

Croatia Circular Economy Approaches in Solid Waste Management (P173141)

Activity 2.2: National Capacity Building

Report on Summary of Capacity Building Programs



CIRCULAR ECONOMY
APPROACHES IN
SOLID WASTE
MANAGEMENT

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1. Abbreviations

CCE	Croatian Chamber of Economy
CDW	Construction and Demolition Waste
CE	Circular Economy
CEA	Croatian Employers' Association
CEC	Circular Economy Committee
CERCLE	RAS "Circular Economy Approaches in Solid Waste Management" (P173141)
CO₂	Carbon Dioxide
EAA	Environment Agency Austria (see also www.umweltbundesamt.at)
EDM	Environmental Data Management
EPD	Environmental Product Declaration
EPEEF	Environmental Protection and Energy Efficiency Fund
EPR	Extended Producer Responsibility
EU	European Union
GoC	Government of Croatia
GPP	Green Public Procurement
ISO	International Organization for Standardization
LCA	Life Cycle Analysis
MoESD/MINGOR	Ministry of Economy and Sustainable Development (of the Republic of Croatia)
MoH	Ministry of Health (of the Republic of Croatia)
MPPCSA	Ministry of Physical Planning, Construction and State Assets (of the Republic of Croatia)
MSW	Municipal Solid Waste
NGO	Non- Governmental Organization
NWMP	National Waste Management Plan (of the Republic of Croatia)
PRO	Producer Responsibility Organizations
Q&A	Questions and Answers
RAS	Reimbursable Advisory Service
SI	State Inspectorate (of the Republic of Croatia)
ToR	Terms of Reference
UK	United Kingdom of Great Britain and Northern Ireland
UNESCO	United Nations Educational, Scientific and Cultural Organization
WB	World Bank (see also www.worldbank.org)
WEEE	Waste Electrical and Electronic Equipment

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Executive Summary

Croatia is lagging compared to other European Union (EU) countries in transitioning towards a circular economy (CE). This highlights the need for a strategic, holistic approach. The World Bank (WB) is supporting the GoC and the Ministry of Economy and Sustainable Development (MoESD) in these efforts through a Reimbursable Advisory Service (RAS) project. The RAS supports Croatia in two Components with five Activities:

1. Component: Diagnostic work on Circular Economy (CE):
 1. Diagnostic analysis for a CE in Croatia;
 2. Support the formulation of a sectorial Circular Economy Action Plan;
 3. Support revision of the National Waste Management Plan (2017-2022) and implementation decision.
2. Component: Stakeholder Coordination and Capacity Building:
 4. National stakeholder engagement and coordination;
 5. National capacity building

The objectives of the RAS include:

- strengthening cooperation among stakeholders
- faster transitioning to a CE in the light of the upcoming NWMP
- support GoC towards delivering on its commitments to comply with EU directives in the waste sector and other relevant policy framework upon the adoption of the EU Circular Economy Package
- closing the knowledge gaps and raising awareness on CE and CE in Construction and Demolition Waste (CDW) management

The present document reports on the implementation of the national capacity building (Activity 2.2).

The objectives of Activity 2.2 are *(i)* support the Client on specific training needs and conduct capacity building trainings for the Client and related stakeholders in Croatia to enhance the understanding and applicability of Circular Economy in the context of waste management, and *(ii)* to provide capacity building training materials such as the lecture and handout notes, in the digital form applicable for on-line distribution. The assignment comprised two main tasks:

- The organization of interactive webinars organized for selected stakeholders as per short-term needs identified by the Client, Circular Economy Committee (CEC);
- The development and conduct of face-to-face training and capacity building on CDW in a CE.

A broad range of stakeholders related to the circular economy was identified and invited to the webinars and the training and capacity building activities, including representatives from the national authorities, regional and municipality level actors, private and business organizations, public and private companies, academia, and NGOs.

The webinar topics and the capacity building and training were agreed upon with the WB and the Client. The selection was based on the priorities identified in the Diagnostic analysis for a CE in Croatia (Activity 1.1) and the current Working Program of the Government.

Three webinars were organized as follows:

- Webinar 1: Preparing a Circular Economy Strategy: The experience of Austria, held online on 6 May (from 09:00 to 12:00)

- Webinar 2: Strengthening the re-use of products and re-use centers in Croatia, held online on 12 July 2022 (from 09:30 to 12:30)
- Webinar 3: Management of Plastic Packaging and Single-Use-Plastics (SUP) in the EU and Croatia: Legislation, policies, and best practices held online on 13 September 2022 (from 09:00 to 12:00).

In order to achieve the main objective of the webinar, key experts were invited to describe the general concept of circular economy in the context of the CE, and discussions with the participants were initiated on the applicability of the proposed measures in Croatia (see also ANNEX I). Different issues were discussed during the webinars, specific for each proposed topic. One of the main outcomes from all discussions, however, highlighted the need to bring stakeholders together to discuss potential or proposed policies; and to promote the knowledge-sharing and education of the stakeholders and practitioners with targeted training programs.

Training and capacity building activities were organized on CE approaches in the CDW sector in six cities attended by 94 participants. The participants represented construction materials producers, recyclers of CDW, industry associations, NGOs, research institutes, and national and local authorities responsible for circular economy and CDW management. However, most stakeholders represented the private sector, which can be interpreted as a clear sign of interest from the CDW private companies in increasing their know-how and capacity to adopt more circular approaches.

The topics for the training and capacity building activities identified jointly with the Client were based on the outcomes of the Diagnostic analysis for a CE in Croatia (Activity 1.1). They included measures that can be applied along the value chain in the construction and demolition sector, including CDW, to achieve circularity, such as:

- a. Measures to include the circular design of buildings;
- b. Measures to increase the uptake of recycled material in new constructions;
- c. Measures to improve the end of life of CDW, including landfilling and end-of-waste.

International experts conducted the training in the CDW and CE sectors. As part of this task, the training material (see ANNEX II and ANNEX III) was distributed to the participants and an evaluation survey was carried out at the end of the training activities.

Discussion and Q&A sessions, and a survey, were held as part of the training sessions and were helpful in highlighting the priority measures to be promoted in the CDW sector and the current challenge and barriers (see ANNEX IV). The results highlighted that re-using and recycling materials and components from buildings is by far the most interesting topic. Still, several barriers hamper the full development of the sector. The available quantity, quality, and supply of recyclable CDW in Croatia are insufficient to adequately meet the requirements and supply of the secondary raw material. The lack of regulatory framework, implementation of policy measures and practices, and administrative capacity were ranked as the most important barriers hindering the proper development of the sector. Practices such as illegal landfilling and dumping of CDW, a common practice in Croatia, were often mentioned as barriers as they decrease the availability of recycled materials and pose environmental risks. These gaps often trigger a lack of willingness from investors to finance projects utilizing recycled materials.

During the training, some measures seemed particularly promising to fill the gaps and boost CE in the CDW sector in Croatia. Regulatory measures such as standards for construction materials and CDW would significantly increase the use of more sustainable construction materials and support the

development of circular approaches in CDW. The introduction of a landfill tax, end-of-waste criteria, and tax on raw materials, and standards for construction and recycled materials were ranked as priority measures.

The results from this exercise were used to formulate recommendations for the current and forthcoming national efforts on CDW, including the development of a sectorial Circular Economy Action Plan (Activity 2.1) and the upcoming national Solid Waste Management Plan. The results from the survey highlighted that the stakeholders deemed the training and capacity building sessions valuable, suggesting other similar activities to be included in future planning and policy development. It could be concluded that continuous information and knowledge sharing and collaboration between the public authorities, the business, consumers and civil society, academia, and NGOs is of utmost importance for successfully implementing the circular economy approach. The involvement of stakeholders might be instrumental in the development of regulations and standards, and the construction sector should be primarily involved in the formulation of realistic and implementable measures.

Specific target groups for the capacity building activities were identified to formulate recommendations and targeted capacity building sessions, including decision-makers, waste inspectors, construction permitting authorities, investors, designers, standard developers, and other representatives from the private sector. The proposed recommendations included specific training topics targeting each identified group and fulfilling knowledge and know-how needs. Particular training and capacity building recommendations for different target groups were prepared, including the targeted audience groups and the specific topics to be covered, as summarized in the table below:

Table 1: proposed training topics for identified target stakeholder groups

TARGET STAKEHOLDER GROUP	TRAINING TOPIC
Decision makers	Regulatory and policy framework to implement CE in CDW
Waste inspectors	Best practices and useful tools for development of inspection plans for controlling CDW management operators and enforcing of CDW related legislation
Construction permitting authorities; Construction supervisors	Regulatory and policy framework to integrate circular economy approaches in urban planning and permitting of construction works
Construction and demolition investors	Regulatory and policy framework, costs and benefits of applying CE approaches in construction sector, existing recycling infrastructure and technologies
Construction designers	Design For Circularity – concept, good practices, standards and legal framework
Construction and demolition companies	Sustainable construction and renovation - good practices, standards and legal framework
CDW management operators	CDW recycling infrastructure GPP and performance-based contracts
Producers of construction materials	Sustainable design and production of building materials
Construction products market surveillance authorities	Implementation of the legal requirements for marketing of construction products
Tax authorities Aggregates extractors CDW management operators	Sustainable sourcing of raw materials for production of construction products
Standards developers	Standards and technical specifications as drivers for increasing the market demand for recycled CDW
Users and civil society representatives	Sustainable use and maintenance of buildings

It can be concluded that the training and capacity building activities contributed to achieve the objectives of the RAS. And especially in strengthening the dialogue among the stakeholders and raising their awareness on CE and CE in CDW management, and in providing recommendations in the light of the upcoming post-2022 NWMP.

1. Introduction

1. Croatia is lagging compared to other European Union (EU) countries in transitioning towards a circular economy (CE), highlighting the need for a more strategic and holistic approach. Transitioning towards CE requires system-wide thinking to consider all stages of the life cycle of products and services, with particular attention to strategic planning at the early designing stages. Even though the Government of Croatia (GoC) has acknowledged the need to move towards a CE and national and local authorities have made efforts, especially focusing on waste management and green public procurement (GPP), this only partially covers the actions needed to reach the CE goals defined by EU legislation. Moreover, implementing the current National Waste Management Plan (NWMP) is significantly lagging in meeting the EU targets, bringing Croatia under the infringement procedures, and facing the prospects of losing funding under the current EU operational program.

2. The World Bank (WB) is supporting the GoC and MoESD (the Client) in these efforts through a Reimbursable Advisory Service (RAS) project. The project was signed in September 2020 for a duration of 26 months. The objective of the RAS is to support GoC to deliver on its commitments to comply with EU directives in the waste sector and other relevant policy frameworks upon the adoption of the EU Circular Economy Package. The RAS will inform Croatia's future (post-2022) NWMP to incorporate CE approaches. This RAS supports Croatia in two Components with five Activities:

Component: Diagnostic work on Circular Economy (CE):

- Diagnostic analysis for a CE in Croatia;
- Support the formulation of a sectorial Circular Economy Action Plan;
- Support revision of the National Waste Management Plan (2017-2022) and implementation decision.

Component: Stakeholder Coordination and Capacity Building:

- National stakeholder engagement and coordination;
- National capacity building.

The present document reports on Activity 2.2 "National capacity building" carried out under the Component 2 "Stakeholder Coordination and Capacity Building".

3. The objectives of this assignment include the support to the Client to carry out training and capacity building activities on circular economy, targeting relevant national stakeholders. More specifically, the objectives include:

- (i) Supporting the Client on specific training needs and conducting capacity building training for the Client and relevant stakeholders to enhance the understanding and applicability of Circular Economy in the context of waste management; and
- (ii) Providing capacity building training materials such as lectures and handout notes in the digital format applicable for online distribution.

The topics selected for the training and capacity building include construction and demolition waste (CDW), one of the identified priority sectors in Croatia. This sector has the potential for a circular economy identified in the Diagnostic analysis for a CE in Croatia (Activity 1.1) as part of the RAS. Other topics include management of plastic packaging and marine littering, reuse of products, and approaches to formulate national strategies on circular economy.

2. Description of the tasks

2.1 Task 1: Just-in-time advisory support and capacity building (Interactive webinars)

4. The Environment Agency Austria (Umweltbundesamt; EAA) was contracted by the World Bank (WB) for preparing, developing, and carrying out online webinars on circular economy topics (Activity 2.2). A preliminary discussion was held with the Client on the typology of activities for this task. According to the ToR, these could comprise:

- Interactive webinars organized for selected stakeholders as per short-term needs identified by the Client, Circular Economy Committee (CEC) and/or the WB team. Outputs developed under RAS Activities 1.1, Activity 1.2 and Activity 1.3 (*see Introduction, Chapter 1*)¹ and could also be shared as part of capacity building programs to communicate recommendations with key stakeholders;
- Or inputs for preparation of key decisions and actions by GoC around promoting and implementing CE approaches in waste management related to bylaws, regulations, or administrative orders governing detailed planning and on-the-ground implementation.

The Client agreed to have a series of three webinars for selected stakeholders on circular economy. The activities carried out by the EAA for the organization of the webinars included the following:

- a. Identifying and engaging the relevant stakeholders for the webinars;
- b. Selection and agreement with the Client on the topics for conducting the webinars;
- c. Organization of the online webinars via the Teams platform, organization of the interpreters, preparation of the agenda and the presentations;
- d. Conducting and moderating the webinars;
- e. Distribution of training materials to participants in training and capacity building activities.

5. A broad range of stakeholders related to the circular economy were identified and invited to the webinars. The selection of the stakeholders took into account the results and the stakeholders' mapping of Activity 1.1. of the RAS. The stakeholders included representatives from the following groups:

- National level: responsible actors of circular economy and waste management;
- Regional and Municipality level actors;
- Private and business organizations;
- Public and Private companies;
- Academia and NGOs.

6. The topics of the webinar were agreed upon with the WB and the Client based on the priorities identified in the diagnostic analysis (Activity 1.1) and the upcoming work of the Government. For the

¹ Available at: <https://www.worldbank.org/en/country/croatia/brief/croatia-circular-economy-approaches-in-solid-waste-management#1>

latter, the forthcoming legislative documents and amendments to the existing legislation in the waste management and circular economy areas were taken into account. The following topics were selected:

- Webinar 1: Preparing a Circular Economy Strategy: The experience of Austria, held online on 6 May from 09:00 – 12:00.
- Webinar 2: Strengthening the re-use of products and re-use centers in Croatia, held online on 12 July 2022 from 09:30 – 12:30.
- Webinar 3: Management of Plastic Packaging and Single-Use-Plastics (SUP) in the EU and Croatia: Legislation, policies and best practices, held online on 13 September 2022 from 09:00 – 12:00.

7. Each webinar included presentations from key experts in the respective fields and moderated discussions (see ANNEX I). The presentations introduced the following topics of relevance:

- EU and Croatian legislative frameworks;
- Key barriers, challenges and opportunities; and
- Best practices from EU countries.

Questions and answers (Q&A) sessions were held at the end of each presentation. During the moderated discussion, the participants were invited to contribute with insights, experiences, and opinions on the implementability of the best practices in Croatia. After the webinar, the presentations were distributed to the participants as training material.

2.2 Task 2: Carry out capacity building training and knowledge exchange activities on CDW in a circular economy in Croatia

8. The Environment Agency Austria (EAA) was contracted by the WB for preparing, developing, and carrying out training and capacity building on CDW in a CE (Activity 2.2.). The activities carried out by the EAA included the following ones:

- a. Identifying and engaging the relevant stakeholders for the training and capacity building activities;
- b. Selection and agreeing with the Client on topics for conducting training and capacity building activities;
- c. Organization of logistics for training and capacity building activities;
- d. Preparation of training materials and capacity building activities;
- e. Implementation of training and capacity building activities; and
- f. Distribution of training materials to participants in the training and capacity building activities.

9. The relevant stakeholders to be invited to the training and capacity building on CDW and circular economy had been identified during Activity 1.1 and include all relevant groups:

- National level: responsible actors of CDW management:
 - Ministry of Economy and Sustainable Development (MoESD);

- Ministry of Physical Planning, Construction and State Assets (MPPCSA);
 - Ministry of Health (MoH);
 - State Inspectorate (SI);
 - Environmental Protection and Energy Efficiency Fund (EPEEF);
 - Circular Economy Committee (CEC).
- Regional and municipality level actors:
 - Counties and local government authorities;
 - Association of Counties, Cities and Municipalities.
 - Private and business organizations:
 - Croatian Chamber of Economy (CCE);
 - Croatian Chamber of Trades and Crafts;
 - Croatian Chamber of Architects;
 - Croatian Chamber of Civil Engineers;
 - Croatian Employers' Association (CEA).
 - Public and private companies:
 - CDW management companies;
 - Construction sector companies.
 - Academia and non-governmental organizations (NGOs):
 - Civil Engineering Faculty;
 - Faculty of Architecture;
 - NGOs.

10. The topics for the capacity building and training activities were identified within the Diagnostic Analysis (Activity 1.1) and discussed with MoESD. The selected topics included measures that can be applied along the value chain in the construction and demolition sector, including CDW, to achieve circularity, such as:

- d. Measures to include the circular design of buildings;
- e. Measures to increase the uptake of recycled material in new constructions;
- f. Measures to improve the end of life of CDW, including landfilling and end-of-waste.

11. The Environment Agency Austria coordinated the organization and conducted training and capacity building activities and the distribution of the training materials to the participants, including an evaluation survey at the end of each training activity. The trainers included international and national experts on CDW and circular economy, from the EAA, the Austrian construction company PORR Recycling GmbH, and the Austrian Construction Materials Recycling Association (BRV). The training activities were organized in six regional centers according to the following schedule:

- Zagreb 23 and 24 May 2022
- Rijeka 25 and 26 May 2022

- Osijek 6 and 7 June 2022
- Varaždin 8 and 9 June 2022
- Split 28 and 29 June 2022
- Dubrovnik 30 and 30 June 2022

The capacity building and training program was similar in all six cities, and included presentations on specific topics (summarized in Annex I) and discussion sessions where the participants were actively engaged in discussing the barriers, challenges, enablers, and implementability of the presented instruments and measures for CDW in the Croatian context. The agenda of the meetings is given in Annex III, whereas the outcomes of the discussion sessions and the evaluation survey are summarized in Annex II for each city, respectively. Finally, a personalized certificate of attendance was sent to all training participants (Annex IV).

