group comprising management and representative trainers to focus on circular economy integration.

- Collaborate on developing strategies, sharing best practices, and monitoring progress through regular meetings and discussions.

5. Create guidelines for action:

- Develop action sheets and guidelines for each trade within the VET center, outlining specific actions and techniques that promote circularity within the construction sector.
- Provide instructions on material selection, reuse techniques, and efficient resource consumption.
- Ensure easy accessibility and regular updates to align with evolving circular economy practices.

6. Encourage exemplary practices:

- Encourage trainers and VET managers to lead by example in adopting circular practices within the VET center.
- Incorporate circular principles in their own workspaces to inspire and motivate students to embrace sustainable approaches.
- Implement a strategic plan that showcases the benefits and positive impact of circular economy practices.

7. Foster participation and involvement:

- Encourage trainers to actively involve training staff in circular economy initiatives.
- Promote participation by setting good examples themselves and creating opportunities for collaboration and engagement.

8. Continuous training of trainers:

- Provide continuous training and education for trainers on circular economy concepts, practices, and implementation strategies.
- Keep trainers updated with the latest developments and innovations in sustainable construction.

9. Foster peer learning and exchange:

- Facilitate platforms for trainers and VET managers to share best practices, experiences, and challenges related to integrating circular economy competencies into their training programs.
- Organize workshops, seminars, or online forums to encourage discussions, learning from each other's experiences, and exchange of innovative ideas.

10. Collaboration with external experts:

- Invite circular economy experts to deliver specialized training sessions and provide guidance on incorporating circular practices into vocational training programs.
- Collaborate on projects to acquire practical skills and knowledge while establishing valuable partnerships with external stakeholders.

11. Establish action sheets for each trade with guidelines on materials and reuse:

- Develop specific guidelines for each trade within the VET center, providing instructions on material selection and reuse techniques.
- Ensure that trainers and students have clear guidance on incorporating circular economy practices in their work.

12. Demonstrate good practice to learners through action:

- Actively showcase and demonstrate circular economy practices within the VET center to inspire learners and reinforce the importance of sustainable construction.

13. Disseminate evaluation practices in the network of training centers:

- Share evaluation practices and success stories related to circular economy integration with other training centers in the network.
- Foster knowledge exchange and collaboration among VET centers to promote the widespread adoption of circular economy principles in the construction sector.

Challenges:

1. Resistance to change: Address resistance to change among trainers and VET managers by promoting the benefits and importance of circular economy practices in the construction sector.
2. Limited social awareness: Overcome the challenge of limited social awareness among some pupils/students by integrating circular economy concepts into the training curriculum and conducting information sessions to raise awareness.
3. Regulatory framework for training: Address the challenge of a regulatory framework for training that imposes a specific curriculum.
4. Lack of experts: Overcome the barrier of a lack of experts in the field of circular economy by actively seeking and engaging knowledgeable professionals.
5. Lack of funding: Find solutions to the challenge of limited funding for implementing circular economy practices in the VET center.
6. Lack of expertise and resources: The limited availability of circular economy experts and resources for training can act as a barrier. To address this challenge,

the VET center should collaborate with relevant organizations, share resources and best practices, and establish networks of expertise. This can involve partnering with universities, research institutions, and industry associations to leverage their knowledge and experience in the field of circular economy.

7. Lack of dedicated training programs: Currently, there might be a limited availability of training programs specifically tailored to circular economy competences for trainers and VET managers. Overcoming this barrier requires the development of comprehensive and accessible training opportunities that address the specific needs and challenges faced by trainers and managers in the Slovenian vocational education system. The VET center should work closely with educational authorities and policymakers to advocate for the development and recognition of such training programs.
8. Resistance to Change: Overcome resistance to change among trainers and VET managers who may be resistant to adopting new practices and integrating circular economy competences into their training programs. This barrier can be addressed through effective communication, awareness campaigns, and highlighting the long-term benefits of circularity.
9. Finding Materials Experts: Identify and engage experts who possess in-depth knowledge of sustainable and circular construction materials. Collaborate with external experts, industry partners, and research institutions to bridge the gap and access the necessary expertise.
10. Finding Environmentally Conscious Suppliers: Address the challenge of identifying suppliers who prioritize sustainability and offer environmentally friendly construction materials. Extensive research, networking, and establishing partnerships with suppliers committed to circular economy principles can help overcome this barrier.

Barriers:

1. Economic Costs: Implementing circular economy practices may involve additional costs initially. Trainers and VET managers may face challenges in finding cost-effective solutions and justifying the investments required for sustainable materials, equipment, and technologies. Exploring funding opportunities and demonstrating the long-term cost benefits of circularity can help overcome this challenge.
2. Training in Circular Economy not Included in Official Programs: Incorporating circular economy competences into official Certificate of Professionalism programs can be a challenge. Collaboration with relevant authorities, curriculum developers, and industry stakeholders can help advocate for the inclusion of circular economy training in the official qualifications framework.
3. Finding expert trainers: Identify and engage experts in the field of circular economy to provide specialized training to trainers and VET managers.
4. Modification of training documents: Adapt the existing training documents and evaluation sheets to incorporate circular economy criteria and assessment of circular-friendly practices.

5. Lack of business interest: Address the lack of interest from some businesses by showcasing the benefits and economic advantages of circular economy practices in the construction sector.
6. Continuous professional development: Providing ongoing professional development opportunities for trainers and VET managers to stay updated with the latest circular economy practices and approaches is crucial. The VET center should encourage and support their participation in conferences, workshops, and seminars related to circular economy themes. This can be achieved through partnerships with relevant organizations, allocating dedicated budgets for professional development, and integrating continuous learning into the VET center's culture.
7. Cultural shift: Promoting a cultural shift towards circular economy thinking among trainers and VET managers requires time and effort. Overcoming this challenge involves highlighting the benefits of circular practices, sharing success stories and case studies, and creating a supportive environment for experimentation and innovation. The VET center should foster a culture of sustainability and circularity, where trainers and managers are encouraged to explore new approaches, test innovative ideas, and learn from both successes and failures. This can be supported through awareness campaigns, internal communication channels, and recognition of exemplary circular initiatives.
8. Train the trainers activities and effort and resources used for these.
9. Time to develop trade-specific content.

VET staff and students awareness of the circular economy

Suggestion of actions to be taken within the VET center:

1. Conduct awareness workshops and training sessions to educate VET staff and students about the principles and benefits of the circular economy, emphasizing its relevance to the construction sector and the potential environmental and economic advantages.

2. Utilize resources from the GREEN GROWTH project (https://greengrowthproject.eu/) to enhance understanding and engagement with the circular economy.

3. Foster a culture of sustainability and circularity by incorporating circular economy concepts into the VET center's curriculum and daily practices, integrating them into vocational training programs and the center's operations and infrastructure.

4. Conduct training sessions on the circular economy, focusing on resource preservation.

5. Create awareness about waste reduction.

6. Foster awareness of recycling and waste sorting.

7. Launch campaigns to highlight the significance of resource preservation, waste reduction, recycling and sorting, and the use of durable, reusable, upgradable, and repairable products.

8. Integrate circular economy concepts into the official training programs of the VET center, including specific modules on sustainable materials, resource management, waste reduction, and circular design.

9. Develop clear guidelines for materials and reuse practices, providing practical knowledge and instructions for implementing circular principles.

10. Organize communication and information sessions with guest speakers, industry experts, and professionals experienced in circular economy practices in the construction sector.

11. Incorporate circular economy concepts into formal training programs, developing modules or courses that provide theoretical knowledge and practical skills.

12. Create experiential learning opportunities through hands-on projects that allow students to engage directly with circular economy principles.

13. Foster collaboration with industry partners, organizing visits to organizations implementing circular economy practices and encouraging internships and work placements.

14. Promote innovation and entrepreneurship, supporting students in developing circular economy-related projects and providing resources for entrepreneurial endeavors.

15. Organize circular economy events and competitions, hosting seminars, workshops, and conferences, and challenging students to develop sustainable and circular solutions.

Targets:

1. Enhance the competences of trainers and teachers in circular economy practices.

2. Raise awareness among students about the circular economy and its application in the construction sector.

3. Reduce waste generation through improved construction practices and waste management strategies.

4. Develop guidelines for sustainable building practices, aiming for energy-efficient and low-carbon construction projects.

To drive progress towards a circular economy in the construction sector, the VET center should focus on awareness-raising, integration of circular economy concepts, practical training, collaboration, and setting specific targets for trainers, students, waste reduction, and sustainable buildings.

Challenges:

1. Limited awareness and understanding: Many VET staff and students have limited knowledge and understanding of the circular economy, hindering the adoption of circular practices. Addressing this barrier requires comprehensive training, workshops, and educational resources to provide the necessary knowledge and skills.

2. Resistance to change: Staff and students may resist adopting circular economy practices due to their familiarity with traditional approaches. Overcoming this barrier involves effective communication, training, and showcasing successful case studies to highlight the benefits and long-term advantages of circular economy practices.

3. Lack of resources and support: Insufficient resources, including funding and expertise, can pose a significant barrier to implementing circular economy initiatives. Overcoming this challenge involves collaborating with external organizations, experts, and industry stakeholders to provide support, guidance, and specialized training.

4. Limited integration in existing programs: The circular economy concepts may not be integrated into the existing VET curriculum, hindering their promotion and adoption. Addressing this barrier requires advocating for the inclusion of circular economy competences in official qualifications frameworks and training programs.

5. Economic considerations: Implementing circular economy practices can have economic implications, such as the cost of implementing new systems. Addressing this barrier involves exploring funding opportunities, demonstrating the long-term cost benefits, and identifying cost-effective solutions.

Barriers:

1. Educating students: Integrating circular economy concepts into the curriculum and effectively educating students about the circular economy pose challenges. It requires adapting the curriculum, coordinating between different departments and lecturers, and providing clear guidelines and support from the VET center's leadership.

2. Showcasing good practices: Demonstrating successful circular economy practices can be a challenge. Overcoming this challenge involves visiting exemplary building and worksites, showcasing real-world examples, and sharing success stories to inspire and motivate staff and students.

3. Altering established habits: Shifting from traditional practices to circular economy approaches may require altering established habits, which can be challenging. Overcoming this challenge involves promoting behavior change strategies and providing ongoing training and capacity building opportunities.

4. Addressing the cost implications: Implementing circular economy practices may involve initial costs and financial considerations. Overcoming this challenge requires finding funding opportunities through grants, sponsorships, and collaborations and demonstrating the long-term economic benefits of adopting circular practices.

5. Lack of interest and engagement: Generating interest and engagement among staff and students regarding the circular economy can be a challenge. Overcoming this challenge involves finding ways to engage young people, creating a context that aligns with their interests and values, and becoming an active participant in the environmental transition.

Targeted Categories And Monitoring Indicators:

VET Training Center Managers:

↗ Actions to be taken:

- Define a global strategy to raise awareness and train the different actors of their training center.
- Promote the exchange of good practice internally between trainers and staff.

↗ Indicators:

- Number of realized actions: This measures the implementation of the defined strategy and the actual actions taken.
- Carbon emission calculation tool integrated into daily work and travel as logistics: This indicator tracks the integration of a tool to calculate carbon emissions associated with daily work and travel, helping to monitor and reduce the environmental impact.

VET Staff:

↗ Actions to be taken:

- Establish trade-specific courses on the circular economy with concrete examples: This action ensures that staff members receive specialized training on the circular economy, equipping them with the knowledge and skills to incorporate circular principles into their teaching.

- Develop training materials adapted to the different levels of training: This action involves creating training materials that are tailored to the specific needs and levels of the learners, ensuring effective learning and understanding of circular economy concepts.

- Train the trainers (Training of trainers): This action focuses on providing training sessions for the trainers themselves, enhancing their knowledge and understanding of circular economy principles and teaching methodologies.

- Establish an internal working group on circular economy: This action involves forming a dedicated working group comprising management and representatives of trainers within the VET center. The group collaborates to develop and implement strategies for integrating circular economy principles into the training programs and daily operations of the center.

↗ Indicators:

- Number of training actions: This measures the frequency and extent of training initiatives implemented.

- Number of training sources and their variety: This indicates the diversity of sources and perspectives incorporated into the training programs.

- Innovative approach: This assesses the level of creativity and innovation in the training methods and materials used

VET Trainers:

↗ Actions to be taken:

- Enhance personal knowledge and understanding of the circular economy: Trainers should actively educate and train themselves on circular economy principles, ensuring they are well-equipped to teach and integrate these concepts into their training sessions effectively.

- Assess learners on disassembly skills, not just assembly: Trainers should evaluate learners based on their ability to disassemble and handle materials properly, raising awareness about the value of materials and promoting responsible waste management practices.

- Educate learners about the circular approach: Trainers should inform and educate learners about the benefits of material reuse, the concept of grey energy, and the significance of limited resources, fostering a comprehensive understanding of the circular economy principles.

- Prioritize materials and techniques that facilitate reuse: Trainers should consciously select materials and favor techniques that enable easy reuse, minimizing waste generation. For instance, using a chalk mixture instead of traditional glue for fixing tiles allows for effortless dismantling and subsequent reuse in future training courses.

- Promote resource-consciousness: Trainers should emphasize the importance of resource consumption, including water and energy, during training sessions, encouraging learners to be mindful of their usage and explore sustainable alternatives.

- Incorporate materials and reuse practices into training: Trainers should pay attention to the materials used in training and actively encourage techniques that promote reuse, such as choosing appropriate adhesives and fixings. This reinforces the value of materials and instills a culture of waste reduction.

- Evaluate student waste generation: Trainers should assess learners not only on their assembly skills but also on the amount of waste they generate, raising awareness about the value of materials and encouraging responsible disposal practices.

- Raise awareness among trainers about material reuse and waste reduction: Trainers should actively promote awareness and knowledge-sharing among their peers regarding the reuse of materials and strategies for waste reduction.

- Emphasize proper waste disposal: Trainers should highlight the importance of responsible waste disposal and encourage learners to pay closer attention to waste management practices.

↗ Indicators:

- Number of training actions: This measures the frequency and extent of training sessions conducted by trainers.

- Number of training sources and their variety: This indicates the diversity of sources and perspectives incorporated into the training programs.

- Innovative approach: This assesses the level of creativity and innovation in the training methods and materials used.

- Number of training modules followed by trainers: This tracks the professional development of trainers in acquiring circular economy knowledge.

- Number of info sessions: This measures the dissemination of information through dedicated sessions.

- Number of realized material sheets: This tracks the development and implementation of material reuse strategies.

- Adaptation of evaluation sheets: This evaluates the modification of evaluation criteria to include circular economy aspects.

VET Students:

↗ Actions to be taken:

- Engage with supervisors and tutors to raise awareness of circular economy principles in the workplace: Students should proactively communicate with their bosses and tutors, highlighting the importance of circular actions and encouraging the adoption of sustainable practices within the company.

- Understand the purpose of circular actions and the significance of resource preservation and environmental conservation: Students should actively seek knowledge about the benefits of circular practices, emphasizing the importance of conserving resources and protecting the environment.

- Promote awareness of circular actions: Students should raise awareness among their peers and colleagues about the importance of circular actions, emphasizing the value of recycling and proper waste sorting practices.

- Advocate for the use of durable, reusable, upgradeable, and repairable products: Students should encourage the adoption of products that are designed for longevity and can be repaired or upgraded, reducing the need for frequent replacements and minimizing waste generation.

- Integrate the concept of circular economy into training content: Students should actively incorporate the principles of the circular economy into their training materials and discussions. They can make the circular economy an integral part of the company's culture and philosophy by organizing "sustainability competitions" or practical exercises during training, even outside regular learning hours.

- Raise awareness among managers and tutors about circular economy issues: Students should proactively communicate with their managers and tutors, educating them about circular economy principles and encouraging their support in implementing sustainable practices when dual system students are in the company.

↗ Indicators:

- Conducting surveys to measure impact: Surveys can be used to assess the level of awareness and understanding among students, as well as their ability to apply circular principles in their work.

Buildings:

↗ Actions to be taken:

- Implement energy-saving measures to reduce energy costs: This includes improving insulation, installing efficient lighting systems, and integrating renewable energy sources to minimize overall energy consumption and lower carbon emissions.

- Develop a comprehensive resource consumption map: Create a detailed inventory of the resources used in the building process, including materials and energy, to identify areas for optimization and resource reduction.

- Implement a material consumption map: Track the use of materials throughout the building's lifecycle, from construction to maintenance and renovation, with the goal of reducing waste and promoting efficient material usage.

- Incorporate green areas: Integrate green spaces into the building design, both indoors and outdoors, to enhance biodiversity, improve air quality, and provide natural habitats.

- Establish a waste disposal map: Implement an effective waste management system that includes proper sorting, recycling, and disposal of waste generated during construction, operation, and maintenance of the building.

- Promote resource efficiency: Implement strategies to reduce resource consumption throughout the building's lifecycle, such as using sustainable materials, implementing efficient systems, and adopting circular economy principles.

- Prioritize good maintenance management: Implement a proactive maintenance program to ensure optimal performance of building systems, prolong the lifespan of materials and equipment, and prevent unnecessary resource waste.

- Install energy-saving light bulbs: Replace traditional light bulbs with energy-efficient alternatives, such as LED lights, to reduce electricity consumption and decrease carbon footprint.

- Embrace circular economy and energy-saving solutions: Explore innovative solutions that promote circular economy principles, such as using recycled materials, implementing sustainable design practices, and adopting energy-saving technologies.

- Reduce water consumption: Implement water-saving measures such as low-flow fixtures, water-efficient appliances, and rainwater harvesting systems to minimize water usage and promote sustainability.

- Transition to digital work processes: Embrace digital technologies for tasks like drawings and documentation, reducing paper usage and promoting a more environmentally friendly and efficient workflow.

↗ Indicators:

- Operational cost reduction: This measures the financial savings achieved through energy-efficient practices.

Waste:

↗ Actions to be taken:

- Establish a composting system for organic waste: Implement composting systems to efficiently process and convert organic waste into nutrient-rich compost. This reduces landfill waste and supports sustainable agriculture practices.

- Implement and monitor waste sorting within the building, with specific focus on hazardous waste (e.g., batteries): Establish effective waste sorting systems to ensure proper disposal and recycling of different waste categories, giving particular attention to hazardous materials.

- Optimize waste separation for value recovery: Implement measures to enhance waste separation processes, allowing for the recovery of valuable resources through recycling and reuse initiatives.

- Promote waste reduction strategies: Encourage practices that minimize waste generation, such as avoiding single-use products and opting for alternatives with less packaging. For example, using coffee machines that do not require disposable capsules.

- Encourage the use of digital archives and systems: Promote the transition from physical documentation to digital platforms, reducing paper consumption and promoting more efficient information management.

- Monitor and control waste sorting practices: Regularly assess and supervise waste sorting procedures to ensure compliance with proper waste disposal protocols, including the appropriate handling of hazardous waste items.

- Implement education and awareness programs: Educate students and staff about the importance of waste reduction, recycling, and responsible waste management practices. This can include workshops, campaigns, and informational materials.

- Collaborate with recycling and waste management organizations: Establish partnerships with local recycling centers and waste management facilities to facilitate proper disposal and recycling of different waste materials, maximizing resource recovery.

↗ Indicators:

- Reduction of waste: This measures the decrease in overall waste generation.

- Compost production and its usage: This tracks the amount of compost produced and its utilization in gardening or landscaping projects.

Food:

↗ Actions to be taken:

- Prioritize local and sustainable food sourcing: Select food suppliers who prioritize locally sourced products and engage in short-circuit supply chains. This supports the local economy, reduces carbon emissions associated with transportation, and promotes sustainable farming practices.

- Implement seasonal menu planning: Design menus that align with the availability of local, seasonal produce. This reduces the need for long-distance transportation and ensures fresher and more flavorful meals.

- Promote plant-based and vegetarian options: Increase the availability of plant-based and vegetarian meal choices to reduce the environmental impact associated with meat production. This encourages healthier eating habits and supports sustainability efforts.

- Minimize food waste: Implement strategies to minimize food waste, such as accurately forecasting meal portions, properly storing leftovers, and encouraging students and staff to take only what they need. This reduces food waste and saves resources.

- Educate on sustainable food practices: Provide education and awareness programs that highlight the importance of sustainable food choices, including the environmental, health, and social benefits. This can include workshops, guest speakers, and informative materials.

- Support local food initiatives: Collaborate with local farmers and community organizations to promote sustainable agriculture and food initiatives. This can involve organizing farm visits, establishing partnerships for educational projects, or hosting farmers' markets on campus.

- Engage students if possible also in food-related projects: Encourage students to participate in activities related to food production, such as growing their own fruits and vegetables, establishing on-site herb gardens, or organizing cooking workshops focused on sustainable and healthy recipes.

- Monitor and assess food suppliers' sustainability practices: Regularly evaluate food suppliers' sustainability practices, including their waste management, packaging choices, and adherence to ethical standards. Consider partnering with suppliers who align with sustainable food principles.

↗ Indicators:

- Quality of the chosen suppliers: This assesses the adherence of food suppliers to sustainable and local sourcing practices.