3. Webinars: Overview on the objectives, outcomes, and discussions

12. Three topics had been identified and agreed upon with the WB and the Client to provide advisory assistance for capacity building and knowledge exchange in three online webinars. The topics were selected based on the result of the diagnostic assessment carried out within the RAS and preliminary consultations with the Client (the Ministry of Economy and Sustainable Development) and the WB task team.

13. Each webinar comprised a series of expert presentations, followed by Q&A and discussion sessions highlighting some priority issues. The various highlighted issues should be considered for future work and policy-making to promote a circular economy in Croatia. One of the main outcomes of all webinars was that continuous knowledge sharing and collaboration between the stakeholders is of utmost importance for successfully implementing the circular economy approach. The table below summarizes the discussed points in each webinar.

Table 2: summary of the outcomes from the webinars

Webinar 1: Preparing a Circular Economy Strategy: The experience of Austria	Webinar 2 - Strengthening the re-use of products and re-use centers in Croatia	Webinar 3 - Management of Plastic Packaging and Single-Use-Plastics in the EU and Croatia: Legislation, Policies and Best Practices
Measurability of CE indicators and availability of data	Need to organize and finance social entrepreneurship as part of the circular economy	The importance of EPR for plastic packaging and its potential to be applied to fishing nets and gear
Monitoring of CE	Issues around the reporting of re-used items for achieving the municipal waste recycling targets	Collection of fishing nets and gear littered in the sea and lack of clear boundaries on the responsibilities
Institutional setup and responsibilities for collecting CE-related information needed for tracking the implementation of the CE Action Plan	Need to bring different stakeholders together for a functioning re-use system (business sector, social workers, policy-making, etc.)	The importance of stakeholder dialogues (policymakers, the municipalities and port authorities, and the fishery sector) to improve waste collection fishing nets and gear
Need for stakeholder consultation towards the preparation of a CE Action Plan	Need for awareness raising for citizens on re-use practices	

3.1 Webinar 1 - Preparing a Circular Economy Strategy: The experience of Austria

14. The first webinar was held on 6 May 2022 from 09:00 to 12:00 and presented the Austrian experience in preparing the Austrian Circular Economy Strategy. This could serve as an example for Croatia in light of preparing the upcoming Croatian National Circular Economy Action Plan. The Croatian MoESD has set the goal to promote the circular economy and development of the National Circular Economy Action Plan, which is part of the current government program. Developing a circular economy plan will fundamentally change business models, including how products are designed, produced, and consumed, and also promote new practices for re-use, recycling, and waste recovery. The measures in the National Circular Economy Action Plan will affect a wide range of actors. Therefore, the presentation of Austria's experience was considered particularly beneficial.

Key experts were invited to describe the general concept of circular economy in the context of the EU. Additionally, the path of consultation with the stakeholders and development, and the Austrian Circular Economy Strategy with the central elements of the strategy were described. We could draw a general conclusion that the webinar achieved its primary objective. The agenda of the webinar is presented in Annex I, whereas a summary of each presentation delivered during the webinar is outlined in Annex II.

15. Thirty-eight participants attended the first webinar (including the five keynote speakers). The invited stakeholders were representatives from the public sector and Ministries, primarily involved in preparing national legislative and strategic documents. Other participants were invited from different representative groups such as the business sector, academia, NGOs, etc., which deal with circular economy aspects in their daily activities.

16. Two moderated Q&A sessions were held during the webinar, the results of which are presented below. The problem of the measurability of CE indicators and availability of data was discussed. The Austrian and Italian experts explained that obtaining enough information is challenging since the data for CE indicators is related not only to waste material quantities and types but also to materials in various products placed on the market. A clear link to other indicators related to climate, water, etc., needs to be considered when monitoring the transition to a circular economy. The monitoring will require the improvement of existing waste databases and exchanging information with other environmental protection-related information systems and statistical data.

Another issue discussed during the webinar was the institutional setup and responsibilities for collecting CE-related information needed for tracking the implementation of the CE Action Plan. It was suggested that in addition to waste management and environmental protection authorities, also statistical and other authorities that regulate the production, service, and construction sectors should be involved. A discussion followed on whether the stakeholder consultation should be held when drafting the plan or a more permanent dialogue should be established. It was concluded that continuous information and knowledge sharing and collaboration between the public authorities, the business, consumers and civil society, academia, and NGOs is of utmost importance for successfully implementing the circular economy approach. A question was raised to Austrian experts about whether it is worth the effort to carry out such lengthy stakeholder consultations. The reply was that the circular economy affects the whole economy and changes the business models and consumption patterns; therefore, providing the opportunity for broader discussion is highly recommended.

3.2 Webinar 2 - Strengthening the re-use of products and re-use centers in Croatia

17. The second webinar was organized on 12 July 2022, from 09:00 to 12:00, on how to strengthen the re-use of products and re-use centers in Croatia, since the establishment of re-use centers is identified as one of the most significant waste prevention measures in the Waste Management Plan of the Republic of Croatia (2017-2022). According to the National Plan, this measure includes constructing re-use centers, i.e., construction work on current facilities to adapt them for their new use, equipment procurement, producing and distributing promotional material, organizing workshops, etc. The practical implementation of this measure is lagging, and there is a need for knowledge exchange and experience sharing with the top-performing countries in the EU.

18. Key experts were invited to introduce and discuss the topic of re-use. A set of presentations was selected to achieve the webinar's main objective – exchange of experience and benchmarking of the progress of Croatia with the good practices in the EU. More specifically, an overview of the current legislative framework and status of product re-use in the EU and Croatia was provided. Furthermore, best practice examples on the establishment of re-use centers and waste prevention activities were shown from Austria, Belgium, and Flanders. Finally, an overview of the waste status and end-of-waste criteria in Austria was provided. The presentation's summary is included in Annex I, whereas the agenda of the meeting is provided in Annex II.

19. Sixty-one participants attended the second webinar (including the nine keynote speakers). The invited stakeholders included representatives from different representative groups such as policymakers, the business sector, academia, NGOs, etc., which deal with circular economy aspects in their daily activities.

20. During the webinar, moderated question-and-answer sessions were held, highlighting the current challenges and opportunities in Croatia for establishing re-use practices. A question was posed on how fast the re-use sector grew in other countries, and the answer was that it took about 40 years for Austria since the process of establishing social re-use shops started as a result of the high number of unemployed people in the 80s. Constantly growing, the re-use sector achieved a tenfold increase in 20 years. The participants saw education and training of social workers to repair, especially electronics, as most important to ensure the quality and safety of reusable products.

21. Concerns about the best way of organizing and financing social entrepreneurship as part of the circular economy were raised. The Flemish experts explained that to address these challenges, mutual integration of environmental protection, social inclusion and job creation policies, collaboration with different departments, appropriate taxation, and establishment of functional collection systems are crucial. According to the consulting business's representatives, the main problem is that the re-use market is unbalanced, as the recycling prices are distorted due to the low price of landfilling. Additionally, the social funds are not used for the right purpose, and EPR schemes are not enforced. Other recommendations raised by the participants included awareness raising starting from an early age and promoting private initiatives for re-use through social media. It was highlighted that private initiatives should not be considered a competitor to social entrepreneurship but actually complement these.

22. The problem with reporting re-used items for achieving the municipal waste recycling targets was pointed out. Belgian experts explained that this is directly linked to the implementation of end-of-waste legislation. There is pressure at the local and regional levels where data are collected to

include quantities from re-use centers in actual data for achieving the targets. Austrian experts explained that the quantities donated to re-use centers are calculated as waste, but waste directly donated to new users is calculated as re-use. Despite these rules, there is always a little mix between the figures, and documentation needs to be simplified. Additionally, items reported in pieces should be converted into kilograms. Spain applies a different approach - textile is considered no-waste; therefore, there is a need for clarity at the EU level.

3.3 Webinar 3 - Management of Plastic Packaging and Single-Use-Plastics in the EU and Croatia: Legislation, Policies and Best Practices

23. The third webinar was organized on 13 September 2022, from 09:00 to 11:30, aiming to provide a comprehensive overview of the management of plastic packaging and single-use-plastics and to discuss and evaluate the challenges and opportunities of implementing EU plastic waste legislation in Croatia.

24. Key experts were invited to introduce and discuss the topic of re-use. A set of presentations were selected to achieve the webinar's primary objective – exchange of experience and benchmarking of the progress of Croatia with the good practices in the EU. The presentations highlighted the need for sustainable plastic management, the EU legal framework, the status and outlook for plastic waste management in Croatia, best practices on marine littering, EPR for plastic packaging, and waste prevention programs. The presentations' summaries are included in Annex II, whereas the agenda of the meeting is provided in Annex I.

25. 113 (one hundred thirteen) participants attended the third webinar (including the nine keynote speakers). The invited stakeholders included representatives from different representative groups such as policymakers, the business sector, academia, NGOs, etc., which deal with circular economy aspects in their daily activities.

26. During the webinar, several moderated question-and-answer sessions were held. During the first, the circularity of plastic and options to achieve it were mentioned. This discussion highlighted that the circular economy transition should be combined with the energy transition due to the interconnection between material and energy. Although there is still room to increase the mechanical recycling quota for plastic packaging, the maximum potential for increasing it is limited. In order to address the packaging that cannot be recycled, the policy mix for a circular economy should include a combination of recycling and incineration with energy recovery.

27. The participants expressed their views on EPR, which they consider an excellent and vital instrument. This is true, especially if producers/manufacturers want to reduce costs and promote greener options. However, the public may have concern that producers may pass down the costs to the consumer. Participants asked if this was a potential issue or if there was some mechanism to prevent it. The experts pointed out that the consumers are also polluters, and the price must be divided among the stakeholders. It is impossible to avoid the problem of transferring the cost burden to consumers.

The participants also discussed how the ownership of waste was dealt with in the EPR system in Austria. Different Producer Responsibility Organizations (PROs) are responsible for different regions cooperating with private waste operators and municipalities. The ownership of the waste is regulated accordingly.

28. The issue of collecting fishing nets and gear littered in the sea was addressed. It is tricky to get any information on fishing nets — ghost nets with some organization to do the cleanup wash up on beaches. Concerning the ownership, it is generally not very clear who is responsible for this type of

waste, especially if it is lost at sea. In many places, fishing gear goes to the landfill, but data is also scarce here. This is a key problem that hampers further business development. Reporting is also a problem, especially with the smaller nets. Large nets are more expensive, and the fishermen might not want to lose them. Thus, it is vital to initiate dialogues among the stakeholders, including policymakers, the municipalities and port authorities, and the fishery sector, to develop targeted solutions for more efficient fishing gear and nets collection.

4. Training and capacity building sessions on CDW

4.1 Overview on the objectives, topics and participants

29. The regional workshops on Circular Economy Approaches with a focus on Construction Sector took place in six cities and were attended by representing producers of construction materials, recyclers of CDW, industry associations, NGOs, research institutes, and national and local authorities responsible for circular economy and CDW management. The workshops focused on gathering stakeholder views on identifying measures to address circular economy approaches in the sector and the problems and root causes of CDW.

Place	Period of the sessions				Participants
Zagreb	23 rd	and	24 th	of May 2022	20 stakeholders
Rijeka	25 th	and	26 th	of May 2022	13 stakeholders
Varaždin	6 th	and	7 th	of June 2022	16 stakeholders
Osijek	8 th	and	9 th	of June 2022	16 stakeholders
Split	28 th	and	29 th	of June 2022	18 stakeholders
Dubrovnik	30 st of June	and	1 st	of July 2022	11 stakeholders

About 94 participants attended the training and capacity building sessions in the six cities, mostly representatives of regional and municipality institutions and private and business organizations from the CDW sectors (Figure 1).

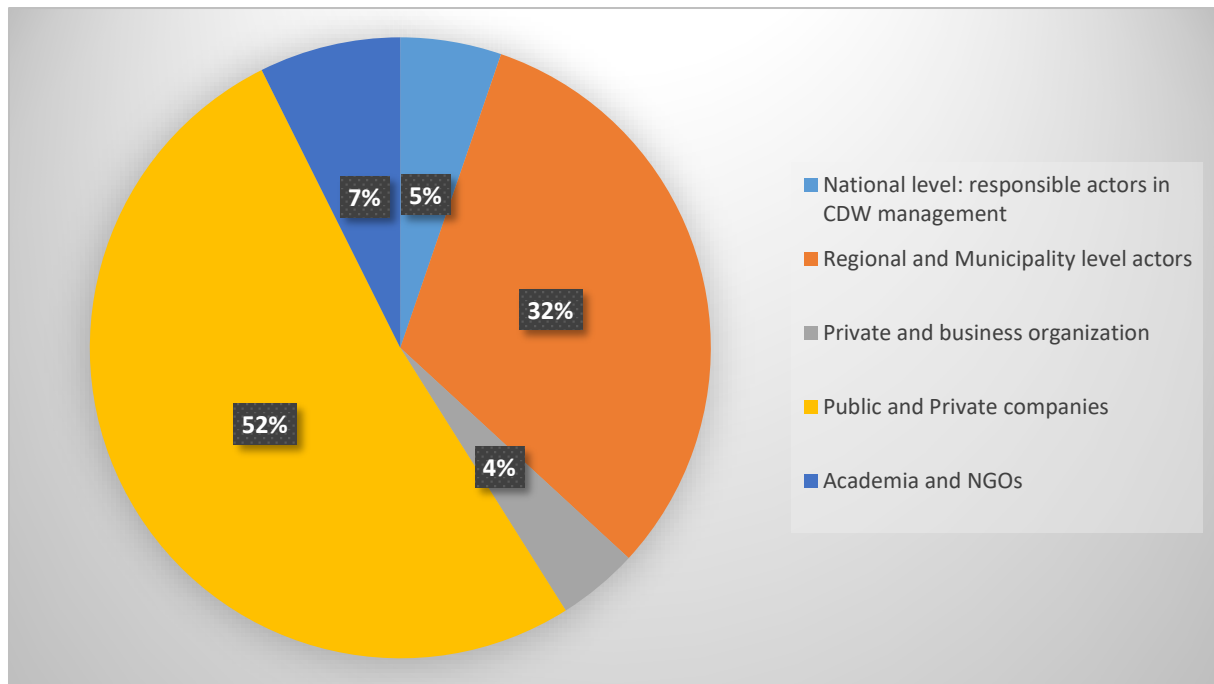


Figure 1: Stakeholders distribution according to the identified groups

30. During the training, experts from the CDW sectors presented different EU best practices along the CDW value chain to improve circularity in the sector. They included measures that can be applied along the value chain in the construction and demolition sector, including CDW, to achieve circularity, such as:

- Measures to include the circular design of buildings;
- Measures to increase the uptake of recycled material in new constructions;
- Measures to improve the end of life of CDW, including landfilling and end-of-waste.

An overview of the presentations used for the six sessions is provided in the table below. The presentation summary is included in Annex I. The training material (e.g., the presentations and the reports for the six cities) was distributed to the participants.

Table 3: Summary of presentations

Introduction
<ul style="list-style-type: none"> CERCLE series of CE in CDW capacity building training; Overview and objectives of the capacity building and training activities; Circular Economy in the EU and Croatia – overview; CDW in the context of CE in Croatia and approaches along the value chain.
Session 1: Circular design of buildings
<ul style="list-style-type: none"> Concept, barriers, and enabling conditions for the implementation of circular design of buildings' policies; Integration of sustainable criteria into the construction process – the experience of Austria; Requirements for issuance of building permits or in public procurement. Best practices from the EU.
Session 2: Increasing recycling content in construction production
<ul style="list-style-type: none"> Introduction of measures to increase recycling content in buildings and products;

<ul style="list-style-type: none"> • Overview of EU and Croatian legislation on the status of recyclability and recycling of construction and demolition; • Closing the loop of materials in the construction and demolition waste sector. Recycling yards and permits in Austria; • GPP as a policy measure for CDW in a circular economy. Concepts and the process of procuring construction works along the value chain, and documentation and verification procedures.
Session 3: CDW end of life and landfilling restrictions
<ul style="list-style-type: none"> • Introduction to measures for CDW management at its end-of-life; • Overview of EU and Croatian legislation on landfilling with a focus on construction and demolition; • CDW: end-of-life, recycling possibilities, and landfilling restrictions in Austria; • Guidelines for the waste audits before demolition and renovation works of Buildings.

4.2 Overview on the outcomes of the survey and the discussion sessions

31. Discussion and Q&A sessions, and a survey, were held as part of the training sessions. The discussion sessions and the survey were beneficial in highlighting the priority measures to be adopted in the CDW sector and the current challenges and barriers. The results from this exercise were used to formulate some recommendations for the present and future work, including developing a sectorial Circular Economy Action Plan (Activity 2.1) and the upcoming Solid Waste Management Plan. A summary of the different issues highlighted during the discussion sessions for each topic is provided in the table below, including the identified gaps, barriers, and potential measures. The potential measures are divided into two groups: the first group should be implemented in the short term, whereas the second group is mid-term and long-term measures.

Table 4: Overview on the outcomes of the survey and the discussion sessions, including the identified barriers and gaps, and the potential measures.

	Circular design of buildings	Recycled material in new constructions	End of life of CDW including landfilling
Identified barriers and gaps			
	Lack of GPP practices	Lack of quantity, quality, supply of recyclable CDW in Croatia	High illegal landfilling and dumping of CDW, leakage in the environment
	Lack of best practices toward CE in the construction sector	Lack of willingness from investors to finance projects utilizing recycled materials Low rates of re-used CDW materials Lack of policy measures and practices Lack of profitability of recycling centers	Lack of regulation to use excavated soil Lack of education and awareness of professionals for selective demolition
Potential measures			

High potential for implementation (for short-term implementation)	Standards for construction materials Capacity building and education for the construction sector GPP for sustainable construction	Increase of recycled content in products and buildings Quality standards for recycled materials, including concrete and asphalt Guidelines for recycling practices of CDW Capacity building for the construction sector and recycling sector Collaboration of stakeholders to develop standards for CDW	landfill tax on recyclable materials End-of-waste criteria for building construction and demolition permitting Legal obligations for selective sorting
Other measures (mid to long-term implementation)	Voluntary commitments as green deals Building passports	Catalog of recycled construction materials Mandatory minimum recycling content	Mandatory selective deconstruction and pre-demolition auditing and planning

32. The discussion and Q&A sessions highlighted several issues as priorities that need to be addressed in Croatia to promote the circular economy further. These issues range across the entire construction and demolition value chain and include management and recycling of CDW. It is recommended that the identified issues are addressed during the preparation of the National Action Plan for Circular Economy in the CDW sector in Croatia.