Suppliers:

↗ Actions to be taken:

- Integrate green criteria in procurement: Incorporate sustainable considerations into the procurement process by including environmental impact assessments of products, prioritizing local suppliers, and encouraging environmentally friendly delivery methods such as cycling.

- Establish partnerships with sustainable businesses: Foster collaborations with suppliers that demonstrate strong commitments to sustainability and offer environmentally friendly products and services. This helps support sustainable practices throughout the supply chain.

- Collaborate with recycling companies: Form partnerships with recycling companies to facilitate proper disposal and recycling of waste materials generated by the vocational schools and centers. This promotes circularity and reduces the environmental impact of waste management.

- Support local businesses to reduce travel: Prioritize local suppliers and service providers to minimize transportation distances, thereby reducing carbon emissions associated with long-distance travel.

- Collect supplier data on sustainability practices: Gather relevant data on suppliers' sustainability practices and performance. This information can be used to evaluate and select suppliers based on their environmental credentials.

- Develop an overall strategy for awareness-raising and stakeholder training: Establish a comprehensive plan for raising awareness and providing training to various stakeholders, including suppliers. This strategy can include workshops, seminars, and resources that promote sustainable practices and highlight the importance of circular economy principles.

- Engage with SMEs offering circular economy solutions: Seek partnerships and collaborations with small and medium-sized enterprises (SMEs) that specialize in providing circular economy solutions, such as solar tile systems or photovoltaic systems. This helps foster innovation and supports the adoption of sustainable technologies within vocational schools and centers.

↗ Indicators:

- Quality of the chosen suppliers: This evaluates the suppliers' alignment with green criteria and sustainability standards.

Mobility/Movements:

↗ Actions to be taken:

- Promote sustainable modes of transportation: Advocate for and facilitate the adoption of sustainable transportation options beyond cars. Encourage students and staff to utilize public transportation, cycling, walking, and carpooling for their mobility needs.

- Develop partnerships with transportation providers: Establish collaborations with local transportation authorities, companies, and organizations to enhance access to sustainable modes of transportation. This can involve negotiating discounted fares or organizing dedicated transportation services for vocational school and center activities.

- Provide information and resources on sustainable mobility: Educate students and staff about the benefits of alternative transportation methods and provide resources, such as maps, guides, and online platforms, to support their use. Promote the use of digital tools and apps for trip planning and real-time transportation updates.

- Organize sustainable mobility campaigns: Conduct awareness campaigns and events that promote sustainable mobility practices. These initiatives can include workshops, seminars, and competitions to encourage students and staff to actively choose environmentally friendly transportation options.

- Facilitate the integration of sustainable mobility in curricula: Integrate discussions and projects related to sustainable mobility within the vocational school and center curricula. This can include exploring topics such as urban planning, transportation systems, and sustainable mobility solutions.

- Encourage international mobilities with a focus on sustainable transportation: When organizing international mobility programs, prioritize sustainable transportation options for students and staff traveling across countries, regions, or within the EU area. Emphasize the use of public transportation, cycling, or walking for local transportation during mobility activities.

- Monitor and evaluate mobility-related carbon emissions: Implement systems to track and measure the carbon emissions associated with mobility activities. Regularly assess the environmental impact of transportation choices and identify areas for improvement and reduction in carbon footprint.

↗ Indicators:

- Number of journeys made with alternative transport: This tracks the shift in transportation choices towards more sustainable options.

- Reduction in fuel consumption (liters): This measures the decrease in fuel consumption resulting from reduced car usage.

The list of roadmap implementation tools to be deployed

The following instruments and approaches should be used to achieve the objectives set out in the Roadmap:

↗ GREEN GROWTH learning material

Handbook «Circular Economy in practice».

↗ GREEN GROWTH supporting learning material

Case studies and exercises for trainers

Pedagogical material on the application of the circular economy in practice for construction trainers.

↗ GREEN GROWTH learning management system – MOOC

Course on circular economy skills with 6 insights on

INTRODUCTION: Circular economy in construction

MODULE DE FORMATION 1: Embodied energy in the construction industry

MODULE DE FORMATION 2: LEVEL (S): European framework for sustainable buildings

MODULE DE FORMATION 3: BIM and sustainable construction

MODULE DE FORMATION 4: Materials, how to use/guide to sustainable materials

MODULE DE FORMATION 5: Reuse in construction

↗ GREEN GROWTH Mobile application for Android:

App on circular principles in renovation works

which covers 10 sustainable materials and their application, fact sheets and classification, handling, storage, reuse and recycling potential, etc

Other recommended tools to be deployed:

- Calculation tool for VET Center's Carbon Footprint
- Discover and explore requirement of Sustainable Building Certifications
- Ask for the environmental declaration type III (ISO 14025) and search for national EPD or international EPD databases or global databases when ordering construction products and materials for VET workshop activities. The EPD differs in many aspects from ISO Type I third party (independent eco-labels) and Type II self-declared eco-labels. The importance of EPDs is steadily increasing in the context of voluntary and mandatory commitments. So, requiring an EPD on the market could encourage other manufacturers to acquire them and put them on their products so that investors get used to comparing them with each other and choosing the products with the best environmental performance.

ROAD MAP GREEN GROWTH. Summary sheets

Based on the work carried out for this roadmap proposal, the following sheets summarize and specify the work carried out in 10 actions and combine the actions that have been highlighted in this work process by the groups of experts proposed in the partner countries of the Green Growth project.

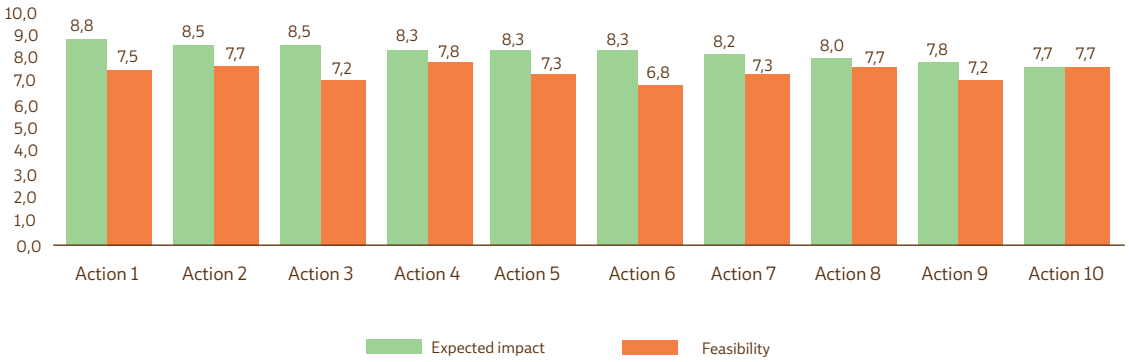
The purpose of the sheets is to simplify and specify in the most highlighted actions during the field work those options for improvement and achievement of the concept of circularity in the economy and management of the training centers.

Finally, and after the sheets it can be viewed the assessment in a graphic way together with the expected timing for each of the actions proposed to get the final Road map.

Previously to the sheets and the details in each, the assessment methodology was based on the following actions, the value given for the experts involved in the discussion groups of the IO 4 (Road map), was well-founded in a 10 grades scale. The results are summarized in the table below, the graphic representation and the final tables with the final decision.

Action	Who	Expected impact	Feasibility	Timing 1	Timing 2	Timing 3	Timing 4	Timing 5	Timing 6
Stablish a global strategy internally	Managers	8,8	7,5	medium term - between 1 and 5 years	short term - within 1 year	medium term - between 1 and 5 years	medium term - between 1 and 5 years	short term - within 1 year	short term - within 1 year
Promote the exchange of good practice internally	Managers	8,5	7,7	medium term - between 1 and 5 years	medium term - between 1 and 5 years	short term - within 1 year	short term - within 1 year	short term - within 1 year	medium term - between 1 and 5 years
Establish trade-specific courses on the circular economy	VET Staff	8,0	7,7	short term - within 1 year	medium term - between 1 and 5 years	short term - within 1 year	medium term - between 1 and 5 years	medium term - between 1 and 5 years	long term - 5 to 10 years
Enhance personal knowledge and understanding of the circular economy	VET Trainers	7,7	7,7	short term - within 1 year	medium term - between 1 and 5 years	short term - within 1 year	medium term - between 1 and 5 years	medium term - between 1 and 5 years	medium term - between 1 and 5 years
Educate learners about the circular approach	VET Trainers	8,3	7,8	short term - within 1 year	short term - within 1 year	short term - within 1 year	medium term - between 1 and 5 years	medium term - between 1 and 5 years	medium term - between 1 and 5 years
Prioritize materials and techniques that facilitate reuse.	VET Trainers	8,3	7,3	short term - within 1 year	medium term - between 1 and 5 years	short term - within 1 year	long term - 5 to 10 years	medium term - between 1 and 5 years	medium term - between 1 and 5 years
Engage with supervisors and tutors to raise awareness of circular economy principles.	VET Students	8,2	7,3	short term - within 1 year	short term - within 1 year	short term - within 1 year	medium term - between 1 and 5 years	medium term - between 1 and 5 years	medium term - between 1 and 5 years
Implement a material and resources consumption map	VET Buildings	7,8	7,2	short term - within 1 year	short term - within 1 year	medium term - between 1 and 5 years	medium term - between 1 and 5 years	short term - within 1 year	medium term - between 1 and 5 years
Optimise waste separation (value recovery).	VET Buildings	8,5	7,2	short term - within 1 year	medium term - between 1 and 5 years	short term - within 1 year	medium term - between 1 and 5 years	short term - within 1 year	long term - 5 to 10 years
Implement and control waste sorting	VET Buildings	8,3	6,8	short term - within 1 year	medium term - between 1 and 5 years	short term - within 1 year	medium term - between 1 and 5 years	short term - within 1 year	medium term - between 1 and 5 years

Actions assessment



N. Action	Actions ordered based on the assessment:	Timing
1	Stablish a global strategy internally	short term - within 1 year
2	Promote the exchange of good practice internally	medium term - between 1 and 5 years
3	Educate learners about the circular approach	medium term - between 1 and 5 years
4	Prioritize materials and techniques that facilitate reuse.	medium term - between 1 and 5 years
5	Engage with supervisors and tutors to raise awareness of circular economy principles.	short term - within 1 year
6	Optimise waste separation (value recovery).	medium term - between 1 and 5 years
7	Establish trade-specific courses on the circular economy	short term - within 1 year
8	Implement and control waste sorting	short term - within 1 year
9	Enhance personal knowledge and understanding of the circular economy	short term - within 1 year
10	Implement a material and resources consumption map	short term - within 1 year

Based on the assessment results the elected order in the actions development including the timing for their implementation was as follows:

1	Stablish a global strategy internally	short term - within 1 year
2	Promote the exchange of good practice internally	medium term - between 1 and 5 years
6	Optimise waste separation (value recovery).	medium term - between 1 and 5 years
3	Educate learners about the circular approach	medium term - between 1 and 5 years
4	Prioritize materials and techniques that facilitate reuse.	medium term - between 1 and 5 years
8	Implement and control waste sorting	short term - within 1 year
5	Engage with supervisors and tutors to raise awareness of circular economy principles.	short term - within 1 year
7	Establish trade-specific courses on the circular economy	short term - within 1 year
10	Implement a material and resources consumption map	short term - within 1 year
9	Enhance personal knowledge and understanding of the circular economy	short term - within 1 year

ANEX 1. FIELDWORK-DISCUSSION GROUPS DETAILS

Chapter: Germany - Summary of Findings from the Focus Group

Workshop Details:

- Date: 17.04.2022
- Number of participants: 7
- Participants' profiles: General management, Head of training, VET trainers, digitalisation/innovation officer, facility manager

In Germany, the focus group discussions highlighted the potential for creating a vocational training center that aligns with the principles of the circular economy. However, several barriers and challenges need to be addressed to achieve this vision.