33. First, illegal landfilling and dumping of CDW is a common practice in Croatia that harms the environment but also decreases the availability of recycled materials. The primary triggers for illegal landfilling were identified, such as the lack of proper monitoring and enforcement of penalties and punishing mechanisms and low social awareness of the problem. Partly, the issue of illegal CDW dumping lies in lengthy and costly administrative efforts and required bureaucracy to:

- Obtain permits to utilize recycled material for aggregates that can be easily recycled, such as asphalt;
- Obtain permits to utilize excavated soil, e.g., as backfilling material for the construction operations;
- Obtain permits for mobile and stationary recycling treatment plants;
- Obtain the end-of-waste status for certain CDW products that can be easily recycled.

To address illegal dumping, it is necessary to implement strict penalties for those who dump CDW illegally and to promote mechanisms for controlling and monitoring CDW producers and managers. The disposal of recyclable material should also become cheaper by providing incentives for its correct separation and collection. Austria provides an excellent example of how the problem of illegal CDW dumping has been eradicated through a mix of landfill taxes, monitoring, inspection, and penalties.

34. Secondly, the available quantity, quality, supply, and demand of recyclable CDW in Croatia were highlighted as significant gaps. Discussions around the limitations of potential measures highlighted

that readily recyclable materials for producing recycled construction products are often not available in the required quantity and quality. Currently, the demand exceeds the supply, and there is a gap in the information on the availability and location of recyclable materials. The quantity, quality, supply, and demand for recycled materials could be boosted through different measures. In other EU countries such as Austria and Italy, for instance, high quality is ensured through legal requirements for on-site separation and quality criteria and procedures applied at the recycling plants, regulatory measures such as standards for construction material and recyclable CDW, and economic instruments such as landfilling taxes. The cement producers noted that a detailed action plan would be needed to increase the use of CDW in concrete and cement.

35. Regulatory measures such as standards for construction materials and CDW would significantly increase the use of more sustainable construction materials and support the development of circular approaches in CDW. Still, there are limitations to their wider adoption. Croatian national standards already exist and have been adopted to some extent, but they are not mandatory and are thus applied by companies voluntarily. Issues include price competition by cheaper, non-sustainable, low-quality products and loss of recyclable waste due to illegal dumping and incineration. Other regulatory measures, such as mandatory minimum recycling content, shall also be discussed. The participants suggested that the minimum recycling content for cement could be between 5% and 10%.

On the other hand, the content in asphalt could be up to 20-30% since it can be recycled easily according to the currently available technology. There is, however, a need for cooperation between different stakeholders in the CDW sector to develop standards that will be widely adopted, following the example of other EU countries such as Austria. In Italy, for instance, high quality of recycling products is ensured through legal requirements for selective demolition, on-site separation and quality criteria and procedures applied at the recycling plants, and requirements for CDW producers to remove hazardous components that could lower the quality of the recycled material. In Austria, the law mandates the employment of a demolition expert on the site.

36. These gaps often trigger a lack of willingness from investors to finance projects utilizing recycled materials. This is primarily due to the lack of widely adopted standards, competition with cheaper raw materials, low knowledge of possible use and benefits of recycled CDW, and lack of trust in recycled material, which is often perceived as less quality than virgin material. It was highlighted that there is certain readiness and willingness of the Croatian construction sector to introduce more sustainable and circular practices, especially to reduce costs and Greenhouse Gas (GHG) emissions. Still, the lack of proper framework conditions hampers the favoring of the circular approach.

37. Introducing a landfill tax was often discussed as an essential economic measure to promote circularity in the CDW sector. This economic instrument would trigger more competitive prices and a market for recycled materials. Many participants see the landfill tax as a highly effective instrument, but it needs to be treated with caution as taxes should be acceptable; otherwise, the waste would be dumped illegally. The implementation of this instrument requires improved control. For example, in Austria, the Finance ministry controls its implementation and imposes fines if taxes are not adequately paid. Moreover, it was concluded that it is necessary to have a network of properly functioning recycling facilities before increasing the tax to restrict landfilling.

38. End-of-waste criteria were often mentioned as a potential measure to increase circularity in the CDW sector and boost the demand for recycled materials. End-of-waste criteria, for instance, for asphalt, could facilitate its re-use since this material can be easily reprocessed into construction. Another material that might benefit from the end-of-waste status is excavated soil, which is generated in large amounts, and the current legislative framework does not allow its re-use in the construction

process. Currently, end-of-waste criteria for CDW are not adopted in Croatia. Austria has set a good example for the development of end-of-waste criteria: here, these criteria were developed in cooperation with all stakeholders, taking into consideration all technical aspects, the possibilities of using CDW in different construction applications, and primarily addressing the concerns of the producers and users including the perceived lower quality of the recycled material. However, the administrative burden of obtaining the end-of-waste status might increase the capacities and resources companies would need.

39. The stakeholders also discussed Green Public Procurement (GPP) as a possible measure for introducing CE approaches, more sustainable management of CDW, and increasing the uptake of more sustainable construction materials. The lack of GPP initiatives on CDW and low awareness among construction project practitioners and public procurers was highlighted as a gap. It was suggested that to implement GPP, inter-sectorial cooperation would be needed, and contracting authorities should consult practitioners. It would also require an interdisciplinary approach by integrating various expertise, political will, and integrity. The current practice for awarding contracts to the bidder that offers the lowest price should be changed, and it shall be ensured that the prices of waste management services are more realistic and incorporate all costs. All bidders offering services that do not meet the legal requirements should be excluded from the tender. During the discussion, it was noted that introducing GPP in the construction sector could increase the administrative burden of processing public procurement tenders. More criteria need to be fulfilled, and technical experts would be necessary to prepare tender documentation and evaluate technical proposals. The participants were reminded about the national educational program for teaching experts on GPP practices in Croatia.

40. The need for capacity building of the stakeholders and practitioners was also highlighted, generally, concerning education and awareness of the stakeholders. Capacity building would be needed for the representatives of the state institutions to develop an adequate legislative framework on the different issues raised during the discussions. The liability of investors and civil engineering companies must be precisely defined, and educated professionals are needed at all levels. In this regard, funding universities should introduce more professional modules and courses, including necessary circular economy subjects. Training on standards and practices would also be beneficial for the workers in the CDW waste management sector to improve the quality of recycling, such as selective demolition practices.

41. A survey of participants' opinions on the training was conducted between 20 August and 12 September 2022. 28 (twenty-eight) workshop participants filled in the survey questionnaire. The distribution of respondents by the city is as follows:

- Osijek 4 participants
- Rijeka 1 participant
- Split 5 participants
- Varaždin 5 participants
- Zagreb 10 participants

42. The main goal of the survey was to examine the attitudes of different stakeholders from the construction sector about the preferable policy options for introduction of circular economy approaches in the sector and to provide the policy makers with information about the perceptions and expectations of the participants on this matter.

The survey covered the following issues:

- The areas of interest of the participants from the 5 (five) life cycle stages in the construction sector;
- The most significant barriers to implementing circular economy measures for CDW in Croatia;
- The measures that shall be given priority to promoting circular economy in the CDW sector in Croatia.

The respondents were also asked to provide information on what capacity they participated in the workshop. The results are as follows:

Type of stakeholder	
Public administration employee(s) at the national level (state administration)	2
Regional and local government employee(s)	8
An expert employed in an agency, fund, NGO, civil society	1
Private company or private entrepreneur(s) employee(s)	12
State or local public company employee(s)	2
Independent expert(s)	1
Other	2

The level of satisfaction of participants with the workshops was also ranked in general useful, as shown in the following figure:

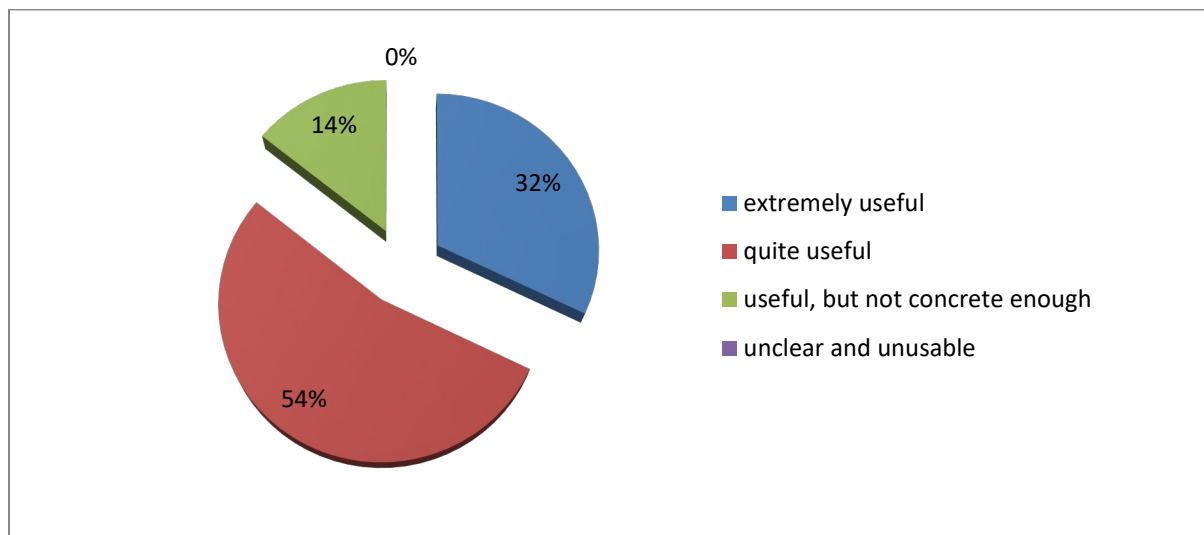


Figure 2: Results from the survey: usefulness of the training

43. The following questions focused on the areas of interest among the participants in the workshops, priority measures, and the barriers to CE. The results show that the re-use and recycling of materials and components from buildings is by far the most interesting topic.

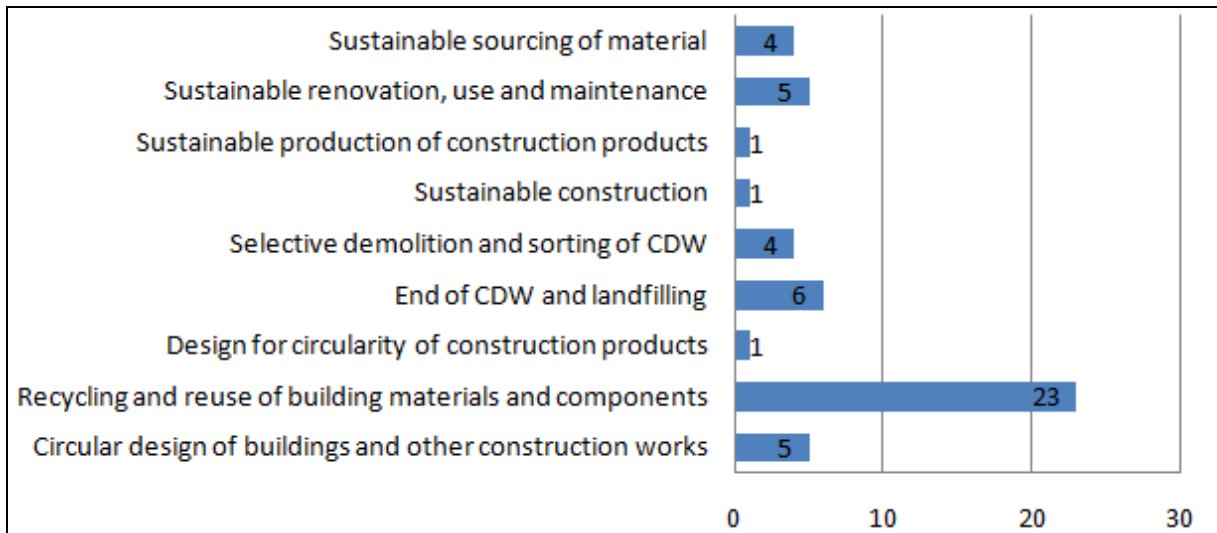


Figure 3: Most interesting topics on CDW in a CE and responses from the survey

Afterward, the respondents were asked their opinion on the most important barriers to implementing circular economy measures for CDW in Croatia. The results highlighted that the lack of regulatory framework, the lack of implementation of policy measures and practices, and the lack of administrative capacity were ranked as the most important barriers.

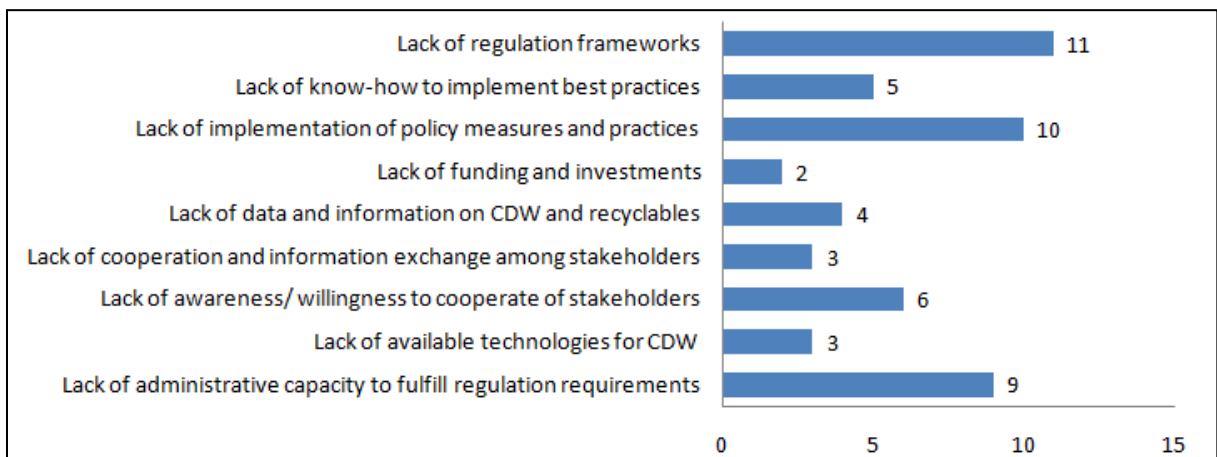


Figure 4: Barriers to implementing CE in CDW and responses from the survey

Finally, the survey investigated the priority measures for promoting a circular economy in the CDW sector in Croatia. The results highlight that tax on raw materials, end-of-waste criteria and standards were ranked as priority measures.

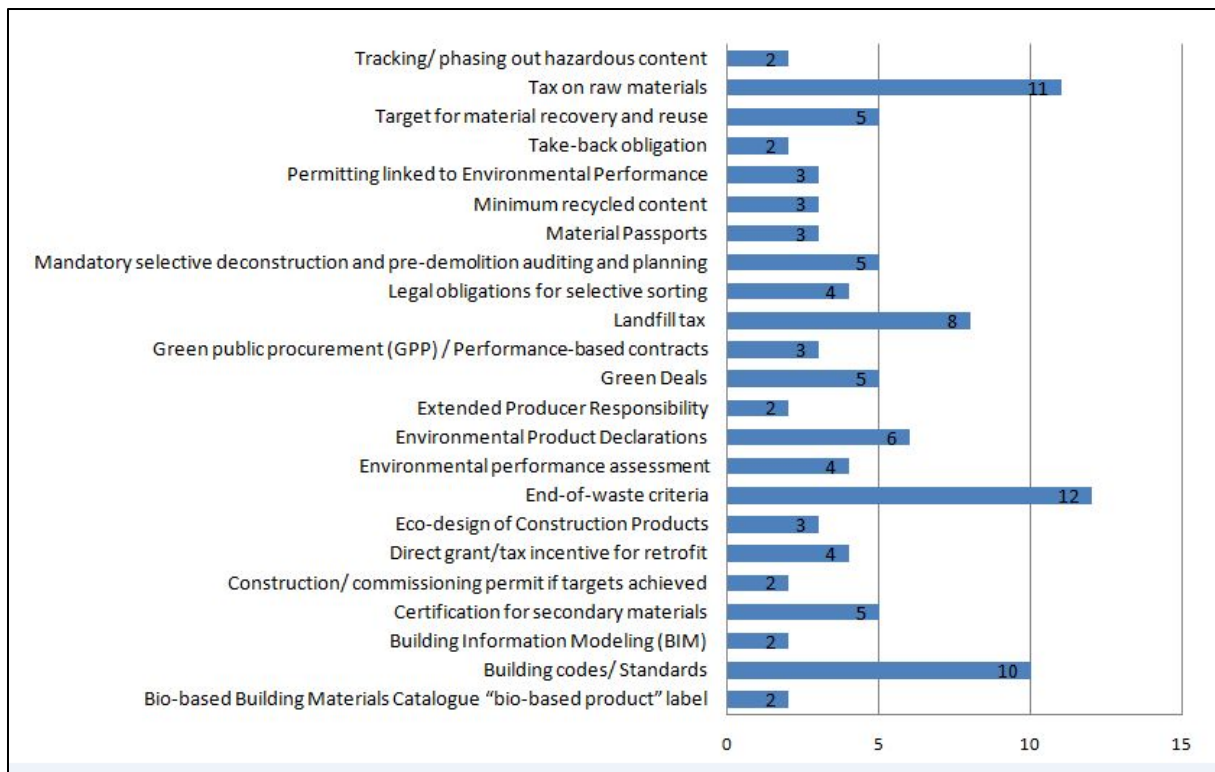


Figure 5: Priority measures. Results from the survey

5. Recommendations for the new (post 2022) NWMP related to capacity building needs

44. Training and capacity building activities are key to implementing circularity aspects in the upcoming (post 2022) National Waste Management Plan and the Circular Economy Action Plan for CDW. Capacity building will be necessary to address the immediate need to raise the capacity of government, regional and local officials, and CDW operators/specialists. Considering the current situation of CDW management in Croatia and the outcomes from face-to-face workshops and webinars, it is evident that the expectation of knowledge, skills, and abilities of officials and other stakeholders concerned at different levels is different. Hence, their training needs are also different. The capacity building must be tailored according to the specific target groups. The recommendations should be used to include training and capacity building programs in the upcoming (post 2022) National Waste Management Plan and the Circular Economy Action Plan for CDW.