Focus groups Questions and Synthesis of Answers:

CIRCULAR-FRIENDLY MANAGED VOCATIONAL EDUCATIONAL TRAINING VET CENTRE

1. Is it possible to create a vocational training centre run according to the principles of the circular economy?

- Yes, in principle, it is possible to fully align a vocational training centre with the principles of the circular economy.
- However, implementing circular economy principles requires alignment from all trades, employees, students, and suppliers in the training centre.
- Management must lead the change, and a top-down approach is necessary.
- Establishing a circular economy requires significant investments, such as renovating training and administration facilities and upgrading heating systems. Subsidies, grants, or funding support are crucial for training centres to manage these investments.

2. Do you know any tools to introduce the concept of circular economy in vocational training centres?

- Vocational training centres should form an internal working group on the circular economy, consisting of general management, training management, and trainer representatives.
- This working group should meet regularly, at least once a quarter, to exchange information on implementing circular economy activities in the training centre.
- Similar to roles like data protection officers and fire safety officers, a "circular

economy officer" should monitor the implementation of circular economy practices within the centre.

- The EU Eco-Management and Audit Scheme (EMAS) is a recommended management instrument developed by the European Commission for evaluating, reporting, and improving environmental performance.

3. Are some SMEs in contact with the VET centre and can offer innovative solutions for the circular economy?

- Yes, the VET centre has contacts with SMEs that offer circular economy solutions.
- Examples include companies providing solar tile systems or PV systems for the roofing trade, as well as companies using earthen building materials in construction.

4. Has the VET centre applied circular economy solutions, energy-saving measures, or material savings (reuse, repair, recycling)?

Solutions already in use at the training centre:

- Close cooperation with regional suppliers and the use of local value chains.
- Waste separation practices.
- Use of energy-saving light bulbs.
- Adoption of recycling paper and reduction of printed documents.
- Digital distribution of technical/workpiece drawings to students instead of paper copies.
- Collection of rainwater for various applications, such as concrete mixing.
- Reuse of construction materials, e.g., mortar in building construction.
- Carpenters optimize cutting with intelligent machines to minimize waste.
- Provision of charging stations and e-car as a company vehicle.

Ideas for future solutions:

- Increasing energy efficiency through renovation or new construction.
- Exploring heating options like heat pumps or district heating.
- Generating domestic hot water and electricity through solar panels.
- Establishing solar-powered charging stations for trainers' and trainees' tablets/cell phones.

- Converting carpentry waste (dust and chips) into briquettes for heating.
- Using circularly designed tools and recyclable/recycled workwear.
- Engaging in online platforms for buying and selling leftover materials.

Calculate the VET Center's Carbon Footprint:

To drive the transition to a sustainable building sector, it is essential to measure and manage the centre's carbon footprint VET. By calculating the centre's carbon emissions, it becomes possible to identify areas for improvement and set targets for reduction. This process includes the analysis of energy consumption, waste generation and transport emissions as part of the centre's operations. Working with sustainability experts and engaging the entire VET community will be critical to accurately measure and reduce the carbon footprint.

Finally, the crucial step in promoting sustainability in the building sector is to calculate the carbon footprint of the VET centre. By assessing its greenhouse gas emissions and identifying the main contributors, the centre can develop targeted strategies to reduce its environmental impact. This measurement provides a basis for monitoring progress and setting future targets.

Barriers:

There is a growing demand for sustainable building practices in the construction sector. However, overcoming certain obstacles is essential to fully harness this trend. One major challenge is the widespread distrust of sustainable construction activities among housing users. To address this, the VET centre should prioritize promoting the benefits of sustainable construction, including energy efficiency, lower environmental impact, and improved indoor air quality. Collaborating with industry stakeholders, housing associations, and community outreach programs can help build confidence and raise awareness about the advantages of sustainable construction. It is essential to dispel these misconceptions and provide evidence showcasing the benefits of energy efficiency, renewable energy, and low-energy buildings.

Additionally, the discussions highlighted the increasing demand for sustainable building practices as society becomes more environmentally aware. However, addressing challenges such as a lack of knowledge and resistance to change is crucial to achieve this shift towards greener solutions.

Challenges:

Designing a comprehensive and cohesive global strategy on sustainable construction presents a significant challenge. The VET center must consider multiple aspects, including energy efficiency, integration of renewable energy, and the promotion of nearly zero energy buildings. This strategy should adopt a lifecycle approach,

encompassing the entire construction process from design to demolition. Collaboration with industry associations, government bodies, and international partners is crucial to gain insights and best practices that will inform the strategy.

The goal is to establish a robust framework that guides training programs, infrastructure upgrades, and the implementation of circular economy principles within the construction sector. By aligning with global standards and practices, the VET center can contribute to the larger vision of sustainable construction on a global scale.

To overcome the barriers previously discussed, developing a comprehensive global strategy on sustainable construction is essential. This strategy should encompass policy frameworks, technical guidelines, financial incentives, and awareness campaigns. Collaborative efforts among government bodies, industry stakeholders, and educational institutions are necessary for the successful implementation of the strategy. By working together, they can drive positive change and ensure a sustainable future for the construction sector.

CIRCULAR ECONOMY COMPETENCES FOR TRAINERS AND VET MANAGERS

Actions to be undertaken in the VET centre:

- identify and develop the necessary circular economy competences for trainers and vet managers.
- provide training and professional development opportunities to enhance their understanding of circular economy principles and practices.
- foster collaboration and knowledge sharing among trainers and vet managers to promote circular economy initiatives within the vet center and the construction sector.

Mapping and Promoting Circular Economy Construction Practices among Trainers and Teachers:

Creating a mapping exercise to identify existing circular economy construction practices among trainers and teachers will enable the sharing of best practices and knowledge exchange. This will contribute to a more holistic integration of circular economy principles into vocational education and training.

- conduct a thorough assessment of current circular economy construction practices among trainers and teachers.
- identify successful case studies and best practices to showcase the implementation of circular economy principles.
- develop guidelines and educational resources to support trainers and teachers in integrating circular economy concepts into their training programs.
- facilitate knowledge exchange and collaboration among trainers and teachers through workshops, seminars, and online platforms.

Circular Economy Competences for Trainers and VET Managers: Training and upskilling trainers and VET managers in circular economy principles and practices will enable them to effectively incorporate these concepts into the curriculum and training programs. This will help develop a workforce that is knowledgeable about sustainable construction and can promote circular practices within the industry.

Carrying Out Awareness Workshops Using GREEN GROWTH Resources: Leveraging resources such as those provided by the GREEN GROWTH project (https://greengrowthproject.eu/) can support the organization of awareness workshops. These resources can provide valuable information, case studies, and practical examples that demonstrate the successful implementation of circular economy practices in the construction sector.

VET STAFF AND STUDENTS' AWARENESS OF THE CIRCULAR ECONOMY

Actions to be undertaken in the VET center:

1. Conduct awareness workshops and training sessions: Organize workshops and training sessions to educate VET staff and students about the principles and benefits of the circular economy. These sessions should emphasize the relevance of the circular economy to the construction sector and highlight the potential environmental and economic advantages it offers.

2. Utilize resources from the GREEN GROWTH project: Utilize the resources and materials provided by the GREEN GROWTH project (*https://greengrowthproject.eu/*) to enhance understanding and engagement with the circular economy.

3. Foster a culture of sustainability and circularity: Incorporate circular economy concepts into the VET center's curriculum and daily practices to foster a culture of sustainability. This can be achieved by integrating circular economy principles and practices into relevant vocational training programs and incorporating circular approaches into the VET center's operations and infrastructure.

Targets:

To drive progress towards a circular economy in the construction sector, specific targets can be established, focusing on:

1. Trainers and Teachers: Enhancing their competences in circular economy practices, enabling them to effectively impart knowledge to students. Set targets to measure the integration of circular economy principles into their teaching methods and course content.

2. Students: Raising awareness among students about the circular economy and its application in the construction sector, fostering a mindset of sustainability. Set targets to measure the understanding and application of circular economy principles in students' projects and assignments.

3. Waste: Reducing waste generation through improved construction practices,

encouraging waste separation, recycling, and reuse. Set targets to measure waste reduction, recycling rates, and the implementation of waste management strategies.

4. Buildings: Develop guidelines for sustainable building practices, aiming for energy-efficient and low-carbon construction projects. Set targets to measure the adoption of sustainable building practices and the implementation of energy-efficient technologies.

Barriers and Challenges:

Identify and address the barriers and challenges associated with promoting awareness of the circular economy among VET staff and students, such as:

1. Limited awareness and understanding: Address the lack of awareness and understanding of the circular economy by providing comprehensive training, workshops, and educational resources.

2. Resistance to change: Overcome resistance to adopting circular economy practices by highlighting the benefits and long-term advantages, addressing misconceptions, and showcasing successful case studies.

3. Lack of resources and expertise: Address the challenge of limited resources and expertise by collaborating with external organizations, experts, and industry stakeholders to provide support, guidance, and specialized training.

4. Limited integration in existing programs: Advocate for the inclusion of circular economy competences in official qualifications frameworks and training programs to ensure their integration into the VET curriculum.

5. Economic considerations: Address the economic challenges of implementing circular economy practices by exploring funding opportunities, demonstrating the long-term cost benefits, and identifying cost-effective solutions.

By addressing these barriers and challenges, the VET center can effectively promote awareness of the circular economy and drive progress towards a sustainable and circular construction sector.