45. Specific target groups for the capacity building activities were identified in Croatia for CDW. After collecting the feedback through state-level interactions and consultations, discussions, and Q&A sessions of live workshops and webinars, some specific training needs and preferred training delivery mechanisms for relevant target groups were identified. Based on roles, responsibilities, and areas of interest, the following target groups were determined:

1. Decision makers - local, regional, and state government officials (both elected officials and expert staff of the public authorities concerned) responsible for the development and implementation of CDW and circular economy-related legislation and strategies;
2. Waste inspectors - authorities responsible for inspection, control, and monitoring of CDW activities;

3. Construction permitting authorities - authorities responsible for issuing permits for design, construction and commissioning of buildings and other construction works;
4. Construction supervisors - consultants performing supervision on design and construction works;
5. Construction and demolition investors - private investors and public contracting authorities investing in construction works (buildings and infrastructural projects), financial institutions funding building and construction works, investors in demolition projects (public and private);
6. Construction designers - designers of buildings and civil construction works;
7. Construction and demolition companies;
8. CDW management operators - companies that carry out transportation, collection, storage, separation, recycling, backfilling, and other treatment operations with CDW, and landfill operators;
9. Producers of construction materials - companies that design, produce or import construction products, including from recycled construction waste;
10. Construction products market surveillance authorities - authorities responsible for market surveillance of construction products placed on the market;
11. Aggregates extractors - companies that extract natural materials for the production of construction products (e.g., operators of quarries and pits for sand, gravel, etc.);
12. Standard developers - scientific and research institutes, authorities responsible for development and adoption of standards, accreditation of laboratories, managers and experts from public or private laboratories;
13. Users and civil society representatives - associations of homeowners and real estate companies, NGOs, and other civil society representatives.

46. Specific training and capacity building recommendations for different target groups were formulated, including the learning objectives, the targeted audience groups, and the learning objectives. The recommendations were formulated considering the following:

1. Deficiency in the CDW management services and lack of circularity approaches in the construction sector, and the gap in capabilities of local, regional, and state Government officials to take corrective measures, revealed during workshops and webinars;
2. The results from the evaluation survey of the “Trainings on the circularity of construction and demolition waste for stakeholders from the construction sector”, carried out at the end of the workshops;
3. Expert opinion of WB experts and external consultants on CDW and circular economy training needs;
4. Analyzing target group-specific training needs.

The identified training areas per each target group are summarized in the table below.

Table 5: Proposed topics for training and capacity building to be included in the next NWMP

N°	TRAINING TITLE	TARGET AUDIENCE GROUP	LEARNING OBJECTIVES	RECOMMENDED TOPICS TO BE COVERED	TYPE AND DURATION	SOURCES OF TRAINING
1.	Regulatory and policy framework to implement circularity aspects in the construction sector	Decision makers	Strengthen the capacity of national, regional, and local authorities for developing and implementing policy measures	<ul style="list-style-type: none"> • Legislation and strategic planning • Enforcement measures • CDW recycling infrastructure • Economic instruments • Increasing market demand of recycled CDW • Networking and cooperation • CDW reporting • LCA and Environmental Performance Assessment • Circular design of buildings • Demolition approaches • End-of-waste status • GPP and performance-based contracts • Sustainable use of buildings • EPR • Mandatory minimum recycled content 	Technical assistance project (1-2 years), including: <ul style="list-style-type: none"> • Workshops • Expert missions • Study visits 	Advisory support from European technical assistance programs or other international financial institutions providing technical assistance
2.	Best practices and useful tools for development of inspection plans for controlling CDW management operators and enforcing of CDW related legislation	Waste inspectors	Strengthen the capacity of waste inspection authorities by drafting inspection plans and making necessary risk assessment, especially by presenting best practices and useful tools to achieve this task	<ul style="list-style-type: none"> • Enforcement measures • CDW reporting • Developing an inspection plan • End-of-waste status • Standards for use of CDW • Landfill tax 	<ul style="list-style-type: none"> • Participation in the Technical assistance project • 2-day workshop • 2-day expert mission and/or • Study visit 	<ul style="list-style-type: none"> • Workshop with participation of EU Member State experts • Study visit and/or EU Member States expert(s) to be sent to waste inspectorate administration to provide in-depth advice on the development of

N°	TRAINING TITLE	TARGET AUDIENCE GROUP	LEARNING OBJECTIVES	RECOMMENDED TOPICS TO BE COVERED	TYPE AND DURATION	SOURCES OF TRAINING
						inspection plans
3.	Regulatory and policy framework to integrate circular economy approaches in urban planning and permitting of construction works	Construction permitting authorities; Construction supervisors	Strengthen the capacity of Construction permitting authorities and Construction supervisors in applying environmentally related criteria when issuing construction permits	<ul style="list-style-type: none"> • Legislation and strategic planning • Enforcement measures • Architecture, urban planning to facilitate circularity • Circular design of buildings • LCA and Environmental Performance Assessment • Sustainable use of buildings • Mandatory minimum recycled content 	<ul style="list-style-type: none"> • Participation in the Technical assistance project • Expert mission to develop Guideline for incorporating CE and waste management related criteria for issuance of construction permits • 2-day workshop 	<ul style="list-style-type: none"> • Workshop with participation of EU Member State experts • EU Member States expert(s) to develop Guideline
4.	Regulatory and policy framework, costs and benefits of applying CE approaches in construction sector, existing recycling infrastructure and technologies	Construction and demolition investors	Increase the knowledge of Construction and demolition investors on waste management and CE to explain their obligations and existing possibilities for fulfilling their obligations, overcome the	<ul style="list-style-type: none"> • Legislation and strategic planning • Enforcement measures • CDW recycling infrastructure • Economic instruments • Increasing market demand of recycled CDW • Networking and cooperation • CDW reporting • Demolition approaches • Standards for use of CDW • Standards on structural requirements for construction materials 	<ul style="list-style-type: none"> • 3-day workshop 	<ul style="list-style-type: none"> • Workshop with participation of national experts

N°	TRAINING TITLE	TARGET AUDIENCE GROUP	LEARNING OBJECTIVES	RECOMMENDED TOPICS TO BE COVERED	TYPE AND DURATION	SOURCES OF TRAINING
			prejudice against recycled CDW, to inform them about the financial and other benefits of applying CE approaches	<ul style="list-style-type: none"> • Standards to ensure that construction products are dismantling-compliant • Real value of the buildings • Circular design of buildings • LCA and Environmental Performance Assessment • GPP and performance based contracts • EPR • Sustainable use of buildings • Mandatory minimum recycled content 		
5.	Design For Circularity – concept, good practices, standards and legal framework	Construction designers	Become familiar with the concepts of circular design and design for deconstruction, existing good practices, standards, and legal requirements, including CE-related criteria for approval of construction design and issuance of a permit for starting the construction, to overcome the prejudice against recycled CDW	<ul style="list-style-type: none"> • Legislation and strategic planning • Enforcement measures • CDW recycling infrastructure • Increasing market demand of recycled CDW • Demolition approaches • End-of-waste status • Standards for use of CDW • Standards on structural requirements for construction materials • Standards to ensure that construction products are dismantling-compliant • Communication of circularity related information • Circular design of buildings • Urban planning to facilitate circularity • LCA and Environmental Performance Assessment • Sustainable use of buildings • Mandatory minimum recycled content • SCIP - database of ECHA for information on substances of concern in articles • Bio-based building materials catalogues and labeling in EU Member States 	<ul style="list-style-type: none"> • Expert mission to develop Guideline for incorporating CE and waste management-related approaches in the designs of building and other construction works • 2-day workshop 	<ul style="list-style-type: none"> • Workshop with participation of national experts • EU Member States expert(s) and national experts to develop the Guideline

N°	TRAINING TITLE	TARGET AUDIENCE GROUP	LEARNING OBJECTIVES	RECOMMENDED TOPICS TO BE COVERED	TYPE AND DURATION	SOURCES OF TRAINING
6.	Sustainable construction and renovation - good practices, standards and legal framework	Construction and demolition companies	Become familiar with existing good practices and legal requirements including CE-related criteria for issuance of commissioning permit	<ul style="list-style-type: none"> • Legislation and strategic planning • Enforcement measures • CDW recycling infrastructure • CDW reporting • Demolition approaches • End-of-waste status • Communication of circularity related information • Sustainable use of buildings 	<ul style="list-style-type: none"> • 2-day workshop 	<ul style="list-style-type: none"> • Workshop with participation of national experts
7.		CDW management operators		<ul style="list-style-type: none"> • CDW recycling infrastructure • GPP and performance based contracts 		
8.	Sustainable design and production of building materials	Producers of construction materials	Become familiar with existing good practices and legal requirements for the production of durable, renewable, non-hazardous, reusable/ recyclable materials by applying sustainable sourcing of raw materials and non-harmful production process, existing financial benefits of producing sustainable materials and legal requirements and incentives	<ul style="list-style-type: none"> • CDW recycling infrastructure • Economic instruments • Increasing market demand of recycled CDW • Environmental product declarations • Material passports • Implementation of EU Construction Product Regulation • Eco-design requirements for construction products • Networking and cooperation • End-of-waste status • Standards for use of CDW • LCA and Environmental Performance Assessment • GPP and performance based contracts • EPR • Mandatory minimum recycled content 	<ul style="list-style-type: none"> • 2-day workshop 	<ul style="list-style-type: none"> • Workshop for business-to-business exchange of information with participation of national and EU Member States expert(s)

N°	TRAINING TITLE	TARGET AUDIENCE GROUP	LEARNING OBJECTIVES	RECOMMENDED TOPICS TO BE COVERED	TYPE AND DURATION	SOURCES OF TRAINING
9.	Implementation of the legal requirements for marketing of construction products	Construction products market surveillance authorities	Strengthen the capacity of market surveillance authorities for the implementation of Declaration of Performance and criteria for CE marking, Assessment and Verification of Constancy of Performance, Harmonized standards European assessment documents and European technical assessments	<ul style="list-style-type: none"> • Standards for use of CDW • Implementation of EU Construction Product Regulation • Eco-design requirements for construction products • Environmental product declarations • Experience in developing national environmental requirements towards construction products in EU Member States 	<ul style="list-style-type: none"> • 2-day workshop 	<ul style="list-style-type: none"> • Workshop with participation of EU Member States expert(s)
10.	Sustainable sourcing of raw materials for production of construction products	Tax authorities Aggregates extractors CDW management operators	Strengthen the capacity of tax authorities in imposing a tax on raw materials and landfill tax and inform aggregates extractors CDW management operators about	<ul style="list-style-type: none"> • Legislation and strategic planning • Enforcement measures • Developing of inspection plan • CDW reporting 	<ul style="list-style-type: none"> • Participation in the Technical assistance project • Expert mission to develop Guideline for imposing Tax 	<ul style="list-style-type: none"> • Workshop with participation of EU Member State experts • EU Member States expert(s) to develop Guideline

N°	TRAINING TITLE	TARGET AUDIENCE GROUP	LEARNING OBJECTIVES	RECOMMENDED TOPICS TO BE COVERED	TYPE AND DURATION	SOURCES OF TRAINING
			their legal obligations		on raw materials and Landfill tax • 2-day workshop	
11.	Standards and technical specifications as drivers for increasing the market demand for recycled CDW	Standards developers	Become familiar with standards related to recycled CDW that contribute to overcoming prejudice against recycled materials, creating legal certainty and boosting market demand	<ul style="list-style-type: none"> Standards for use of CDW Standards on structural requirements for construction materials Standards to ensure that construction products are dismantling-compliant 	• 2-day workshop	• Workshop for business-to-business exchange of information with participation of national and EU Member States expert(s)
12.	Sustainable use and maintenance of buildings	Users and civil society representatives	To become familiar with good practices and benefits of sustainable use and maintenance of buildings to extend their life, obligations of home owners and other users	<ul style="list-style-type: none"> Legislation and strategic planning Communication of circularity related information Real value of the buildings Sustainable use of buildings Urban planning to facilitate circularity 	• 2-day workshop	• Workshop with participation of national experts

ANNEX I. Agendas of the webinars

Webinar 1: Preparing a Circular Economy Strategy: The experience of Austria

Online Webinar

“Preparing a Circular Economy Strategy: The experience of Austria”

6 May 2022, 09:00 – 11:30 CET

Agenda

09:00	Welcome to the conference <i>Representative from the World Bank – Mr Vladimir Kalinski</i>
09:05	Welcome from the Ministry <i>Representative from the Ministry – Ms Tonćika Jarak</i>
09:10	Introduction to the Activity and objectives of the webinar <i>Ms. Francesca MONTEVECCHI, Environment Agency Austria</i>
09:15	Circular economy in the EU: an overview <i>Mr. Ulrich KRAL, Environment Agency Austria</i>
09:30	Preparing a circular economy strategy. The example of Austria <i>Ms. Brigitte KARIGL, Environment Agency Austria</i>
10:00	Moderated Q & A session
10:20	Coffee break
10:30	The stakeholders’ involvement process for the preparation of a circular economy strategy in Austria <i>Ms. Brigitte KARIGL, Environment Agency Austria</i>
10:45	Insights from the preparation of a Croatian Circular Economy strategy on CDW <i>Mr. Francesco LORO, Global Factor</i>
11:00	Moderated Q&A session
11:30	End of the meeting

Online Webinar

“Strengthening the re-use of products and re-use centers in Croatia”

12 July 2022, 09:30 – 12:00 CET

Context

Repair and re-use of products bring ecological and regional economic benefits. Recent figures published by European Commission reveal that only 40% of household waste is currently re-used or recycled. The introduction of the Eco-Design Directive and national waste-preventing programs, the emergence of business models and practices in re-use collection and preparation for re-use, and the rising tide of public awareness are all conspiring to change the face of re-use management in Europe.

Aim and scope

This webinar provided a comprehensive overview of re-use activities in Europe. It demonstrated good practices from Belgium and Austria to trigger actions in Croatia. The webinar also gave a unique opportunity to discuss and evaluate current re-use challenges and opportunities in Croatia.

Organizer

The webinar was part of the World Bank’s advisory services to the Ministry of Economy and Sustainable Development to implement a program on Circular Economy Approaches in Solid Waste Management, with the aim to improve waste management practices in Croatia and support the country in transitioning towards a circular economy. More details can be retrieved [online](#).

Agenda

Start	End	Duration	Topic	Presenter
Opening				
09:30	09:35	00:05	Welcome notes	Sanja RADOVIĆ – <i>Ministry of Economy and Sustainable Development (MINGOR), Croatia</i> Vladimir KALINSKI – <i>World Bank</i>
09:35	09:40	00:05	Program overview	Francesca MONTEVECCHI – <i>Environment Agency Austria (EAA)</i>
Keynote				
09:40	10:00	00:20	The European Re-use Landscape	Matthias NEITSCH – <i>RREUSE - Repanet Austria</i>
10:00	10:20	00:20	Re-use in Croatia	Ivan BOŽIĆ – <i>HUMANA NOVA Croatia</i>
10:20	10:30	00:10	Break	
Good practices				
10:30	10:50	00:20	Re-use network and centers in Belgium	Eddy WILLE – <i>OVAM - Public Waste Agency Belgium</i> Jolien ROEDOLF – <i>HERWIN, Flemish region of Belgium</i>
10:50	11:10	00:20	Enhancing re-use collection	Berthold SCHLEICH – <i>Arge Abfallvermeidung GmbH, Austria</i>
11:10	11:30	00:20	End-of-waste for re-usable products	Maximilian WAGNER – <i>Repanet Austria</i>
Interactive session				
11:30	11:50	00:20	Discussion on enablers and barriers for re-use activities in Croatia	-
Closing				
11:50	12:00	00:10	Wrap up, next steps, closing remarks	Francesca MONTEVECCHI – <i>EAA, Austria</i>

Online Webinar

“Management of Plastic Packaging and Single-Use-Plastics in the EU and Croatia: Legislation, policies and best practices”

13 September 2022, 9:00 – 11:30 am

Context

Global plastic production has grown exponentially from 1.5 million tons in 1950 to 359 million tons in 2018, and with it the volumes of plastic waste. Recent figures published by European Commission reveal that only 33% of plastic waste is currently recycled. The main issues complicating plastic waste management are the low price and quality of recycled products, and serious impacts on the environment through plastic littering and the greenhouse gas emission from production and incineration. The introduction of the 55% recycling target for plastic packing waste by 2030, new legal framework conditions, competing markets, import restrictions, evolving technologies and the rising tide of public awareness are all conspiring to change the management of plastics in Europe.

Aim and scope

This webinar provided a comprehensive overview of plastic packaging and single-use plastics management. It highlighted the need for sustainable plastic management, briefly introduced the EU legal framework and focused on the status and outlook for plastic waste management in Croatia. Croatian experts profited from the presentation of good practices from Lithuania and Austria. The webinar provided a unique opportunity to discuss and evaluate the challenges and opportunities of implementing EU plastic waste legislation in Croatia.

Organizer

The webinar was part of World Bank’s advisory services to the Ministry of Economy and Sustainable Development to implement a program on Circular Economy Approaches in Solid Waste Management, with the aim to improve the waste management practices in Croatia and support the country in transitioning towards a circular economy. More details can be retrieved [online](#).