Chapter: Italy - Summary of Findings from the Focus Group

Workshop Details:

- Date: 12.5.2023
- Number of participants: 5
- Participants' profiles: VET staff, VET trainers

This report presents the findings of the focus group discussions conducted in Italy. The discussions focused on identifying target groups, their actions, challenges, barriers, monitoring indicators, and possible actions for valuation as well as tools that could be deployed. The aim is to develop a comprehensive strategy that promotes sustainable practices within the construction sector. The following key points emerged from the discussions:

The focus group discussions in Italy underlined the need to establish a circular economy-friendly VET centre and revealed key findings regarding the promotion of circular economy principles within the construction sector through the VET center. Training centre leaders who participated in the discussion stressed the importance of developing a comprehensive strategy to raise awareness among all stakeholders. The involved VET centre in Italy aims to promote circular economy principles within the construction sector. To achieve this goal, the following actions, challenges, barriers, monitoring indicators, and proposed measures have been identified. However, this also means putting in place the necessary rules and regulations, finding qualified trainers, securing funding for the activities and dealing with resistance to change.

During the stakeholder review for Italy, valuable insights were gathered regarding the establishment of a circular-friendly managed VET centre. Training center managers expressed the need to define a comprehensive strategy that raises awareness among all actors involved in the training center. Challenges identified during the discussions revolved around overcoming established habits, managing the required time and costs, and ensuring compliance with regulations. To monitor progress and evaluate the effectiveness of the strategy, stakeholders recommended mapping the current resource usage and consumption patterns, involving staff in circular economy practices, and implementing bans on single-use products and plastic. Collaboration between relevant stakeholders, including training center managers, staff, students, and suppliers, will be crucial to achieving a successful transition towards a circular-friendly VET center in Italy.

Focus groups Questions and Synthesis of Answers:

CIRCULAR-FRIENDLY MANAGED VOCATIONAL EDUCATIONAL TRAINING VET CENTRE

In order to establish a circular-friendly managed VET centre in Italy, several actions and considerations need to be addressed. Training center managers play a crucial role in defining a strategy that raises awareness among all stakeholders involved. This includes implementing rules, finding knowledgeable trainers, securing funding for activities, and adhering to relevant regulations. Overcoming challenges such as resistance to change, altering established habits, and addressing costs requires monitoring the initial results, mapping the current situation regarding resource usage and consumption, involving staff in circular economy practices, and implementing bans on single-use products and plastic.

Actions to be undertaken in the VET centre:

- Define a strategy to raise awareness among all stakeholders involved in the training centre, define a strategy to raise awareness among all stakeholders involved in the training centre.

- Map the actual situation of overuse and consumption of resources.
- Involve staff in the issue of circular economy.
- Ban disposable products and materials.
- Ban the use of plastic.
- Map resource consumption patterns.
- Map material consumption patterns.
- Map waste disposal practices.
- Implement measures to reduce resource consumption.
- Implement measures to reduce material consumption.
- Implement measures to reduce water consumption.
- Implement good waste segregation practices.
- Promote the use of products that are durable, reusable, upgradable, and repairable.
- Establish collaborations with suppliers who share similar circular economy objectives.
- Avoid the consumption of products that generate unnecessary waste (e.g., promote the use of coffee machines without capsules).
- Implement digital archives and systems to minimize paper usage.
- Establish partnerships with sustainable companies.
- Establish partnerships with local companies to reduce transportation-related emissions.
- Establish partnerships with recycling companies to ensure proper waste management.

Barriers identified in the discussion were cost, preparedness, work overload of maintenance and cleaning staff, cost, and lack of space to deposit or store waste.

Challenges such as implementing regulations, finding knowledgeable trainers, securing funding and compliance were mentioned. Stakeholders stressed the importance of overcoming resistance to change, changing ingrained habits and addressing costs. To monitor progress, stakeholders suggested mapping the current situation in terms of resource consumption, involving staff in circular economy practises, and implementing bans on single-use products and plastic. These measures will contribute to the successful implementation of a circular-friendly VET centre in

Italy. Some other challenges were also detected are resistance to change, habits that need to be changed, time required, cost of implementing measures, implementation of systems to reduce consumption, installation of a monitoring system, installation of renewable energy systems, installation of timing devices to measure consumption, installation of systems for water recovery and purification, creating rules that everyone can understand, knowing which rules to follow (municipality - EU - country), buying a grinding machine, adapting procurement, finding green and more conscious suppliers, costs, time for investment, implementing the rules, finding people who are prepared on the subject to train them if needed, finding funds to cover the costs of implementing the activities to be carried out, following the rules, continuous training and education of trainers in the field of circular economy, defining actions for each subject and implementing clear guidelines for materials and reuse, showing a good example.

CIRCULAR ECONOMY COMPETENCES FOR TRAINERS AND VET MANAGERS

The stakeholder review underscored the importance of enhancing circular economy competences among trainers and VET managers in Italy. It was emphasized that training staff plays a vital role in fostering circular economy principles within the VET center. Challenges identified included securing funding for training activities, finding expert trainers, and allocating dedicated time for training sessions. Stakeholders discussed the need to overcome staff resistance, address the lack of expertise, and tackle funding constraints. To address these challenges, stakeholders proposed establishing clear rules on circular economy practices, supporting staff in adopting a circular mindset and habits, and monitoring adherence to guidelines. The review also highlighted the significance of paying attention to material consumption, waste disposal practices, the use of durable and reusable products, and the incorporation of green materials.

Actions to be taken within the VET center:

- Provide comprehensive training to staff on circular economy principles.
- Establish clear rules for circular economy practices.
- Assist staff in changing habits and mindset.
- Monitor adherence to the established rules.
- Increase awareness among trainers about material reuse and waste reduction.
- Emphasize the importance of responsible material consumption during training sessions.
- Promote proper waste disposal practices.
- Encourage the use of durable, reusable, upgradable, and repairable products.
- Pay attention to the use of green materials.
- Restrict the use of single-use products/materials.

- Promote resource conservation (water and power consumption).
- Create awareness of the importance of preserving resources.
- Highlight the significance of waste reduction.
- Foster awareness of recycling and sorting.
- Encourage the use of durable, reusable, upgradable, and repairable products.

To enhance circular economy competences among trainers and VET managers, specific actions should be taken. Training staff should receive comprehensive training on circular economy principles, secure necessary funding, find expert trainers, and establish dedicated time for training sessions. Overcoming challenges like staff resistance, lack of expertise, and funding constraints requires clear rules on circular economy practices, facilitating mindset and habit changes among the staff, and monitoring adherence to established guidelines. Attention should be given to the consumption of materials, waste disposal practices, use of durable and reusable products, and incorporation of green materials.

Barriers: resistance to change, cost of implementing the systems, lack of willingness from staff, lack of experts, lack of funding.

Challenges: finding funding for the actions, finding experts capable of training the staff, finding a mutually convenient time for staff training, finding organizations that can share best practices, triggering circular economy initiatives within the vet center and the construction sector, mapping and promoting circular economy construction practices among trainers and teachers.

VET STAFF AND STUDENTS' AWARENESS OF THE CIRCULAR ECONOMY

The stakeholder review emphasized the importance of raising awareness among VET staff and students in Italy about the circular economy. Stakeholders highlighted the significance of educating students through dedicated lessons and showcasing good practices. Raising awareness about the circular economy among VET staff and students was identified as a critical step.

Actions to be taken within the VET center:

- Conduct training sessions on the topic of the circular economy.
- Create awareness about the importance of resource preservation.
- Promote awareness of waste reduction.
- Foster awareness of the importance of recycling and sorting.
- Launch campaigns to highlight the significance of resource preservation, waste reduction, recycling and sorting, and the use of durable, reusable, upgradable, and repairable products.

To educate VET staff and students about the principles and benefits of the circular economy, it is recommended to organize awareness-raising workshops and training sessions. These initiatives can provide valuable insights into the relevance of the circular economy to the construction sector and the potential environmental and economic benefits it offers. Utilizing resources and materials provided by the GREEN GROWTH project (*greengrowthproject.eu*) can enhance understanding and engagement, particularly by incorporating circular economy concepts into the curriculum and daily practices.

Additionally, fostering a culture of sustainability and circularity within the VET center can be achieved by integrating circular economy concepts into the curriculum and daily practices. This integration ensures that circular economy principles become an integral part of the educational experience.

Barriers: Resistance to change, cost of implementing systems, lack of interest, lack of expert trainers.

Challenges: Educating students, implementing lessons on the topic, showcasing good practices, altering established habits, addressing the cost implications. It is crucial to address the lack of interest, shortage of expert trainers, and resistance to change. Encouraging sustainable consumption habits, implementing digital systems, and fostering cooperation with suppliers aligned with circular objectives are considered crucial steps in promoting circular economy awareness among staff and students.

Chapter: Belgium - Summary of Findings from the Focus Group

Workshop Details:

- Date: 24.4.2023
- Number of participants: 9
- Participants' profiles: participants (VET staff, VET trainers and experts of circular economy)

This report presents the findings of the focus group discussions conducted in Belgium. The discussions focused on identifying target groups, their actions, challenges, barriers, monitoring indicators, and possible actions for valuation as well as tools that could be deployed. The aim is to develop a comprehensive strategy that promotes sustainable practices within the construction sector. The following key points emerged from the discussions:

Focus groups Questions and Synthesis of Answers:

CIRCULAR-FRIENDLY MANAGED VOCATIONAL EDUCATIONAL TRAINING VET CENTRE According to a study by the Belgian Building Research Institute (BBRI),

sustainable building practises have gained momentum in Belgium in recent years. The BBRI stresses the importance of integrating the principles of the circular economy into the construction sector to minimise resource consumption, reduce waste and promote the reuse of materials. In terms of circular-friendly managed VET centres, there are good practises in Belgium's neighbouring countries. The Netherlands, for example, has implemented successful initiatives where VET centres actively promote the competences of trainers and VET managers in the circular economy. These initiatives include continuous training and education on circular economy principles, the establishment of internal working groups and the development of action sheets and guidelines for each trade. Regarding the circular economy in buildings, Belgium has made progress in reducing carbon consumption and resource use. The installation of efficient systems, such as renewable energy systems and water recovery and purification systems, has been identified as one of the most important actions. In addition, mapping material consumption and implementing control and monitoring systems can help track progress and identify areas for improvement.

Efforts to optimise waste separation and introduce effective waste separation in buildings were also highlighted. Promoting the use of durable, reusable, upgradable and repairable products can help reduce waste. Composting systems can also be introduced to reduce organic waste and produce natural fertilisers. In terms of suppliers, it is important to incorporate green criteria into procurement processes. This includes considering sustainable aspects of products, proximity of suppliers and environmentally friendly delivery methods. Building partnerships with sustainable companies, recycling companies and local suppliers can further support the goals of the circular economy.

Promoting alternative modes of mobility to reduce carbon emissions and encourage sustainable transport should also be considered. This includes promoting carpooling, providing bicycle parking and reimbursing public transport tickets. It is important to note that the findings and recommendations contained in this report are based on the focus group discussions held in Belgium as well as information from relevant online resources. These findings are intended to guide the development of a comprehensive strategy to promote sustainable practises in the construction sector and support the transition to a circular economy in Belgium.

Actions to be taken within the VET center:

- Continuous training and education: The centre VET should provide continuous training and education to trainers and VET managers on the principles of the circular economy. This can include workshops, seminars and courses that focus specifically on circular construction practises. By improving the skills of staff, the VET centre can ensure that they are equipped with the necessary knowledge and skills to effectively promote circular economy practises in vocational training.

- Internal working groups: Establishing internal working groups to address circular economy initiatives can be beneficial. These groups can bring together trainers, VET managers and other relevant stakeholders to work together on developing and implementing circular economy strategies within the VET centre. They can identify areas for improvement, share best practises and work together to integrate circular economy principles into training programmes and daily operations.

- Develop action sheets and guidelines: The VET centre should develop action sheets and guidelines tailored to each occupation or professional qualification. These documents should provide practical guidance on how to implement circular economy practises in the different construction sectors. They can outline specific actions, techniques and considerations related to materials, waste management, energy efficiency and sustainable construction techniques. By providing clear guidelines, the VET centre can facilitate the adoption of circular principles by educators and students.

Barriers:

- No legal obligations or commitments.
- No national action plan for green transformation of VET CENTRES.
- Limited awareness and understanding: One of the main barriers to implementing circular-friendly practises in the VET centre is the limited awareness and understanding of the concept of circular economy among staff. To overcome this barrier, comprehensive training programmes and awareness campaigns are needed to increase knowledge and understanding of circular economy principles and their application in the construction sector.

Challenges:

- Integration into the curriculum: Integrating circular economy concepts into the existing curriculum can be challenging, requiring curriculum revision, coordination between different departments and alignment with accreditation requirements. Overcoming these challenges requires close collaboration between staff, curriculum developers and accrediting bodies to ensure that circular economy principles are effectively integrated into training programmes.
- Availability of resources: Implementing circular practises may require access to certain resources, materials and equipment. It can be difficult for the centre VET to source sustainable and circular products, especially if they have limited availability in the market. To overcome this challenge, you need to build partnerships with sustainable companies, recycling organisations and local suppliers to ensure a continuous supply of circular materials and resources.

Addressing these barriers and challenges requires a collective effort from the VET center, trainers, VET managers, industry partners, and policymakers. By prioritizing the development of circular economy competences, the VET center can play a crucial role in shaping a sustainable and circular construction sector in Belgium.

CIRCULAR ECONOMY COMPETENCES FOR TRAINERS AND VET MANAGERS

To enhance circular economy competences among trainers and VET managers within the Belgian VET center for construction qualifications education and training, several actions can be implemented. These actions aim to equip the staff with the

necessary knowledge and skills to integrate circular economy principles into their training programs effectively. However, certain barriers and challenges must be addressed for successful implementation.

Actions to be taken within the VET center:

- Continuous Training and Education: Develop a comprehensive training program on circular economy principles specifically tailored for trainers and VET managers. This program should cover topics such as resource optimization, waste reduction, materials reuse, and sustainable construction practices. Regular workshops, seminars, and online courses can be organized to ensure ongoing professional development in this field.

- Internal Working Group: Establish an internal working group comprising management and representative trainers to focus on circular economy integration. This group can collaborate on developing strategies, sharing best practices, and monitoring progress. Regular meetings and discussions should be conducted to exchange ideas and insights.

- Guidelines for Action: Create action sheets and guidelines for each trade within the VET center. These documents should outline specific actions and techniques that promote circularity within the construction sector. For instance, guidelines can provide instructions on material selection, reuse techniques, and efficient resource consumption. These documents should be easily accessible and regularly updated to align with evolving circular economy practices.

- Exemplary Practices: Encourage trainers and VET managers to lead by example in adopting circular practices within the VET center. By incorporating circular principles in their own workspaces, trainers can inspire and motivate students to embrace sustainable approaches. Trainers can implement a strategic plan that showcases the benefits and positive impact of circular economy practices.

Barriers:

- Resistance to Change: Some trainers and VET managers may be resistant to adopting new practices and integrating circular economy competences into their training programs. Overcoming this barrier requires effective communication, awareness campaigns, and highlighting the long-term benefits of circularity.

- Finding Materials Experts: Identifying and engaging materials experts who possess in-depth knowledge of sustainable and circular construction materials can be a challenge. Collaborating with external experts, industry partners, and research institutions can help bridge this gap and provide the necessary expertise.

- Finding Environmentally Conscious Suppliers: Identifying suppliers who prioritize sustainability and offer environmentally friendly construction materials can be a barrier. It may require extensive research, building networks, and establishing partnerships with suppliers committed to circular economy principles.

Challenges:

- Economic Costs: Implementing circular economy practices may involve additional costs initially. Trainers and VET managers may face challenges in finding cost-effective solutions and justifying the investments required for sustainable materials, equipment, and technologies. Exploring funding opportunities and demonstrating the long-term cost benefits of circularity can help overcome this challenge.

- Training in Circular Economy not Included in Official Programs: Incorporating circular economy competences into official Certificate of Professionalism programs can be a challenge. Collaboration with relevant authorities, curriculum developers, and industry stakeholders can help advocate for the inclusion of circular economy training in the official qualifications framework.

Addressing these barriers and challenges requires a collective effort from the VET center, trainers, VET managers, industry partners, and policymakers. By prioritizing the development of circular economy competences, the VET center can play a crucial role in shaping a sustainable and circular construction sector in Belgium.

VET STAFF AND STUDENTS' AWARENESS OF THE CIRCULAR ECONOMY

To raise awareness of the circular economy among staff and students at VET, it is important to incorporate circular economy concepts into training content. This can be achieved by integrating the circular economy into formal programmes and developing clear guidelines on materials and reuse. In addition, communication and information events should be organised to engage students and raise their interest in the circular economy:

Actions that should be taken within the centre VET:

- Integration into official programmes: It is important to integrate circular economy concepts into the official training programmes of the VET centre. This can be achieved by revising the curriculum to include specific modules or courses that focus on circular economy principles and practises. These modules should cover topics such as sustainable materials, resource management, waste reduction and circular design. By including these concepts in the core curriculum, students will receive a comprehensive education on circular economy in construction.

- Develop clear guidelines: The centre VET should develop clear guidelines on materials and reuse practises to provide students with practical knowledge and guidelines for implementing circular principles. These guidelines should outline best practises for material selection and emphasise the use of sustainable and recycled materials and strategies for waste reduction, recycling and reuse. By providing clear instructions and recommendations to students, the VET centre can facilitate the application of circular economy principles in real construction projects.

- Communication and information sessions: The VET centre should organise

regular communication and information sessions to engage both VET staff and students in discussions about the circular economy. These events can include guest speakers, industry experts and professionals who have experience with circular economy in the construction sector. The aim is to provide insights, practical examples and case studies that demonstrate the benefits and potential of the circular economy in construction. In addition, workshops, seminars and practical activities may be held to encourage active participation and improve understanding.

Barriers:

- Limited awareness: one of the main barriers to raising awareness of the circular economy among staff and students of VET is the limited knowledge and understanding of the principles and practises of the circular economy. To overcome this barrier, comprehensive training and education initiatives are needed to provide the necessary knowledge and skills.

Challenges:

- Integration into the curriculum: Integrating circular economy concepts into the existing curriculum can be challenging, requiring curriculum revision, alignment with accreditation requirements and coordination between different departments and lecturers. Addressing these challenges requires clear guidelines, collaboration and support from the VET centre's leadership.

- Availability of resources: Implementing circular practises may require access to specific resources, expertise and partnerships with industry stakeholders. To overcome this challenge, you will need to establish links with suppliers, recyclers and organisations involved in the circular economy to ensure the availability of the necessary resources for practical training and projects. By overcoming these obstacles and challenges, the VET centre can successfully raise awareness of the circular economy among VET staff and students, promote a culture of sustainability and support circular practises in the construction sector.

Chapter: Spain - Summary of Findings from the Focus Group

Workshop Details:

- Date: .12-05-2023

- Number of participants: .7

- Participants' profiles: VET staff, training center coordination, VET trainers and experts of circular economy.

This report presents the results of the focus group discussions held in Spain. The discussions focused on the identification of target groups, their actions, challenges, obstacles, monitoring indicators and possible actions for evaluation, as well as tools that could be used. The aim is to develop a comprehensive strategy that promotes sustainable practises in the construction sector. The following key points emerged from the discussions:

Focus groups Questions and Synthesis of Answers:

CIRCULAR-FRIENDLY MANAGED VOCATIONAL EDUCATIONAL TRAINING VET CENTRE The discussions highlighted the importance of creating a circular-friendly managed VET center in Spain's construction industry. To achieve this, the following actions can be taken within the VET center:

Actions to be taken within the VET center:

- Develop a curriculum that integrates circular economy principles: The VET center should revise its existing curriculum to incorporate circular economy concepts and practices. This can include modules or courses dedicated to the circular economy, sustainable construction techniques, waste management, and resource efficiency. By integrating these principles, trainers and students can acquire the necessary competences to promote circular practices in the construction sector.

- Establish partnerships and collaboration with industry stakeholders: The VET center should collaborate with industry associations, construction companies, and relevant organizations to stay updated on the latest circular practices and technologies. This can involve organizing joint workshops, seminars, and site visits to foster knowledge exchange and promote practical applications of circular economy principles.

- To further enhance the circular economy competences of trainers and VET managers within the Spanish VET center for construction qualifications education and training, valuable insights can be gained from international projects and outcomes. The Fundación Laboral de la Construcción, an organization dedicated to training and promoting sustainable practices in the construction sector, has implemented various projects that can serve as references. One such project is the "Circular Construction" initiative, which aims to promote circular economy principles in the construction industry. Through this project, trainers and VET managers can gain access to training materials, guidelines, and case studies on circular construction practices. By incorporating these resources into their training programs, the VET center can ensure that trainers and students are equipped with up-to-date knowledge and skills. Another relevant project is the "Green Skills for a Sustainable Construction Workforce" initiative. This project focuses on developing green skills among construction professionals, including trainers and VET managers. The training programs offered under this initiative cover a wide range of topics, including energy efficiency, sustainable materials, waste management, and carbon footprint reduction. By adopting similar training approaches, the VET center can enhance the circular economy competences of its staff and students.