Agenda of the webinar

Start	End	Duration	Topic	Facilitator
Opening				
09:00	09:05	00:05	Welcome notes	Sanja Radovic - <i>Ministry of Economy and Sustainable Development (MINGOR), Croatia</i> Vladimir Kalinski - <i>World Bank</i>
09:05	09:10	00:05	Programme overview	Francesca Montevecchi – <i>Environment Agency Austria (EAA)</i>
Plastic management in the EU and in Croatia				
09:10	09:25	00:15	The need for sustainable management of plastic packaging and SUP in the EU	Reinhold W. Lang - <i>Johannes Kepler University Linz</i>
09:25	09:40	00:15	Extended producer responsibility (EPR) for plastic packaging and SUP in EU legislation: A brief overview	Mikhail Asenov – <i>Environment Agency Austria (EAA)</i>
09:40	09:55	00:15	Management of plastic packaging and SUPs in Croatia: current status and outlook	Gordana Pehnc Pavlović - <i>Croatian Chamber of Economy</i>
09:55	10:00	00:05	Break	
Good practices from EU Member States				
10:00	10:15	00:15	Development of the EPR system on packaging waste in Austria	Dieter Schuch – <i>Altstoff Recycling Austria</i>
10:15	10:30	00:15	Prevention and management of plastic packing waste in Lithuania	Dainius Kazlauskas – <i>Environmental Projects Management Agency, Lithuania</i>
10:30	10:45	00:15	Management of marine littering: Policies, strategies and actions	Neil A. James – <i>Environmental Research Institute, University of the Highlands and Islands (UHI), UHI North Highland, Scotland (UK)</i>
10:45	10:50	00:05	Break	
Interactive session				
10:55	11:25	00:30	Discussion on opportunities and barriers for improving the management of plastic packaging and SUPs in Croatia	Francesca Montevecchi – <i>Environment Agency Austria (EAA)</i>
Closing				
11:25	11:30	00:05	Wrap up, next steps, closing remarks	Francesca Montevecchi – <i>Environment Agency Austria (EAA)</i>

ANNEX II. Summary of presentations of the webinars

Webinar 1: Preparing a Circular Economy Strategy: The experience of Austria

Introduction to the Activity and objectives of the webinar

An overview and description of the objectives of the webinar were provided at the beginning of the webinar. After the opening remarks by the representatives from the World Bank and the Ministry of Economy and Sustainable Development, an introductory presentation summarized the objectives of the WB for supporting the Government of Croatia to introduce a circular economy in Croatia, focusing on the time frame of the live capacity building and training activities.

Circular economy in the EU: an overview

An overview of the Circular economy in the EU was presented to contextualize the background for the following detailed presentation. The presentation introduced the definition of CE, its objectives, the historical development of the concept, and the most important policies currently applied at the EU level. Material flow management was presented as the primary approach to quantify the materials flowing in and out of the economy, monitor how they are used in society, and measure their level of circularity. The presentation also included a brief description of the legislative and non-legislative measures of the EU Circular Economy Action Plan. The 35 most important measures listed in the EU Circular Economy Action Plan were also introduced. Further information was provided on the monitoring framework, and the indicators used to measure the progress as set up by the European Commission. The European Circular Economy Stakeholder Platform, another initiative of the European Commission related to CE, was also highlighted in the presentation as an essential instrument that brings together stakeholders to share and scale up effective solutions and address specific challenges.

Preparing a circular economy strategy. The example of Austria

The Austrian example of preparing a circular economy strategy was presented in detail to the webinar attendees. Information was provided on the roadmap and organizational set-up for preparing the Austrian Circular Economy Strategy, which is part of the framework of the current Program of the Government 2020-2025, as well as the initiating Order of the Minister for Climate Protection to prepare a Circular Economy Strategy (2020). Special attention was paid to the organizational set-up for Preparing the CE Strategy, which includes a core team (of representatives from all relevant sections of the Ministry of Climate Protection and external experts), a Steering Committee, and a Project Team. The applied stepwise approach for drafting the CE Strategy was also elaborated and included:

- An initial assessment of the status quo of circular economy in Austria using a set of indicators (EU Circular Economy Indicators, Resources, and Resource Efficiency related indicators, Indicators for economic activities, Waste Indicators);
- The identification of the priority areas to be addressed by the CE strategy (CDW, e-mobility and road infrastructure, plastics and packaging, textiles, WEEE, food waste, bio-economy);
- The definition of the strategic goals (resource conservation, zero waste, zero pollution, climate protection) and measurable targets and indicators (material footprint, domestic material consumption, domestic resource productivity, circular material use rate, MSW generation/cap);
- The identification of appropriate measures for achieving the objectives - legal and regulatory framework, smart market incentives, financing and funding, research, technology development and innovation, digitalization, information, knowledge and collaboration.

The stakeholders' involvement process for the preparation of a circular economy strategy in Austria

The approach taken by Austria to ensure the broad involvement of all relevant stakeholders from business and civil society, ministries, federal states, and research was crucial in preparing the National Circular Economy Strategy. The presentation described that the stakeholder consultations started with an online survey of 600 participants, whose results were used to identify the key areas to be dealt with in the CE Strategy. Subsequently, the vision workshop "Why do we need a circular economy strategy" was organized to define interfaces to other strategies and to collect challenges/hurdles and expectations of the circular economy strategy. The survey was followed by in-depth interviews with selected early adopters from various sectors. Furthermore, about 250 stakeholders in 9 online workshops contributed with proposals for measures in the transformation focus areas of construction, mobility, plastics and packaging, textiles, electrical and electronic equipment, biomass, and waste management. The [results of these workshops](#) were incorporated into the draft strategy, which was later circulated within the Ministry of Climate Protection, the Ministry of Agriculture, Regions and Tourism, the Ministry for Digital and Economic Affairs and then subjected to a public review. The draft strategy was presented to the public at the Circular Economy Summit Austria in March 2022, where it attracted great interest.

Insights from the preparation of a Croatian Circular Economy strategy on CDW

The current status of the implementation of the Croatian Circular Economy Action Plan on CDW was presented. There is progress in diagnosing the existing situation in Croatia regarding CDW production and their management, legislative framework and circularity baseline, and identification of main drivers and barriers in place for the enforcement of the plan. The methodology applied for the diagnostic study was also presented. It included analysis of the available data, benchmarking against best practices, and interviews with key stakeholders. The first insight from the diagnostic report and tentative identification of the existing drivers and barriers for CE were presented at the webinar. The main outcomes from the first consultation meeting and next steps on the action plan were provided.

Webinar 2: Strengthening the re-use of products and re-use centers in Croatia

Introduction to the Activity and objectives of the webinar

Before the main presentations, an overview and description of the objectives of the webinar were provided. An introductory presentation summarizing the objectives, and providing a brief description of the WB capacity building and training services to support the Government of Croatia, was delivered after the opening remarks by the representatives of the Ministry of Economy and Sustainable Development and the World Bank.

The European Re-use Landscape

An overview of the European Re-Use landscape was presented to provide the necessary background information for the detailed presentations delivered. The presentation introduced the potential of re-use in reducing global climate emissions and the historical retrospection of the ever-increasing global socioeconomic flows of fossil materials, biomass, metals, and (non-metallic) minerals through the global economy. The potential of re-use and maintenance of products for improving the circularity in the use phase of the product life cycle was discussed. The presentation outlined the current practices to address these issues and exploit the re-use potential through the development of inclusive and circular business models across Europe by describing the activities and results achieved by the RREUSE organization, an international network representing social enterprises active in the area of re-use,

repair, and recycling. The main EU policies in the field of waste prevention and re-use were also elaborated - the EU Circular Economy Action Plan, which contains measures for promoting sustainable products, reduced consumption & waste and the EU Social Economy Action Plan, which encourages the development of social economy organizations and sustainable practices in the circular economy, organic agriculture, renewable energy, housing, and mobility. The existing partnerships between re-use networks and policymakers were also explained, such as the framework partnership of RREUSE with the European Commission's Directorate General for Employment, Social Affairs and Inclusion, participation of re-use networks in the European Commission's Expert Group on Social Economy and Social Enterprises and European Circular Economy Stakeholder Platform Coordination Group. Austrian experience in the field was shared by presenting the activities and results achieved with RepaNet - an Austrian Network of 43 Social Economy Re-Use Organizations.

Re-use in Croatia

The presenters described the experience of Croatia in developing product re-use models and re-use centers. Examples of re-use, repair, and good practices throughout Croatia were presented, such as Riperaj, which is a place where citizens can repair appliances, furniture, clothes, toys, or similar for free with the help of craftsmen who possess the necessary knowledge and skills; Bike Repair Shop - Zelena AKCIJA, which provides all interested persons with space, tools, and advice to repair their own bicycles. The activities, organizational set-up, and the results achieved by the Social cooperative Humana Nova were presented in more detail as it is the most developed social enterprise in Croatia focused on the circular economy. This enterprise is a member of RREUSE network and contributes significantly to the education and employment of persons with disabilities, marginalized and minority groups, long-term unemployed people, single mothers, etc.

Re-use network and centers in Belgium

The policy measures the Public Waste Agency of Flanders applied presented Belgium as one of the front runners in re-use EU-wide. After briefly describing the historical development of re-use in Flanders, the presentation focused on the main pillars of Flanders' re-use sector (environmental protection, social employment, and social protection) and the key success factors. Establishing a link between re-use & social employment was highlighted as one of the main success factors, including embedding re-use centers in local waste policy, establishing a strong federation of re-use centers (HERW!N; <https://herwin.be>) to promote the exchange of experiences, standardizing reporting and serve as a representative body in discussions with policymakers, and continuous professionalization of the centers creating their own brand, awareness raising through professional advertisement, etc. The results achieved in collection and re-use according to the financial data provided in the presentation confirmed that the Flemish model is one of the most successful in Europe.

The objectives, organizational setup, and activities of HERW!N were presented, a collective of socially circular entrepreneurs in Flanders. The primary purpose of the collective is to create employment for people far from the regular labor market and, at the same time, through the Kringwinkels initiative, give used items a second life and take care of the environment. The presentation focuses on the scope of Kringwinkel, consisting of 28 dynamic companies operating 28 Re-use shopping centers and 162 stores, and how HERW!N supports Kringwinkel through communication partnerships, innovation projects, repair services, and rental services.

Enhancing re-use collection

The participants at the webinar had the opportunity to listen to details about the Austrian example of establishing a network of re-use centers. A brief introduction of ARGE - Association for Waste Prevention founded in 1982 was provided, followed by a description of approaches applied in Austria for collecting reusable items, including details about various types of delivery systems, pick-up systems. Examples of good practices and re-use initiatives in the different Federal States of Austria we also provided such as:

- RepaNet: Online container finder (www.repanet.at);
- Revital in Upper Austria that consist of 110 recycling centers, 8 social enterprises, and 25 shops (www.revitalistgenial.at);
- Overview of the Styrian Re-Use Shops and re-use activities in the City of Graz ([Graz – Re-Use Box](#));
- “48er Tandler” in Vienna (<https://48ertandler.wien.gv.at>).

End-of-waste for re-usable products

The importance of the end-of-waste status for reusable products and the content of the Austrian guideline "Re-Use of products - guideline for determining the end of waste when preparing for re-use" was presented. The presentation provided an explanation of the criteria for the classification of product groups, steps, and procedures for assessment checking, cleaning, and, if necessary, repairing of goods before they lose the status of waste and can be offered to customers, as well as the protocols for proving the end-of-waste status. It was highlighted that training the workers to repair end-of-life products is of great importance. The guideline also contains a form to be used as proof of training.

Webinar 3: Training and capacity building on CDW in CE

The need for sustainable management of plastic packaging and SUP in the EU

The presentation introduced the topic of the management of plastic packaging and SUPs in the EU. A transformative Change by Design is needed to overcome the grand challenges the world is facing, including plastic waste and the climate crisis. Plastic circularity is still low, but limits exist to the maximum amounts of plastic waste that can be mechanically recycled. Rough estimations of the maximum eco-efficient or mechanical recycling of plastic packaging can achieve 35-53% of the total plastic waste, suggesting that other forms of recovery should be considered. These would include re-use, chemical recycling and energy recovery. In this sense, sustainable circular economy paths must also find the nexus with the energy transition paradigm and the carbon CO2 circularity in a cross-sectoral Energy, Climate & Circular Economy Strategy.

Extended producer responsibility (EPR) for plastic packaging and SUP in EU legislation: A brief overview

The presentation introduced the principles of EPR systems. First, an overview of the regulation on EPR in the EU was provided. The EPR, included in the Waste Framework Directive, sets specific obligations for PROs, including the minimum scope of costs coverage, reporting obligations, and eco-modulated fees where possible. The different approaches in the EU to achieve the objective of the EPR systems were introduced, including competitive EPR schemes (with an open market with multiple PROs),

monopolistic (with one centralized PRO), and collective and individual schemes. The EU Member States apply both approaches.

Management of plastic packaging and SUPs in Croatia: current status and outlook

The presentation overviewed the last achievements and forthcoming legislation on plastic and packaging in Croatia. The EU SUPs Single Use Plastic Directive was transposed in 2021 into national legislation. Measures include a ban on plastic bags, which already entered into force, and an ordinance on waste management. SUPs and fishing gear are also included in the scope. The Croatian plastic industry is aware of the problem and supports the EU Plastic Strategy.

In 2019, the Croatian Platform for Plastic Waste was established by the association representing the industries, aiming to create a market for recycling material, promote standards and eco-design, and construction of modern sorting facilities.

And a special financial fund.

Development of the EPR system on packaging waste in Austria

The presentation introduced Altstoff Recycling Austria (ARA), one of Austria's PROs. ARA was established in 1993 and organized the EPR system for all plastic packaging. The PROs generate about 155 million Euro in revenues from the organization of all waste management steps per year; and additional 45 million Euro from selling secondary raw materials. The costs were reduced, during the years, through tenders and revenues from selling secondary raw materials. Since the recycling rate is still low (about 25%), and Austria needs to double it to comply with the EU regulation, further measures should be developed along the value chain. These include constructing new sorting plants in Austria, better sorting, and more efficient recycling. The backbone of the system is a proper separate collection for mechanical recycling.

Prevention and management of plastic packing waste in Lithuania

The presentation provided an overview of plastic packaging measures adopted in Lithuania. These include plastic bag fees, financial instruments to promote the substitution of plastic bags, EPR systems, marking requirements, and minimum recycling contents for PET. The ban on superlight plastic bags is under discussion.

Since 2016, there has been a deposit system for glass and PET plastic for the collection of beverage bottles. In the beginning, the beverage bottle producers started to collect the bottles. Now the system functions through reverse vending machines. The implementation of DRS implies costs for producers and the administration. For instance, the establishing and running of counting centers cost about 20 million euros in Lithuania.

Management of marine littering: Policies, strategies and actions

About 20 million tons of plastic enter the aquatic systems each year. More data on the quantity and type of marine littering are needed. Data on fishing gears is, unfortunately, poor. Studies in the Northern Sea demonstrated that more than 30% of species ingest plastic and microplastic from plastic gears, fishing ropes, nets, etc.

Research on eco-innovation is conducted to address the problem, including using marine plastic as reinforcing material for construction and the use of bottles to remove pollutants (since these tend to attract when sedimenting in the sea).

Communication and engagement with the stakeholders are essential policies to address the issue of plastic waste from fishing activities in marine pollution. It is recommended to organize training for fishermen.

ANNEX III. Summary of Presentations of the training and capacity building on CDW in a CE

A summary of each presentation delivered during the training session is presented below. The PowerPoint presentations (training materials) are attached in Annex III – Training Material.

CE in CDW capacity building training

The presentation introduced the concept of circular economy as a paradigm to keep resources, materials, and products in the economy as long as possible until their intrinsic value is retained and to minimize raw resource input which will lead to a decrease in waste generation and emissions. The presentation explained the RAS - “Circular Economy Approaches in Solid Waste Management (P173141)” – CERCLE, which aims to operationalize circular economy in Croatia to comply with EU Directives in the waste sector, that were amended upon the adoption of the EU CE package. The series of training and capacity building for the CDW sector and developing a national CE Action Plan for Construction & Demolition Waste are some of the main RAS outputs.

Overview and objectives of the capacity building and training activities

A brief overview was made on the training and capacity building objectives, the calendar of events in the different cities, the agenda of the training, and the trainers and experts involved.

CDW in the context of CE and approaches along the value chain

Furthermore, the most important policies on circular economy for CDW along the value chain were introduced. These include mandatory and voluntary measures for:

- Production of building materials;
- Design for circularity;
- Construction phase;
- Use and Maintenance of buildings and infrastructures; and
- End of Life of buildings and infrastructures.

Circular Economy in the EU and Croatia - an overview

The presentation framed the issue of circular economy in the context of the EU and Croatia. The EU Green Deal, the Circular Economy Action Plan, and the upcoming European Commission Strategy for a Sustainable Built Environment (specifically for CDW) were emphasized in the EU context. An important tool for circular economy consists of the EU circular economy indicators, as part of the circular economy monitoring framework, which includes the indicators of municipal solid waste generation and recycling, circular material use, competitiveness, and innovation. Croatia lies below the EU average when considering these indicators. The steps forward for Croatia include the alignment of the national waste legislation to the EU legislation, and the preparation of a Circular Economy Action Plan for CDW (currently under development).

Session 1 Circular design of buildings

The session aimed to provide an overview of circular economy-related instruments currently applied in the design and construction phase in several EU Member States.

Concept, barriers, and enabling conditions for the implementation of circular design of buildings

The concept of circular design for buildings was introduced, including the main characteristics to be achieved during the construction process, including, e.g., modularity and demountability, adaptability, durability, light design, recyclability and non-hazardousness of materials and components, less material use and environmentally compatible choice of materials. The main instruments applicable in this phase to achieve circularity were presented, including the stipulation of Green Deals between national governments and the private sector and the adoption of Material Passports, Environmental Product Declarations, and Certification Systems.

Integration of sustainable criteria into the construction process – The experience of Austria

The presentation highlighted the sustainability criteria currently applied in Austria's construction process to promote the sector's circularity. The EU legal framework, the national legal frameworks, and the current status of CDW production and recycling in Austria were briefly introduced as well. Furthermore, the EU Construction Products Directive² and the requirements of Annex I - "Basic requirements for construction works" were presented. In Austria, Annex I was transposed into six legal documents (OIB-Richtlinien³) covering several aspects related to construction (safety, mechanical stability, protection against noise, etc.). However, the document on "Sustainable use of natural resources" which covers re-use, recyclability and durability of construction products has not yet been adopted in Austria.

Additionally, the Manual and Atlas for Recycling developed for Austria were shown. These include the sustainable use of excavated soil in new construction projects for all aggregates. The prescriptions of the Atlas are also transposed into the national legislation, the Recycling Materials Directive⁴. Recycling on site and the potential savings in CO₂ emissions related to the transport of materials were also elaborated, as well as the next challenge for the sector – treating and recycling mineral wool and recycling plastic waste.

Requirements for issuance of building permits or in public procurement. Best practices from the EU

An overview was provided for the building permits and permits in public procurement in different EU countries to achieve sustainability in the CDW sector. First, the EC Construction Products Regulation N° 305/2011⁵ and the methods and criteria prescribed in the document were presented. Furthermore, a summary of currently applied standards was provided, including the Standard ISO 20887 (2020) for Design for Disassembly and Adaptability. Examples from the application of legal and economic instruments applied in specific EU countries were also given, including the Code for Sustainable Homes in the UK (which sets mandatory minimum performance standards and assessment criteria for new buildings) and the Environmental Performance of Buildings in the Netherlands, based on LCA assessment of building components and materials.