- Disseminate the good practices and the message transmitted in the training centre to companies.
- Raising awareness of the building's occupants.
- Installation of a monitoring system.
- Installation of renewable energy systems.
- Putting in place an effective policy that everyone can understand.
- Waste reduction and creation of natural fertilizers.
- Adapting procurements.
- Secure parking for bicycles.
- Encourage carpooling.
- Reimburse public transport tickets.

In addition to project outcomes, it is essential for the VET center to address barriers and challenges in implementing circular economy principles. One key barrier identified in the discussions is the limited availability of resources and funding. To overcome this barrier, the VET center can explore funding opportunities provided by national and European programs dedicated to promoting sustainable practices in the construction sector. Additionally, partnerships with industry stakeholders and organizations can help secure resources and support for implementing circular economy initiatives.

Challenges:

- Resistance to change and lack of interest to collaborate by companies (supplier)
- Overload of work for maintenance and cleaning staff
- Lack of specific funding for green transformation

Monitoring carbon emissions is another important aspect to consider. The VET center can develop a comprehensive carbon calculation method that considers emissions from traveling, logistics, performance, and operational activities. By tracking and analyzing carbon emissions, the VET centre can identify improvement areas and implement measures to reduce its environmental impact.

In conclusion, by incorporating international project outcomes and adopting best practices from initiatives such as the "Circular Construction" and "Green Skills for a Sustainable Construction Workforce," the Spanish VET center for construction qualifications education and training can enhance its circular economy competences. Overcoming barriers and addressing challenges will require collaborative efforts,

adequate resources, and continuous monitoring of carbon emissions. By promoting circular-friendly practices and raising awareness among staff and students, the VET center can contribute to the sustainable transformation of the construction sector in Spain.

CIRCULAR ECONOMY COMPETENCES FOR TRAINERS AND VET MANAGERS

To enhance circular economy competences among trainers and VET managers within the Spanish VET center for construction qualifications education and training, several actions can be implemented. These actions aim to equip the staff with the necessary knowledge and skills to integrate circular economy principles into their training programs effectively. However, certain barriers and challenges must be addressed for successful implementation.

Actions to be taken within the VET center:

- Participation: Encourage trainers to participate by setting good examples themselves and actively involving training staff in circular economy initiatives.
- Training of trainers: Provide continuous training and education for trainers on circular economy concepts, practices, and implementation strategies.
- Internal working group on circular economy: Establish an internal working group consisting of management and representatives of trainers to develop and implement circular economy initiatives within the VET center.

Barriers:

- Resistance to change: Address resistance to change among trainers and VET managers by promoting the benefits and importance of circular economy practices in the construction sector.
- Limited social awareness: Overcome the challenge of limited social awareness among some pupils/students by integrating circular economy concepts into the training curriculum and conducting information sessions to raise awareness.
- Regulatory framework for training (imposed training curriculum).
- Lack of experts.
- Lack of funding.
- Find material experts.
- Some learners are very removed from these topics and are not interested in the environment.

Challenges:

- Finding expert trainers: Identify and engage experts in the field of circular economy to provide specialized training to trainers and VET managers.
- Modification of training documents: Adapt the existing training documents and evaluation sheets to incorporate circular economy criteria and assessment of circular-friendly practices.
- Lack of business interest: Address the lack of interest from some businesses by showcasing the benefits and economic advantages of circular economy practices in the construction sector.

Monitoring Indicators:

- Number of training modules followed by trainers.
- Number of information sessions conducted.
- Adaptation of evaluation sheets to include circular economy criteria.
- Number of positive and negative findings on circular economy behaviors observed in training sessions.
- Number of sheets of material produced.
- Number of positive and negative findings on circular economy behaviors observed in training centers and training actions.

Evaluation:

Regular evaluation should be conducted to assess the effectiveness of the implemented actions and their impact on trainers, VET managers, and students. The evaluation should consider the monitoring indicators mentioned above and provide insights for further improvement and adjustment of the circular economy initiatives within the VET center.

By implementing these actions and addressing the identified barriers and challenges, the Spanish VET center can enhance the circular economy competences of trainers and VET managers, fostering the sustainable transformation of the construction sector in Spain.

VET STAFF AND STUDENTS' AWARENESS OF THE CIRCULAR ECONOMY

To enhance awareness of the circular economy among VET staff and students in Spain, innovative and out-of-the-box approaches can be implemented. Here are some actions and challenges to consider:

Actions that should be taken within the centre VET:

- Incorporate circular economy concepts into formal training programs: Integrate circular economy principles and practices into the curriculum of various vocational training programs. Develop modules or courses that specifically focus on circular economy topics, providing students with theoretical knowledge and practical skills.

- Develop experiential learning opportunities: Create hands-on projects and practical exercises that allow students to directly engage with circular economy principles. For example, students can be involved in designing and implementing circular solutions, such as recycling initiatives, waste reduction programs, or sustainable material use.

- Foster collaboration with industry partners: Establish partnerships with local businesses, industries, and organizations that are implementing circular economy practices. Arrange visits to these organizations, where students can observe and learn from real-world circular economy initiatives. Encourage internships and work placements in companies that prioritize circularity.

- Promote innovation and entrepreneurship: Encourage students to develop innovative ideas and projects related to the circular economy. Provide support and resources for entrepreneurial endeavours, such as incubation programs, mentorship, and access to funding opportunities. Foster a culture of innovation and creativity within the VET center.

- Organize circular economy events and competitions: Host seminars, workshops, and conferences focused on circular economy topics. Invite guest speakers, experts, and practitioners to share their knowledge and experiences. Organize student competitions that challenge participants to develop sustainable and circular solutions for real-world problems.

Barriers:

- Limited awareness and understanding: Overcoming the lack of awareness and understanding among VET staff and students regarding the circular economy is crucial. Many individuals may not be familiar with the concept or its potential benefits. Educational campaigns and informative sessions can help address this barrier.

- Resistance to change: Implementing new approaches and integrating circular economy principles into existing training programs may face resistance from staff and students who are accustomed to traditional methods. Overcoming resistance requires effective communication, training, and showcasing successful case studies.

Challenges:

- Funding and resources: Securing adequate funding and resources to support the integration of circular economy concepts into VET programs can be a challenge. Seek funding opportunities through government grants, private sponsorships, and collaborations with relevant stakeholders.

- Curricular constraints: Adapting the curriculum to incorporate circular economy concepts may require navigating existing regulations and frameworks. Collaboration with educational authorities and policymakers can help address these challenges and create room for innovation.

- Training and capacity building: Providing sufficient training and capacity building opportunities for VET staff to enhance their knowledge and teaching skills related to the circular economy is crucial. Continuous professional development programs and workshops can help overcome this challenge.

By implementing these actions and addressing the barriers and challenges, VET centers in Spain can effectively raise awareness of the circular economy among staff and students, fostering a generation of professionals who are well-equipped to contribute to a sustainable and circular future.

Chapter: Slovenia - Summary of Findings from the Focus Group

Workshop Details:

- Date: 12.5.2023

- Number of participants: 14

- Participants' profiles: VET staff, VET trainers from various of VET centers

CIRCULAR-FRIENDLY MANAGED VOCATIONAL EDUCATIONAL TRAINING (VET) CENTRE IN SLOVENIA

Actions to be taken within the VET center:

- Integrate circular economy principles into the curriculum: Modify existing vocational training programs to include modules and courses that emphasize circular economy concepts. This can involve incorporating topics such as sustainable resource management, waste reduction, and eco-design principles into the curriculum.

- Foster partnerships and collaborations: Establish partnerships with local businesses, industry experts, and organizations working on circular economy initiatives. Collaborate on projects, invite guest speakers, and provide students with opportunities to gain practical experience and exposure to circular practices.

- Develop practical training opportunities: Create experiential learning opportunities that allow students to apply circular economy principles in real-world settings. This can involve organizing field trips to companies implementing circular practices, where students can observe and learn from these experiences.

- Encourage research and innovation: Promote research and innovation in the field of circular economy within the VET center. Support students and staff in developing innovative solutions, such as sustainable product designs or circular business models.

- Study the matter and its potential through the piloting activities funded by different EU programmes and initiatives: Take advantage of EU programmes and initiatives that support piloting activities and research in the circular economy field. The Climate Change Fund in Slovenia, as well as EU funding programs, can provide financial resources for studying the potential of circular economy practices within the VET center.

Barriers:

- Limited awareness and understanding: Many VET staff and students may have limited knowledge and understanding of the circular economy. Overcoming this barrier requires awareness campaigns, training sessions, and information dissemination to educate stakeholders about the benefits and opportunities of circular practices.

- Introducing new concepts and practices can be met with resistance from staff and students who are accustomed to traditional approaches. Addressing this barrier involves providing training, showcasing successful case studies, and emphasizing the long-term benefits of circular economy principles. The findings from the Care4Climate projects and the Erasmus+ projects focused on green vocational centers can provide examples of successful transition stories and serve as a catalyst for overcoming resistance to change.

Challenges:

- Policy and regulatory frameworks: Adapting the VET curriculum and practices to align with circular economy principles may require navigating existing policy and regulatory frameworks. Collaboration with educational authorities and policymakers is essential to overcome these challenges.

- Resource constraints: Limited funding and resources can pose a challenge when implementing circular economy initiatives. Seek financial support through grants.

By incorporating circular economy principles, fostering partnerships, providing practical training opportunities, encouraging research and innovation, and leveraging the findings from relevant projects and initiatives, the Slovenian VET center can play a

significant role in promoting sustainable practices, preparing students for the circular economy job market, and contributing to the overall transition towards a circular economy in Slovenia. Monitoring indicators and evaluation for the transformation of Slovenian VET centers towards a circular economy:

- Integration of circular economy principles: Monitor the extent to which circular economy principles are integrated into the VET curriculum and training programs. This can be evaluated by reviewing course materials, syllabi, and lesson plans to ensure the inclusion of relevant topics and concepts.

- Collaboration and partnerships: Evaluate the establishment and effectiveness of partnerships and collaborations with external stakeholders, such as businesses, industry experts, and policymakers. Monitor the level of collaboration, joint projects, and the outcomes of these partnerships in promoting circular economy competences within the VET center.

- Resource allocation: Monitor the allocation of resources, including funding and support, for circular economy initiatives within the VET center. Assess whether adequate resources are allocated to training programs, materials, infrastructure, and ongoing professional development.

- Policy alignment: Assess the alignment of VET center practices with existing policies and regulations related to the circular economy. Monitor changes in policies and regulations to ensure that the VET center's activities remain in compliance and take advantage of supportive policy frameworks.