² [Construction products \(CPD/CPR\) \(europa.eu\)](https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32011R0305)

³ <https://www.oib.or.at/en/oib-guidelines>, Guidelines in German language only, but overview is also available in English.

⁴ [Herstellung und Verwendung von Recycling-Baustoffen \(usp.gv.at\)](https://www.usp.gv.at/Herstellung-und-Verwendung-von-Recycling-Baustoffen)

⁵ [EUR-Lex - 32011R0305 - EN - EUR-Lex \(europa.eu\)](https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32011R0305)

Session 2: Increasing recycling content in construction products

The session aimed to introduce policy instruments currently implemented in several EU Member States to promote the uptake of recycled materials into new constructions.

Introduction of measures to increase recycling content in buildings and products

In the beginning, the presentation introduced the barriers and enabling conditions to increase the recycling content in new construction projects. Lack of legally-binding requirements, investors' trust in the recycled material, and the supply and availability of recycled material were indicated as the most prominent barriers. In addition, instruments currently applied in several EU Member States were introduced, including the Green Deal prescribing minimum recycling content of concrete in the Netherlands, the mandatory use of recycled materials by the public authorities in Italy according to the national Green Public Procurement rules, including the legislation regulating the requirement, and the norms and standards that the recycled material needs to satisfy.

Overview of EU and Croatian legislation on status of recyclability, and recycling of construction and demolition

The presentation aimed to provide an overview of the EU and Croatian legislation on recycling. First, an overview of the current EU legal documents and strategies concerning CDW was provided, including the Circular Economy Action Plan (A new Circular Economy Action Plan for a cleaner and more competitive Europe COM/2020/98 final), the EU Waste Framework Directive 2008/98/EC, and the EU construction and demolition waste protocol and guidelines⁶. An overview of the construction and demolition sector's footprint in Croatia was provided, highlighting that the sector contributes to 21% of total raw material consumption, 32% of total waste generated, and 13% of total GHG emissions. Then, the Croatian legislative framework for CDW was introduced, including the Building Act⁷ and the Waste Management Act⁸, which set priorities for CDW management, and separate collection and prevention activities. Followed by the Ordinance on Construction Waste sets the conditions to properly address the hazardous content, by-products, and end-of-waste criteria for CDW. Finally, the presentation briefly described the current status of CDW management and recycling in Croatia and the progress in achieving the EU targets. It was highlighted that despite the progress in the past years to recycle CDW waste, Croatia is still lagging in achieving the targets due to some barriers, including illegal disposal of CDW, lack of availability of recycled material, lack of trust of investors for recycled products, and lack of monitoring and infrastructure.

At the end of the presentation, future measures to increase the recycling quantities in the construction sector in Croatia were introduced, including the Waste Management Plan 2022 and the National Action Plan for the circular economy in the sector of construction and demolition, currently developed by the Ministry of the Economy and Sustainable Development in cooperation with the World Bank.

Closing the material loops in the construction and demolition waste sector. Recycling yards and Permits in Austria

The purpose of the presentation was to introduce the measures implemented in Austria to close the materials loops and increase recycling in the CDW sector. The CDW management in Austria has developed over the past 30 years with the progressive implementation of laws, voluntary agreements,

⁶ <https://ec.europa.eu/docsroom/documents/20509/attachments/1/translations/en/renditions/native>

⁷ [Building Act.pdf \(gov.hr\)](#)

⁸ https://mingor.gov.hr/UserDocImages/UPRAVA-ZA-PROCIJENU-UTJECAJA-NA-OKOLIS-ODRZIVO-GOSPODARENJE-OTPADOM/Sektor_za_odrzivo_gospodarenje_otpadom/Ostalo/management_plan_of_the_republic_of_croatia_for_the_period_2017-2022.pdf

establishment of voluntary Associations for Recycling, and adoption of guidelines and standards for recycling involving all relevant sector representatives. This allowed establishing a competitive recycling market without introducing legal requirements such as minimum recycling contents. The mechanisms to establish mobile and stationary treatment plants to increase the recycling of CDW in Austria were also presented. Mobile treatment plants are utilized mainly in remote areas, such as mountain areas. In contrast, stationary treatment plants are established in more urbanized areas, such as in the City of Vienna, where strict requirements on noise and dust emissions guarantee the safety and acceptance of the plants by the population. Finally, the law for the reorganization of past pollution was presented, which consists of a landfill tax that covers non-recyclable materials, whereas recyclable materials are not subject to any taxation.

Green Public Procurement as a policy measure for CDW in a circular economy. Concepts, the process of procuring construction works along the value chain, and documentation and verification procedures

The presentation elaborated on the Green Public Procurement approaches for CDW. The EU GPP core and additional criteria were presented. These are voluntary criteria that the EU Member States can transpose into their national legislation. The process of adopting GPP criteria was also introduced, together with the need for assessment of the criteria and definition of technical specifications in tenders; and the different phases of buildings and constructions' life-cycle where GPP requirements are applied. Furthermore, the typologies of GPP criteria were introduced, including standards, labeling, LCA, environmental product declaration, requirements on waste management, etc. Finally, the mechanisms to verify the compliance of the tenders with the GPP criteria were briefly discussed.

Session 3: CDW end of life and landfilling restrictions

This session was dedicated to the legal frameworks of the EU and Croatia and policy measures adopted in different EU Member states for the end-of-life and landfilling of CDW in the view of a circular economy.

Introduction to measures for CDW management at its end of life

First, the presentation covered the objectives, barriers, and conditions for obtaining high recovery rates of recyclable materials from CDW and minimizing the landfilling of valuable resources. Economic factors and legal requirements were identified among the main drivers. The presentation also introduced the mechanisms usually employed to apply landfilling restrictions for CDW, including landfill taxes with different structures, landfill bans, and gate fees. Enforcement measures to promote the recovery of material from CDW over landfilling include adopting site waste management plans, mandatory deposits before demolishing (as in the example of Spain) and adopting end-of-waste criteria. To obtain the end-of-waste status, different procedures are applied in the EU Member States, which include adopting quality requirements such as the declaration of conformity.

Overview of EU and Croatian legislation on landfilling with a focus on construction and demolition

The aim was to introduce the legal framework for landfilling of CDW in the EU and Croatia, including the EU Landfill Directive⁹ (1999/31/EC) and its transposition into Croatian legislation. Specifically, the Croatian Waste Management Act in its Article 39 prohibits the disposal of certain types of waste, which nevertheless do not include recyclable, energy recoverable, and inert waste. The national Ordinance on Waste Disposal also regulates the issuance of a waste disposal permit, a financial guarantee for

⁹ <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A31999L0031>

insurance of waste disposal costs in Article 17, and provides a distinction between landfilling and backfilling operations. Notably, a landfilling tax is prescribed in Article 100 of the national Waste Management Act but is not implemented.

CDW: end of life, recycling possibilities and landfilling restrictions in Austria

The presentation elaborated on the topic of end-of-life, recycling possibilities, and landfilling restrictions in Austria. At first, the legal instruments currently available in Austria were presented, including the Austrian “End of Waste Act” and the standards applied by the Austrian Standard Institute. Further, the Guidelines for Recycled Construction Material adopted in Austria in 2017 were presented, including the protocol for quality management of CDW and different quality classes of aggregates. Concerning landfilling, the national legislation recognizes different types of waste sites and bans the landfilling of certain types of aggregates that can be recycled.

Guidelines for the waste audits before demolition and renovation works of Buildings

The presentation introduced measures for waste audits before the demolition and renovation of buildings in order to identify the material that can be recovered. Deconstruction permits and public procurement are used to achieve this objective. Some EU examples, including the Green Deal on pre-deconstruction audits in Finland and the pre-demolition audits in Austria, were shown. In Austria, a demolition expert is legally required to conduct an audit to identify hazardous material and is liable for the process. Further examples in Denmark, Finland, and Sweden were presented, where selective deconstruction and on-site sorting are carried out without legal obligations for demolition auditing for different aggregates.

ANNEX IV. Capacity building trainings delivery reports

The six reports for the capacity building pieces of training are given below. These include a summary of outcomes from the discussion sessions, the signatories of the participants, outcomes from the survey reports, and photos taken during the sessions - as proof of delivery. Since the training program was identical in all six cities, the summary of the presentations is provided in Annex I.

Training session report from Zagreb

Summary of the discussion

A range of measures, of both regulatory and voluntary nature, were discussed.

- Voluntary commitments in the form of Green Deals

The respondents would welcome voluntary agreements and **Green Deals** as a tool to introduce circular approaches in the construction sector, however, the comments were that Croatia is lagging too far behind to have a Green Deal and the country has other more urgent priorities.

- Increase of recycled content in products and buildings

Concerning enhancing recycled content in construction products, the importance of scaling up the research and development achievements were highlighted through examples. The percentage of **recycled aggregates in concrete** is already up to 50% in the country. In particular, a representative of a civil engineering company shared that performed tests have shown that the rate of replacing natural aggregates with recycled products can go up to 50%, and even further scaling up is already feasible. Another good practice from Istria province showed that recycling mineral wool is feasible. Still, the

main problems for further development are the lack of sufficient quantities of separated waste without contaminants and the lack of location to store recycled material.

Representatives from the cement industry and producers of construction products commented that increasing the recycling content beyond 50% would not make the concrete a lower quality product, and recycled content in concrete can safely be up to 60%. Regarding the use of recycled CDW in cement production, it was highlighted that the technology could be more expensive to adapt the cement plant to include recycled content, but it will eventually lead to savings on CO₂ emission taxes.

- Standards, quality and supply of recyclates.

Regulatory measures were discussed, including the introduction of **quality standards** for construction products. The participants highlighted that Croatian national standards already exist. The Institute IGH commented that the quality and technical properties of recyclable CDW have to be well known to achieve desired characteristics of the final product. The geographical location where the recycled CDW will be used is also essential because applications closer to the sea require higher quality and lower recycled content due to the risk of corrosion and the harmful impact of moisture.

Discussions around the limitations of potential measures highlighted that readily recyclable materials for producing recycled construction products are not available in the required **quantity and quality**. Currently, the demand exceeds the supply, and there is a gap in (sharing) information and availability of recyclable materials.

A waste exchange platform was suggested by workshop participants as an important measure to **increase the supply and demand** for recycled CDW. The Waste Stock Exchange was created under the Croatian Chamber of Commerce for easier locating and recovery of secondary raw materials needed for production processes¹⁰. However, the stakeholders indicated that the waste stock exchange needs to be further developed, a lot of materials are already listed, but implementation is lagging.

- Building passports and public procurement.

The possibility of utilizing **building passports** in Croatia was discussed, but the participants highlighted that such a practice is too advanced. More important **training is needed** in waste management, and basic approaches should be developed first.

Stakeholders also shared their opinions on **green public procurement (GPP)** practices in Croatia, noting that experience has existed for several years, but there are problems in implementation. An opinion was shared that with the introduction of GPP in the construction sector, the administrative burden to process public procurement tenders can increase because more criteria need to be fulfilled, and there will be a necessity for technical experts who would prepare tender documentation and evaluate technical proposals. The participants were reminded that there is a national educational program for teaching experts on GPP practices in Croatia.

- Illegal dumping of CDW.

The root causes of the **leakage of CDW into the environment** were discussed, and the overarching problems identified included low levels of recycling and the existence of illegal dumping. In this context, various causes were also discussed, such as “sham recovery” (examples were given of property owners allowing the dumping of CDW on their land), the need for awareness raising, and

¹⁰ <https://digitalnakomora.hr/e-gospodarske-informacije/burza-otpada/centar-informacija/o-burzi-otpada>

change in end-user behavior. Several participants argued that the lack of regulatory measures to address these issues could also be seen as a root cause for improper CDW treatment.

Representatives from local authorities raised the question of how national inspectorates could ensure proper CDW disposal because there is a problem with **illegal dumping** and inspectorates should be able to control not only registered companies but also private citizens and unregistered companies. Only a few companies generating CDW are currently registered.

- Improvements in CDW recycling practices.

Some participants saw **state subsidies** and other positive financial stimuli for recycling as more effective than taxes, fees, and other negative financial instruments for discouraging landfilling. Still, in this case, general taxpayers will bear the costs instead of punishing polluters.

Some participants noted that a **catalog of recycled construction materials** is needed to enhance the use of such materials in new buildings. Except for some ongoing initiatives, currently, there is no such catalog at the EU level, and such a measure is welcomed in Croatia as certification of products could create trust and increase the market demand.

A question was raised on the availability of **storage capacity for recycled material** and in particular how it is possible to have storage in the city and how to overcome the resistance of the citizens living nearby. The Austrian experts provided an example of a CDW storage site in Vienna. At this site, the authorities applied an in-house solution that reduces noise and emissions of pollutants like dust. All precautionary measures were taken so that incoming road, as well as the entrance and exits, are not in the vicinity of the residential buildings.

- CDW from earthquakes.

Distinct measures for different **earthquake debris** were discussed. Unlike Austria, where such events are rare, Croatia needs specific measures to address this waste stream. The good practice of Italy, which is geologically very similar to Croatia, was provided where in response to such kind of event, a special ordinance is in force allowing quick allocation of funds for those who bring material for recycling. Normal waste classification is changed by introducing special waste codes to deal with the debris. Permits for creating temporary storage are temporarily waived so that the material can be brought away quickly from the earthquake area to a place where it can be sorted. The priority, in this case, is to reconstruct, not CDW recycling.

- End-of-waste and landfilling of CDW.

Some stakeholders noted that **End-of-waste status** is needed to encourage recycled waste in buildings and construction works. They compared the situation in Austria, where it is challenging to obtain end-of-waste status because of the current legislative setup. Still, other options exist to increase recycling, and the recycling rate is high. In Italy, CDW could obtain either status of by-product or end-of-waste if CDW meets certain conditions. However, the requirements for recycling CDW are strict and almost equal to the administrative burden for obtaining end-of-waste authorizations. The focus should always be on ensuring the quality of the final product, regardless of whether it will follow the waste management requirements or product standards.

Many participants considered **landfill tax** a highly effective instrument, but it should be treated with caution as the taxes should be acceptable; otherwise, the waste will be dumped illegally. Implementation of this instrument requires strengthening the control. The following example was provided: in Austria, the Finance ministry controls the implementation and imposes fines if taxes are

not properly paid. It was stated that a network of adequately functioning replacing facilities is needed before increasing the tax to restrict landfilling.

Asphalt and cement producers noted that **quality assurance procedures and documentation** require a lot of paperwork. Austrian and Italian experts highlighted the importance of such procedures to guarantee the technical and chemical quality of recycled waste. In Italy, the technical standards for asphalt made from virgin raw materials and waste are the same to ensure high quality. They pointed out that it is not possible to simplify EU procedures, but it is possible to ease procedures for which member states are responsible.

- Re-use of CDW.

Some participants stated that **the re-use** of construction materials could significantly contribute to the efficient use of resources. This practice is new and just starting in Austria, and it is limited to re-using components such as windows and doors. Re-using such components is not always possible because they can be damaged, or installing them in a new place might be difficult. In Italy, the legislation does not allow the re-use of components in building structures but only for aesthetic purposes. This practice is clearly in line with circularity aspects, but as the quantities suitable for re-use are insignificant, it solves a little part of the whole problem. Currently, no database on reusable components exists in Italy and Austria.

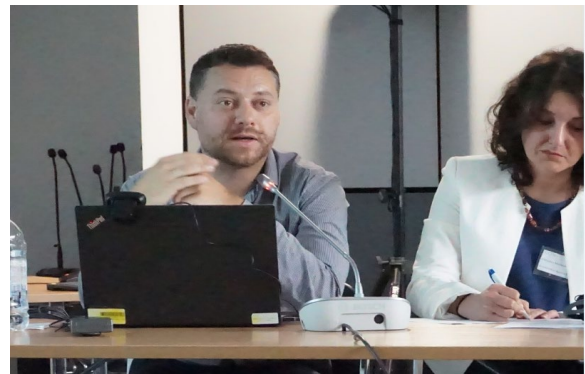


Picture 1: Opening speakers in the training and capacity building session in Zagreb





Picture 2: Participants in the training and capacity building session in Zagreb



Picture 3: Trainers and screenshot of the presentations

Outcomes from the training evaluation reports

The survey questionnaire was filled out by 10 participants from Zagreb region.

The results of the survey show the following areas of interest among the participants in the workshops. Maximum two answers were allowed.

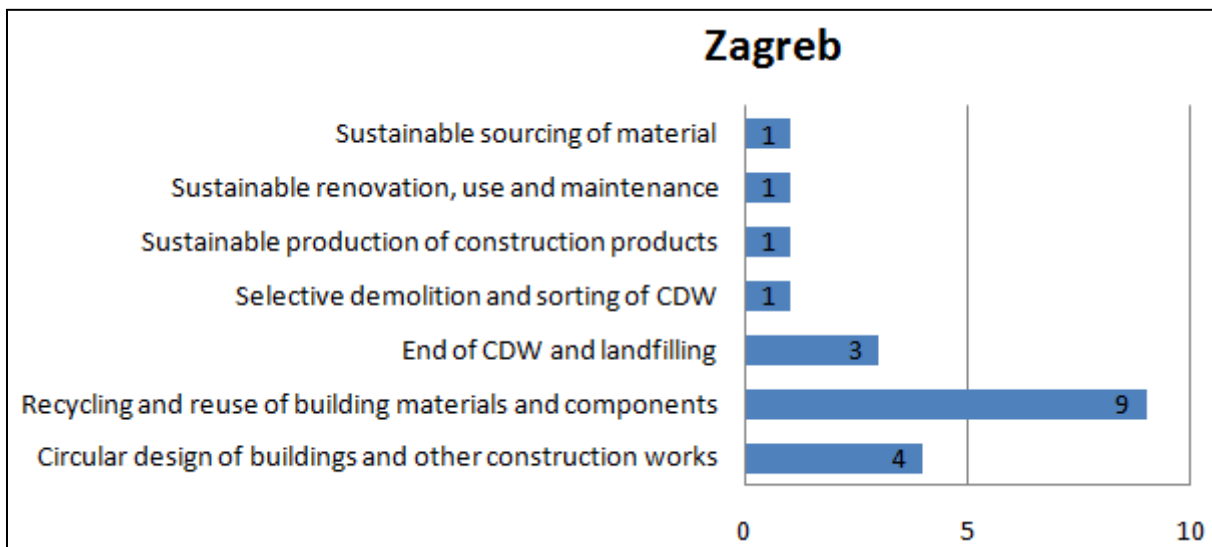


Figure 6: Areas of Interest. Identified barriers. Results from the survey in Zagreb

The respondents were asked about their opinion on the most important barriers to implement circular economy measures for CDW in Croatia. Maximum 2 answers were allowed. The following responses were received.