- Impact assessment: Evaluate the overall impact of the circular economy initiatives on the VET center, its staff, students, and the broader community. This can involve assessing environmental, social, and economic outcomes, such as waste reduction, resource efficiency, job creation, and stakeholder satisfaction.

CIRCULAR ECONOMY COMPETENCES FOR TRAINERS AND VET MANAGERS

Actions to be taken within the VET center:

- Develop comprehensive training programs: Create specific training programs or workshops designed to enhance the knowledge and understanding of trainers and VET managers regarding circular economy principles. These programs should focus on topics such as sustainable resource management, circular business models, and eco-design. The programs should be tailored to the needs of trainers and managers in the Slovenian context, considering the specific challenges and opportunities within the vocational education sector.

- Foster peer learning and exchange: Facilitate platforms for trainers and VET managers to share best practices, experiences, and challenges related to integrating circular economy competences into their training programs. This can be achieved through workshops, seminars, or online forums where participants can engage in discussions, learn from each other's experiences, and exchange innovative ideas. The VET center can encourage collaboration and create a supportive community of practice that promotes continuous learning and improvement.

- Collaboration with external experts: Invite circular economy experts to deliver specialized training sessions and provide guidance on incorporating circular practices into vocational training programs. Collaborative projects with experts can help VET staff acquire practical skills and knowledge, while also establishing valuable partnerships with external stakeholders. The VET center should actively seek out opportunities for collaboration with organizations, research institutes, and industry professionals who specialize in the circular economy.

- Establish action sheets for each trade with guidelines on materials and how to re-use them.

- Demonstrate good practice to learners through action.

- Disseminate these evaluation practices in the network of training centers.

Barriers:

- Lack of expertise and resources: The limited availability of circular economy experts and resources for training can act as a barrier. To address this challenge, the VET center should collaborate with relevant organizations, share resources and best practices, and establish networks of expertise. This can involve partnering with universities, research institutions, and industry associations to leverage their knowledge and experience in the field of circular economy.

- Lack of dedicated training programs: Currently, there might be a limited availability of training programs specifically tailored to circular economy competences for trainers and VET managers. Overcoming this barrier requires the development of comprehensive and accessible training opportunities that address the specific needs and challenges faced by trainers and managers in the Slovenian vocational education system. The VET center should work closely with educational authorities and policymakers to advocate for the development and recognition of such training programs.

Challenges:

- Continuous professional development: Providing ongoing professional development opportunities for trainers and VET managers to stay updated with the latest circular economy practices and approaches is crucial. The VET center should encourage and support their participation in conferences, workshops, and seminars related to circular economy themes. This can be achieved through partnerships with relevant organizations, allocating dedicated budgets for professional development, and integrating continuous learning into the VET center's culture.

- Cultural shift: Promoting a cultural shift towards circular economy thinking among trainers and VET managers requires time and effort. Overcoming this challenge involves highlighting the benefits of circular practices, sharing

success stories and case studies, and creating a supportive environment for experimentation and innovation. The VET center should foster a culture of sustainability and circularity, where trainers and managers are encouraged to explore new approaches, test innovative ideas, and learn from both successes and failures. This can be supported through awareness campaigns, internal communication channels, and recognition of exemplary circular initiatives.

- Train the trainers.
- Time to develop trade-specific content.

By implementing these actions and addressing the identified barriers and challenges, the Slovenian VET center can effectively enhance the circular economy competences of trainers and VET managers. This, in turn, will contribute to the integration of circular economy principles into vocational training programs, preparing students for the demands of a sustainable and circular job market, and driving the overall transition towards a circular economy in Slovenia.

To ensure the effectiveness and progress of the transformation efforts in developing circular economy competences for trainers and VET managers, monitoring and evaluation are essential. The following indicators can be used to assess the outcomes and impact of the actions taken within the VET center:

- Participation and engagement: Monitor the level of participation and engagement of trainers and VET managers in the training programs and workshops focused on circular economy competences. This can be measured through attendance records, feedback surveys, and participation rates in peer learning and exchange activities.
- Knowledge and skills development: Evaluate the knowledge and skills development of trainers and VET managers in relation to circular economy principles. This can be done through pre- and post-training assessments, self-assessment surveys, and performance evaluations.
- Integration into training programs: Assess the extent to which circular economy competences are integrated into the VET center's training programs. This can involve reviewing the curriculum, course materials, and lesson plans to ensure the inclusion of circular economy concepts and practices.
- Collaboration and partnerships: Monitor the establishment and effectiveness of collaborations and partnerships with external experts and organizations. Evaluate the outcomes and impact of these collaborations on trainers' and VET managers' understanding and application of circular economy competences.
- Behaviour change and application: Track changes in behaviour and practices among trainers and VET managers that reflect the adoption of circular economy principles. This can be assessed through observations, case studies, and feedback from stakeholders.
- Continuous professional development: Evaluate the participation of trainers and VET managers in continuous professional development activities related to circular economy competences. This can include monitoring attendance

at conferences, workshops, and seminars and assessing the application of acquired knowledge and skills in their work.

- Stakeholder feedback: Gather feedback from trainers, VET managers, students, and external stakeholders to gauge their perceptions of the effectiveness and relevance of the implemented actions and training programs.

Regular monitoring and evaluation of these indicators will provide valuable insights into the progress, strengths, and areas for improvement in the development of circular economy competences for trainers and VET managers. The findings can be used to refine training programs, identify additional support needs, and demonstrate the impact of the VET center's efforts in promoting circular economy principles.

VET STAFF AND STUDENTS' AWARENESS OF THE CIRCULAR ECONOMY

Moving forward, it is crucial for VET centers in Slovenia to continue prioritizing circular economy competences among staff and students. This involves ongoing professional development, collaboration with stakeholders, and the integration of circular economy principles into training programs. By addressing the identified barriers and challenges and leveraging the findings from research on behaviour change, social and behaviour change strategies, and green transformation in VET, Slovenian VET centers can contribute significantly to the transition towards a more sustainable and circular future. Actions to be taken within the VET center:

- Incorporate circular economy concepts into training content: It is crucial to integrate the principles of the circular economy into the formal training programs offered by the VET center. This can be achieved by revising and updating the curriculum to include modules and courses that focus on sustainable resource management, waste reduction, recycling, and eco-design. The VET center should collaborate with experts in the field and leverage available resources to develop engaging and informative training materials.

- Develop communication and information events: Organize workshops, seminars, and awareness campaigns to engage both staff and students in discussions and activities related to the circular economy. These events can include guest speakers, practical demonstrations, and interactive sessions that showcase the benefits and opportunities of circular practices. The VET center can also establish partnerships with local businesses and organizations to provide real-life examples and case studies that demonstrate the application of circular economy principles.

- Foster student participation in circular economy projects: Encourage students to actively participate in circular economy initiatives and projects. This can involve organizing competitions, hackathons, or innovation challenges that focus on finding sustainable and circular solutions to real-world problems. By engaging students in hands-on activities, they will develop a deeper understanding of the circular economy and its relevance to their chosen vocational fields.

Barriers:

- Lack of awareness and understanding: Many individuals within the VET community may have limited knowledge and understanding of the circular economy and its principles. This lack of awareness can hinder the adoption of circular practices and the integration of circular economy concepts into training programs.

- Resistance to change: Human behaviour is often resistant to change, particularly when it disrupts established routines and practices. The transition to a circular economy requires a shift in mindset and the adoption of new behaviours, which may be met with resistance from staff and students who are accustomed to traditional approaches.

- Limited resources and support: Insufficient resources, both in terms of funding and expertise, can pose a significant barrier to implementing circular economy initiatives in VET centers. The lack of dedicated funding and support for training programs, materials, and infrastructure can hinder progress in raising awareness and integrating circular economy concepts.

- Policy and regulatory constraints: Existing policies and regulations may not be aligned with circular economy principles, making it challenging to implement changes in VET centers. Adapting the curriculum and practices to incorporate circular economy concepts may require navigating complex policy frameworks and garnering support from relevant educational authorities and policymakers.

Challenges:

- Behavioural change: The successful adoption of circular practices relies on individuals' willingness to change their behaviours and embrace new ways of thinking. Promoting behaviour change requires comprehensive and targeted social and behaviour change strategies that consider the unique needs, motivations, and barriers faced by VET staff and students.

- Training and capacity building: Building the necessary capacity and expertise among VET staff and trainers to effectively teach and promote circular economy concepts is crucial. Providing ongoing training opportunities, professional development programs, and access to resources will help equip trainers and staff with the knowledge and skills needed to integrate circular economy principles into their teaching practices.

- Collaboration and stakeholder engagement: Achieving a circular economy requires collaboration among various stakeholders, including VET centers, businesses, policymakers, and community organizations. Establishing effective partnerships and engaging stakeholders in the process of raising awareness and integrating circular economy concepts will be essential for long-term success.

- Finding the right communication channels.

- Finding the right people.

- Finding the right context to address the topic according to the target group.
- Finding funding for the deployment of materials and actions.
- Finding experts.
- Finding time in the training schedules.
- Visiting exemplary building and worksites.
- Including learners in the circular approach as they will be the future construction workers.
- Finding ways to engage young people.
- Becoming an actor in the environmental transition.
- Monitoring indicators and evaluation for the transformation of Slovenian VET centers towards a circular economy:
- Student and staff engagement: Measure the level of participation and engagement of students and staff in activities related to the circular economy, such as training programs, workshops, and collaborative projects. This can be assessed through attendance records, surveys, and feedback mechanisms.
- The transformation towards a circular economy in Slovenian VET centers requires concerted efforts to raise awareness, build capacity, and overcome barriers and challenges. By integrating circular economy concepts into the curriculum, organizing awareness events, fostering collaborations, and providing ongoing training opportunities, VET centers can play a pivotal role in preparing students for the demands of a sustainable and circular economy.
- Knowledge and understanding: Assess the knowledge and understanding of circular economy concepts among VET staff and students. This can be measured through pre- and post-training assessments, quizzes, or surveys that gauge participants' understanding of key principles and practices.
- Behaviour change: Track changes in behaviour and practices among VET staff and students that align with circular economy principles. This can be done through observation, self-reporting, or case studies that capture examples of sustainable practices implemented within the VET center.
- Number of volunteers per year (students willing to do internships generating green spaces)

Regular monitoring and evaluation of these indicators will provide valuable insights into the progress, effectiveness, and areas for improvement in the transformation of Slovenian VET centers towards a circular economy. This information can guide decision-making, resource allocation, and continuous improvement efforts to ensure the success of the circular economy initiatives.


Green
Growth