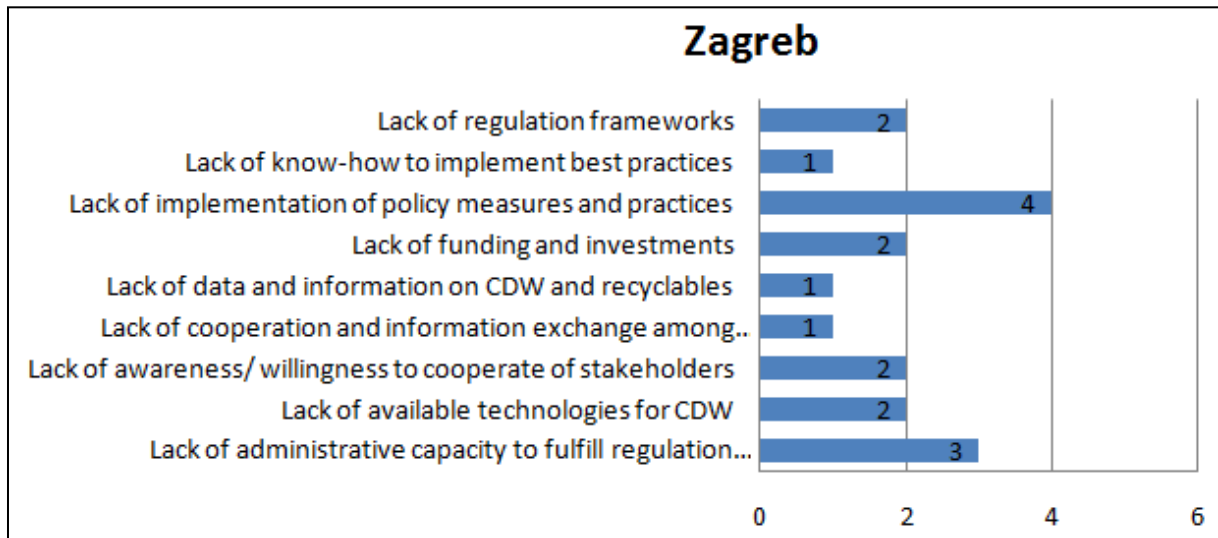


Figure 7: Identified barriers. Results from the survey in Zagreb

List of participating stakeholders in the event in Zagreb

- The Ministry of Economy and Sustainable Development
- Faculty of Civil engineering, Zagreb
- The City of Zagreb
- Zagrebačke ceste branch of Zagreb Holding Ltd.
- The City of Karlovac
- Croatian Business Council for Sustainable Development
- Institut IGH d.d.
- NEXE d.d.
- CE-ZA-R d.o.o.
- STRABAG d.o.o.
- Holcim d.o.o.

Training Session Report from Rijeka

The workshop's purpose was to receive input and describe and evaluate the existing problems and possible policy options that could be implemented in Croatia to improve CDW management and introduce more circular approaches in the sector.

- Lack of enough quantity and quality of recyclable CDW.

Cement producers noted that a detailed action plan would be needed to increase the use of CDW in concrete and cement, containing **measures to motivate** cement producers and concrete batching plants to use CDW in cement production or respectively as filling materials or aggregate in concrete. Other concerns are the **supply of enough quantities** of CDW ready for use in cement and concrete production and the **demand for the final product** made from waste.

- Permitting of construction works and tracking of CDW.

The representatives of recycling yards also raised the problem of insufficient readily recyclable CDW due to the illegal dumping of CDW suitable for recycling, adequate inspections, and enforcement measures. It was suggested that building construction and demolition **permitting** should be used to enhance the control over CDW separation and environmentally-sound treatment. The representatives of the recycling industry merited the following good international practice (shown in the presentations) as suitable for Croatia - issuing building permits only in case the Site Waste Management Plan shows that the 70% material recovery target is fulfilled and the deposit required within the application procedure for building and demolition permits (practice in Spain). Recycling industry representatives mentioned that CDW is often being disposed of illegally, and there are no efficient methods of **tracking CDW streams**. He proposed that during issuing a use permit for the object, monitoring of relevant documentation that proves that proper CDW management has been done can be conducted.

- Responsibilities for CDW.

Representatives of local and regional authorities noted that the construction sector is currently not circular, and measures are needed to stop the leakage and keep the materials in the loop. However, at the moment, there are more pressing issues related to CDW, like insufficient control over illegal dumping, regulations not fully harmonized with EU requirements, and **overlapping responsibilities** (the construction sector is under the jurisdiction of 3 ministries). It was suggested that the priority should be simplifying, harmonizing, and enforcing waste management legislation. Technical inspections would be needed. For example, inspectors and communal inspectors should undertake the role of inspecting illegal disposal. It was suggested that strengthening the inspections should be part of the CE action plan.

- Utilization of excavated soil.

The participants also discussed the possible ways to utilize **excavated soil** and the related problems. Representatives from the scientific community and academy (in the field of civil engineering) raised concerns that the use of excavation soil for backfilling in building foundations should be performed with caution because it might affect the bearing capacity of the building and cause a negative impact due to humidity. Therefore, quality assessment is needed for using excavated soil in such applications. The recycling industry noted that the stony content in the excavated soil could be crushed to the desired size, sieved, separated, and used in landscaping. The construction industry representatives stated that they could use the excavated materials for backfilling of inactive quarries, but they cannot get permission from competent authorities. In practice, the legislation does not permit backfilling old

quarries because large quantities should be included in another waste code, 170104, to be used in quarries. Participants suggested that excavation materials should be included in the construction waste management legislation (probably meaning to be included in the material recovery targets), and the law should foresee using this material to close old quarries.

- Standards and guidelines for CDW.

Standards and guidelines were seen by many as highly effective for ensuring the quality of the construction materials made from CDW. Representatives from the scientific community and academy noted that there is a practice and ongoing research activities for testing construction waste for usability in construction works and possible combinations of waste and virgin raw materials in producing new construction materials. There are also research activities for the implementation of passive and circular designs of buildings that have a lower impact on the environment and preserve natural resources. The results of the research activities are transferred to practitioners and construction companies and could be used to develop standards and guidelines. Representatives from local authorities suggested that deconstruction standards should be highly prioritized as demolition is the largest source of CDW. A representative of the cement industry noted their company sells low-carbon concrete. It was also stated that there is still no certified construction waste in Croatia that can be used instead of natural stone aggregate for concrete production. Good practice was presented in a pilot project on the application of recycled aggregate during the construction of a new hospital in Zadar. The project included demolishing an existing building and using generated construction waste as recycled aggregate in the construction of a part of the building. The pilot project confirmed that by complying with the standards for recycled aggregates and knowing their origin, it is possible to produce concrete with properties equivalent to ordinary concrete for specified durability conditions. However, no further information was available regarding whether the project results were used for developing a guideline or standard for deconstruction.

- Development of quality standards and guidelines.

Concerning **mandatory minimum recycling content**, the participants suggested that it could be between 5% and 10%, according to the current state of technology. Still, the participants highlighted the problem of available secondary materials and trust in their quality.

It was well noted that **Life Cycle Analysis (LCA)** analysis is the basis for **Environmental Product Declaration (EPD)**. In Croatia, LCA of different construction products is established. One of the suggestions at the meeting was the establishment of a national database for LCA for construction materials.

- Behavioral change and education.

Behavioral change was also identified as essential in implementing more circular approaches in the construction sector. Both representatives from universities and local authorities suggested that the change should start from an early age - from children in kindergartens. Also, they shared some good practices (e.g., an alphabet of municipal waste). However, it was noted that these measures would bring results after 40 years, but more pressing problems should be solved now, like amending the regulations and enforcing the legal requirements.

Education was seen by many as highly effective for enhancing circularity in the construction sector. It was pointed out that there are currently sustainability courses in the universities, not part of regular curricula, but as extra-curriculum subjects within the environmental engineering specialties.

- Economic instruments.

Economic instruments were discussed as a suitable measure to encourage the separation of CDW and increase the supply of recyclable CDW. It was noted that currently landfilling and illegal dumping are much cheaper than separation and recycling. Croatia does not apply landfill tax, but it was pointed out that other legal requirements should be established before the tax, such as separation before backfilling. An opinion was shared that introduction of a landfill tax could be unaffordable due to the current economic crisis and rising prices. Awarding construction companies that separate their waste accompanied with a recording system which company is bringing the waste to the recycling yards was proposed as an alternative approach to landfill tax. Environmental Protection Fund where funds from environmental tax would be raised and EPR funding were mentioned as possible sources for financing the awards. Representatives from local authorities argued that awarding is unrealistic due to the need of raising public funds through taxes or prices. Another option is to enhance the application of the existing incentives through VAT reduction for specific services.

- Management of CDW from small generators.

The participants discussed the problem with the economy of scale and **regional CDW treatment facilities**. It was pointed out that in Croatia, there are too many small municipalities (more than 400 in the country), and in many of them, there are no demolition activities. Therefore, it would be impractical if each municipality had its recycling facility for CDW.

Management of **CDW in small quantities** (e.g., from household repairs) was raised as another issue that needs a solution. Many municipalities do not provide collection services for CDW in small quantities generated by households even if they are supposed to, and the CDW ends up in the environment. The Law on Spatial Planning and Construction of Facilities requires that owners report the repair work of the facilities and that the adaptation must not be confused with the reconstruction. In reality, 30-40% of adaptation works are performed without authorization, and the generated CDW is mismanaged.

- Green public procurement.

Green Public Procurement was also discussed by workshop participants as a possible measure for introducing CE approaches, more sustainable management of CDW, and increasing the uptake of more sustainable construction materials. Participants suggested that new regulation should be adopted so that the CDW is mandatory and included in the Bill of Quantities and unit prices are specified. Examples of unacceptable practices were also provided such as changing the prices and scope of work after contracting through the conclusion of new Annexes to the contract. Overall, the participants were skeptical that this instrument would bring tangible results in introducing circular approaches in the construction sector due to organizational issues in public procurement.

- Control of illegal dumping.

A participant representing a small municipality highlighted that sanctioning **illegal dumping** and land restoration measures for compensating the owner of the polluted property **when the polluter is unknown** is a subject of great concern. The long duration of misdemeanor proceedings if the perpetrator of the illegal dumping of CDW is identified was also highlighted as problematic. The restoration and clean-up measures are the responsibility of the municipality. Still, when the municipality cannot allocate the necessary funds, it is the responsibility of the county, and in the case when even the county cannot fund the clean-up, the State Inspectorate should issue directions for clean-up. In practice, instructions for clean-up are rarely given, and many areas remain polluted.

- Recycling centers.

Regarding recycling centers, the participants asked the Austrian experts several questions. The first question asked was about the **profitability of recycling centers** in Austria. The Austrian experts answered that the centers sell recycled products at prices similar to those of raw materials and apply gate fees for treatment of CDW accepted at the centers.

The second question was in which application CDW uptake is the highest. They replied that natural materials in Austria lack enough aluminosilicate content, and CDW is welcomed in cement production.

The third question was about the most appropriate uses of waste gypsum. They answered that gypsum is welcomed in cement production; however, due to the larger quantities generated in Austria, a new plant will be built, enabling the production of new gypsum walls from waste gypsum.

The recommendation for Croatia given by the experts when establishing the foundation of the recycling system for CDW was to start with simple legislation for the mandatory separation of CDW. The landfill tax was Austria's key policy to stimulate proper disposal and recycling. Another important aspect is the effectiveness of control and collaboration with the population to combat illegal dumping. In Austria, violators might receive a fine of up to 100 000 EUR.



Picture 4: Participants of the training in Rijeka

Outcomes from the training evaluation reports

The survey was compiled by just one respondent. The answers are as follow:

- areas of your interest? - Recycling and re-use of building materials and components
- most important barriers to implement circular economy measures for CDW in Croatia?
 - Lack of administrative capacity to fulfill regulation requirements
 - Lack of implementation of policy measures and practices
- measures that shall be given priority to promote circular economy in the CDW sector in Croatia?
 - Green Deals
 - Tax on raw materials
 - Permitting linked to Environmental Performance
 - Legal obligations for selective sorting
 - Certification for secondary materials

- Mandatory selective deconstruction and pre-demolition auditing and planning

List of participating stakeholders in the event in Rijeka

- Primorje-Gorski Kotar County
- Istria County
- The City of Rijeka
- Association of Cities in the Republic of Croatia
- The Municipality of Vrbnik
- Eko - Murvica d.o.o. Crikvenica
- Faculty of Civil Engineering, University of Rijeka
- GRD d.o.o.
- Holcim d.o.o.
- Izgradnja d.o.o. Crikvenica

Training Session Report from Varaždin

A range of measures, of both regulatory and voluntary nature, were discussed.

- Enhancing the use of sustainable construction materials in construction works.

Discussions around the problems of **using more sustainable construction materials** in construction works highlighted that price competition by cheaper, non-sustainable, low-quality products and loss of recyclable waste due to illegal dumping and incineration should be addressed. A representative from the industry showed good practices of using bio-oils with low hazardous content in coatings to protect shelves and panels, sorting and re-using wood pallets, etc. The representative also pointed out that to further incentivize such practices, the following would be needed: **standardization** useful to restrict the use of low-quality, cheaper materials, **enforcement of the prohibitions on illegal dumping** to increase re-use and recycling, and education and **training of workers in source separation**. The awareness of practitioners is high on this matter.

- Permitting and end-of-waste status for using of asphalt and concrete in road construction.

Road construction companies highlighted that asphalt is 100% recyclable, and all the asphalt they receive can be re-used. The same is valid for concrete. These waste materials could be crushed and used in road construction. According to the construction sector's representatives, the main problems are not technical but legal and administrative. Asphalt taken from existing roads is considered waste and cannot be directly re-used in new construction. There is also an administrative burden to obtain **permits** to use asphalt on new roads. They expressed an opinion that asphalt is a too high-quality material that can be recycled 100% and should not be considered waste. **End-of-waste criteria**, for instance, for asphalt, could facilitate the re-use of asphalt waste. However, the experts pointed out that currently end-of-waste status of asphalt is not given in Croatia. Still, even if it were, the paperwork and documentation would not be reduced through the introduction of EOW criteria. Country roads in Croatia might use up to 100% recycled asphalt. However, for recycling asphalt from old roads in Croatia, there is a problem with the tar that cannot be recycled. Currently, the percentage of recycled waste in new asphalt is around 15-20%, and at this rate, there is enough recycled asphalt to supply the full demand, and all quantities incoming at the site are recycled. There are possibilities to increase the uptake above the current rates even up to 100% if there is enough supply of recyclable asphalt and demand for asphalt in road construction. The only technical problem is the asphalt used in old road construction in the 1950s, which was made from tar instead of bitumen.

The academia representatives commented that most construction materials could be made from renewable (bio-based) and recyclable materials. They also stated that the mindset and construction practices and the social perspective as a whole should be thought to comprehend that almost everything is reusable and recyclable and that the design phase in the construction life cycle is the most important.

- Suitable degree of regulation and standardization to ensure quality on one hand and decrease the administrative burden on the other.

When discussing the obstacles to increasing the recycled content in construction, the representatives from the road construction industries raised the issue of end-of-waste status for asphalt and excavation materials again. They suggested that there should be **less stringent regulation**. These materials should be exempted from having the waste status to ease re-utilization in road construction, especially for waste aggregates in embankments. Also, the paperwork required by the legislation results in higher prices for recycled waste. On the other hand, the same companies expressed disappointment that the investors and designers are reluctant to use more recycled material due to: a

lack of trust in the quality of products made from waste, lack of prescriptions in civil engineering guidelines, standards, and legislation for using waste, avoidance of waste utilization in public procurement, and by the private investors, lack of minimum recycled content in GPP (in contrast to Slovenia, where minimum recycled content is mandatory). It was suggested that the most proper balance should be found in developing the regulatory framework through cooperation between the business, government, academia, and NGOs.

- Need of educated professionals in all levels.

The academia representatives noted that for the development of the regulatory framework, several factors should be met: an increase in the level of knowledge in state institutions, the precise definition of the liability of investors and civil engineering companies, and engagement of **educated professionals** at all levels, but especially in state institutions. In this regard, funding universities to **introduce more professional modules**, courses, and circular economy subjects would be necessary.

- Handling of hazardous packaging and asbestos waste.

The question of **packaging used for hazardous construction materials** and how to handle them was raised since PROs do not take it back as part of EPR schemes. Experts explained that an eco-modulated fee could be part of the solution so that hazardous packaging would be subject to higher EPR fees and non-hazardous packaging of lower EPR fees. Another problem discussed was landfilling **asbestos waste** and the existing price difference between landfills in different counties. Most probably, the price difference is due to the existence of non-compliant landfills and the fact that some counties do not take advantage of the exemption provided in the Landfill Directive, which allows asbestos waste to be accepted at landfills for non-hazardous waste if it is appropriately packed.

- Operation and permitting of mobile recycling plants.

The participants highlighted the importance of on-the-spot construction recycling – demolition sites. Austrian and Croatian experts pointed out a maximum of 20-25 km transport of the CDW for recycling as the maximum distance for cost-effective recycling. A solution (or an alternative) for this could be **mobile recycling plants**. Existing legal barriers to using mobile crushing plants were discussed, including lack of trained workers, complicated permitting, registration and Environmental Impact Assessment procedures, and water protection regulations. The permitting procedure for mobile plants often lasts too long, and the permitting expires too soon (6 months), while the permitted period for stationary plants is 5 (five) years. Economic obstacles were also stated, such as the higher prices to install mobile recycling plants, availability of limited quantities of materials without unwanted contaminants (e.g., bricks and mortar), and the lack of economic feasibility to justify this investment. Mobile plants are preferable because, according to the current requirements, the excess materials utilized on site are not considered waste. Excess materials will be considered waste only if they are sent for utilization outside the construction site.

- Feasibility of landfill tax and green public procurement.

The applicability of the **landfill tax** was again discussed. The participants were in favor of introducing such an economic instrument. However, they commented that the tax should be applied not only to landfilled waste but also to the waste stored for an extended period (which is hard to be identified by inspectors). The tax should cover not only landfilling but also all other operations that are not recycling or re-using so that it becomes an incentive for recycling and re-use.

A question was raised on how to promote recycled CDW in **public procurement tenders**. The Austrian Recycling Associations experts explained that the waste aggregates' quality should be proven by

requiring fulfillment of the same quality standards as natural aggregates. Secondly, the economic advantages of recycled aggregates should be exploited since, in some areas, primary materials are not available. Therefore, the tender documentation could require the materials to be sourced locally (maximum transport distance to be defined). Also, if the price of natural and recycled aggregates is comparable, priority should be given to recycled construction materials in GPP. The experts recommended another solution, i.e., to require minimum recycling content in different layers of construction works and award additional points to participants that offer recycling content that exceeds the minimum.

- Need for collaboration between various stakeholders.

The Austrian experts highlighted a few lessons learned from the Austrian experience to ensure a high level of recycling:

- Apply penalties on improper waste disposal;
- Tax less desirable waste management options such as landfilling;
- Increase the quality of recycled material through laboratory testing, external verification for achieving high technical quality for the fulfillment of EU standards (Construction Products Regulation) as well as Austrian standards, and gain the trust of investors;
- Achieve competitive prices of recycled material, for instance by reducing transport costs;
- Creation of working groups to discuss the standards, which involved academia, the public sector, ministry representatives, and the private sector, for instance, to produce guidelines.

Other options include taxes on natural raw materials, for instance, through green deals, recycling quotas (minimum recycling content), or the introduction of end-of-waste status to ensure that natural and recycled materials are indistinguishable in terms of quality. However, it was pointed out that it took years to properly introduce the end-of-waste status in Austria.

A question was posed regarding the organization and procedures for ensuring **collaboration between various stakeholders in developing standards**. The representatives of the Austrian Recycling Organization explained that working groups were established to discuss and fulfill EU standards and decide how to control their implementation. Through this mechanism, the Association produces guidelines in collaboration with the industry, government, and academia.

- Requirements for selective deconstruction and platform for marketing recycled CDW.

The problem of **selective demolition** was also addressed since this is rarely performed in Croatia. The priority is to achieve a high quality of demolition material. The Austrian experts highlighted that since 2017, for bigger deconstruction projects, above 750 tons of waste, the owner of the building is obliged to have a demolition expert. The procedure of demolition includes inspections to free the material from dangerous substances such as asbestos, organic materials, oil, paints, etc. The demolition expert has liability for the process.

A question was posed about the existence of a recycling **marketplace** in Austria. The experts highlighted that an internet platform for recycled products exists where producers and recyclers can indicate even available tonnages. However, the platform is not considered the primary instrument for the functioning of recycling markets. The market for recycled CDW is mostly regional (within 20-30 km) and driven by transportation costs. In a regional market, the companies know each other for a long time, and this reduces the need for an online platform that connects companies nationwide outside the region. Thus, for most materials, buying recycled CDW from another distant region through the platform would not be economically feasible due to transportation costs.



Picture 5: Participants of the training in Varaždin

Outcomes from the training evaluation reports

The survey questionnaire was filled in by 5 respondents from Varaždin region.

The results of the survey show the following areas of interest among the participants in the workshops. Maximum 2 answers were allowed.

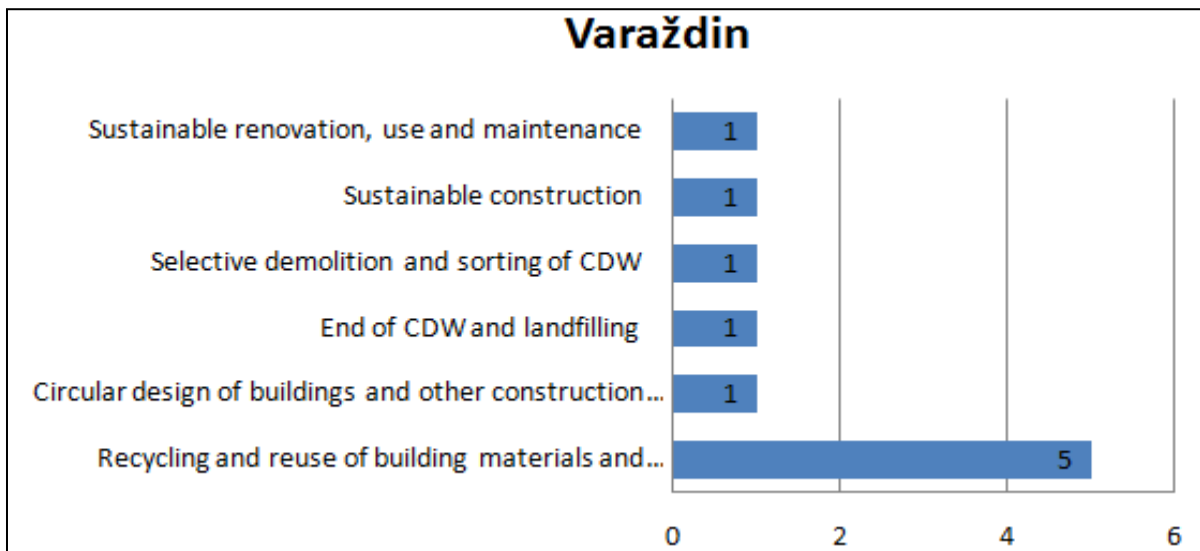


Figure 8: Areas of interest. Results from the survey in Varaždin

The respondents were asked about their opinion on the most important barriers to implement circular economy measures for CDW in Croatia. Maximum 2 answers were allowed. The following responses were received.

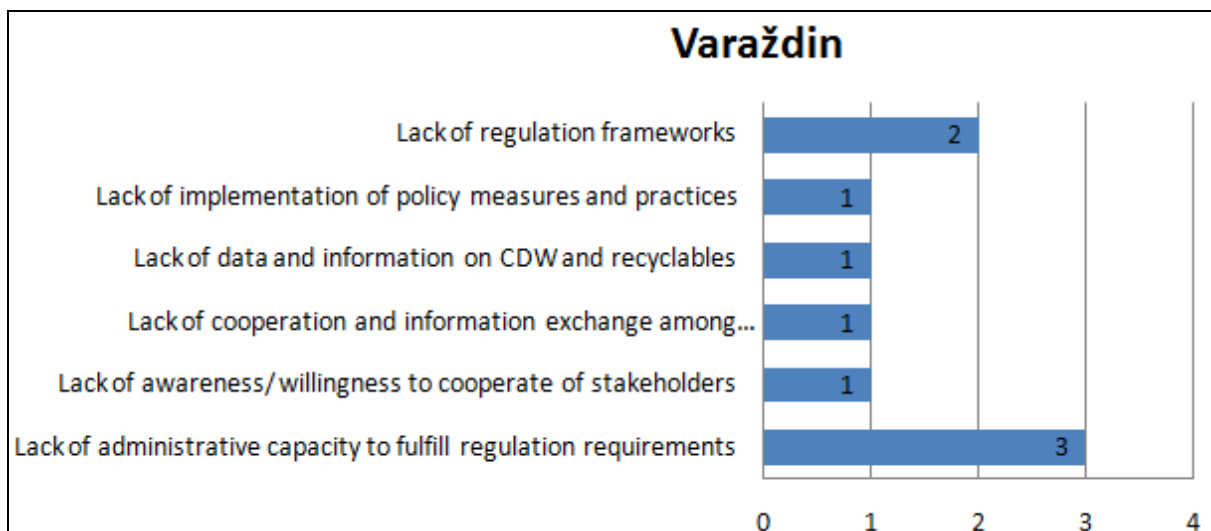


Figure 9: Identified barriers. Results from the survey in Varaždin

In regard to the question about the priority measures for promoting circular economy in the CDW sector in Croatia the participants showed the following preferences.

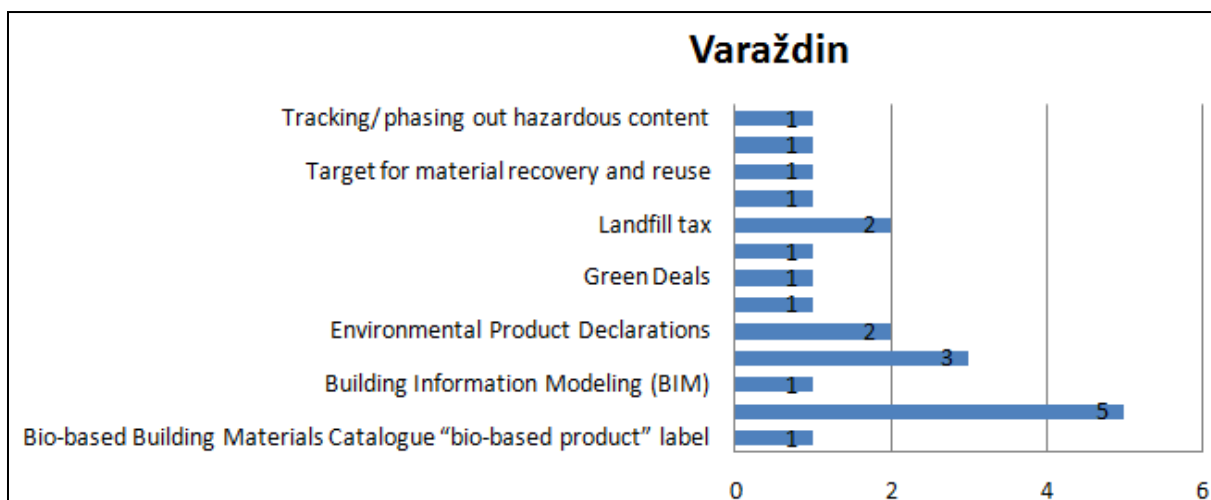


Figure 10: Priority measures. Results from the survey in Varaždin

List of participating stakeholders in the event in Varaždin

- Međimurska County
- The City of Varaždin
- University North, Koprivnica
- Public Institution for Development of Međimurje County REDEA
- Regional center for waste management "Piškornica"
- Colas Hrvatska d.d.
- MIPCRO d.o.o.
- Zagorje – Tehnobeton d.d.
- Brickyard Cerje Tužno d.o.o.
- EcoMission d.o.o.
- Reciklaža Mišić d.o.o.

Training Session Report from Osijek

A range of measures, of both regulatory and voluntary nature, were discussed in Osijek.

- Usage of environmental product declarations and certification systems.

The participants saw the application of voluntary **environmental product declarations** and **certification systems** as proper instruments to distinguish sustainable construction products and buildings. Still, it was stated that despite the construction companies in Croatia catching up with the voluntary application of these measures, their use is still uncommon. Especially the financial aspect related to the costs for life cycle assessments and certifications could be a barrier to broader adoption, and it should be taken into account.

- Application of construction and environmental criteria in the building of traditional earth houses.

A specific problem of using excavated soil (clay) for **constructing traditional earth houses** was pointed out. The legislation considers the excavated material waste, and cannot be used directly in construction. Currently, there are neither EU nor national end-of-waste criteria for the use of excavated soil in the building of earth houses, nor EU or national quality requirements for the mechanical and structural properties of excavated soil for construction purposes.

- Availability of accredited laboratories.

The participants also discussed the existing test methods and the most usual construction materials being tested by **accredited laboratories**. A testing laboratory representative highlighted that construction materials such as concrete, bricks, and tiles are usually tested to assess whether they meet the basic functional criteria (e.g., foundation soils from locations for evaluating the bearing capacity, etc.). Thus, currently, tests focus on physical and mechanical properties rather than testing compliance with environmental standards such as the presence of hazardous contents, but there are laboratories with few exemptions. Participants also highlighted that there would be readiness in terms of available technology and willingness to test environmentally related parameters. However, currently, the necessary regulation is missing. The testing laboratory representatives also stated that there is a problem with the proper recycling and disposal of waste from laboratory tests as it is in small quantities.

- The experience of Austria and Italy in switching from landfilling to recycling CDW.

Like in training in other regions, the administrative burden was highlighted as the basic problem for **increasing recyclable content**.

Austrian and Italian experts shared the lessons learned regarding the driving forces behind the uptake of higher recycling contents in CDW in their respective countries. In the '90s, in Austria, about 12 companies joined to establish a quality standard for construction materials. On this basis, the Austrian Recycling Association was founded. The first developed standards were for valuable materials such as asphalt (due to bitumen content) and concrete. At the same time, legislation on past pollution was adopted, and a tax of 4 Euros per ton of landfilled CDW was required. The Austrian experts highlighted this tax as essential for developing the recycling infrastructure.

In Italy, the recycling of CDW has undergone rapid development during 90-ties due to the waste crisis and shortage of landfills. The starting point was the cooperation between the Ministry of Environment and the recycling industry. The end-of-waste criteria were developed as a cooperation between all stakeholders, taking into consideration all technical aspects, the possibilities to use CDW in different

construction applications, and especially to address the concerns of the producers and users, including the perceived lower quality of the recycled material. Italy carried out demonstration projects to promote products made from CDW. The next step was making GPP mandatory with minimum recycled content.

Experts shared their views on the effectiveness of an online **marketplace** for recycled materials. In Italy, there is no central marketplace, but each company promotes its products through its webpage, several existing associations and a high number of installations, and its professional network.

Another point during the discussion was permitting stationary and **mobile treatment plants** in Austria. For stationary plants, 1 to 1.5 years are usually needed to obtain a permit. For mobile plants, the time is up to 1 year, but the permit could be used on the national level, of course, under the condition that minimum distances from schools, homes, hospitals, etc. be respected. The exact requirements are in force in Italy.

- Financial guarantee on landfilling.

A question of **financial guarantee on landfilling** was posed. The financial guarantee will increase the price of landfilling, thus encouraging recycling. In Croatia, a bank guarantee is required for private companies, while the public authority provides the guarantee for publicly owned landfills. A new methodology for clarifying the way this instrument works will be implemented in the future.

- Functioning of the Recycling Association in Austria.

Participants asked about the functioning of the **Recycling Association in Austria** and which institutions are part of it. The Austrian experts replied that the Association was established 30 years ago, and, in the beginning, there were 10-14 members, mainly construction companies, that were also recycling CDW. Today the Association has more than 80 members, primarily private but also public customers, federal states, and the Ministry of Environment. Every stakeholder whose activity is related to CDW management could become a member of the Association. The Austrian Quality Protection Association for Recycling Building Materials (Österreichischer Güteschutzverband Recycling-Baustoffe) prepares a list of all recycled building materials that were tested in accordance with the Recycling Building Materials Ordinance specifications, including the amendment, ÖNORM B 3140 (marked with a Seal of quality for recycled building materials) and an additional list of mobile recycling plants that have been tested according to the "Guideline for the mobile processing of mineral construction waste and excavated soil, 2nd edition" and have the quality mark for mobile Recycling facilities. The Association is a member of the European Quality Association for Recycling, the European roof organization of national quality protection organizations, and producers of quality-controlled recycled building materials from the EU Member States.

At the beginning of the 90s, Austria had no CDW regulations. Instead, the Association developed a guideline on recycling that focused on the quality of CDW. It took 20 years to improve the guideline and communicate it to the Ministry of Environment. Based on the guideline, 5 (five) years ago, the Ministry of Environment developed a mandatory Ordinance and standards. The Association works in close contact with the Austrian Institute for Standardization.

- Obligations for source separation in Austria.

Participants asked the Austrian experts for recommendations on introducing **an obligation for source separation**. The experts recommended that standards and procedures for dismantling buildings should be developed as a first step.

A question on the type of **information requested for the lab test** was posed to the Austrian experts. They elaborated that, in Austria, there are two types of parameters that should be tested – 1) construction-related parameters such as physical and mechanical properties of the construction material and 2) environmental protection-related parameters. Construction-related parameters are required mainly by the EU legislation – Construction Product Regulation. But there are also national standards. In Austria, all construction products (whether made from recycled or virgin materials) need to obey the same quality standards and achieve the same characteristics. Most of the environmental protection-related parameters are set in the national legislation. They include testing hazardous characteristics such as the content of specific anions, and polycyclic aromatic hydrocarbon, especially in asphalt that could be carcinogenic.

Another question was raised about the usual percentage of crushed asphalt incorporation **in road construction**. The experts answered that the crushed asphalt could be used:

- In hot mixed asphalt (that requires heating the mixture at the production facility at a temperature up to 300 to 350 degrees Celsius before shipment and installation) - crushed asphalt could reach up to 90%;
- As an aggregate in the cold process where it is mixed with new asphalt (at a central plant or a mobile plant, or even an in-situ plant) to produce cold mix base mixtures (does not require pre-heating for application) - the percentage of crushed asphalt is 10-20%;
- In unbound layers, in some cases, 100% asphalt is allowed, but usually, it is mixed with excavation soil or stones;
- Control of landfill taxes and illegal dumping, an administrative burden in Austria.

The participants raised the question of **controlling landfill taxes and illegal dumping** in Austria. The experts answered that after adopting the Austrian Ordinance on past damages to the environment, a landfill tax on landfilling was implemented. The only way to bring the CDW for treatment without landfilling is to send it for recycling. In Austria, every shipment of CDW is registered in a central database controlled and operated by the Environment Agency Austria (the EDM – Environmental Data Management system; www.edm.gv.at), and each operator, including landfill operators, must report incoming and outgoing waste quantities. The reported quantities are cross-checked, and in case of material is missing from the reported quantities, the Ministry of Finance starts an investigation for non-payment of the landfill tax and applies severe penalties.

A final question about the **administrative burden** in Austria was posed. The experts replied that the Ministry of Environment took part in developing the guidelines from the beginning, but when the guideline was made mandatory, the Ordinance became stricter. The role of the Association is to discuss the feasibility and implementability of the standards and procedures with the Ministry. This way, a balance between quality, environmental protection, and administrative burden for the construction sector can be achieved.



Picture 6: Participants of the training in Osijek

Outcomes from the training evaluation reports

The survey questionnaire was filled out by 4 respondents from Osijek region. The results of the survey show the following areas of interest among the participants in the workshops. Maximum 2 answers were allowed.

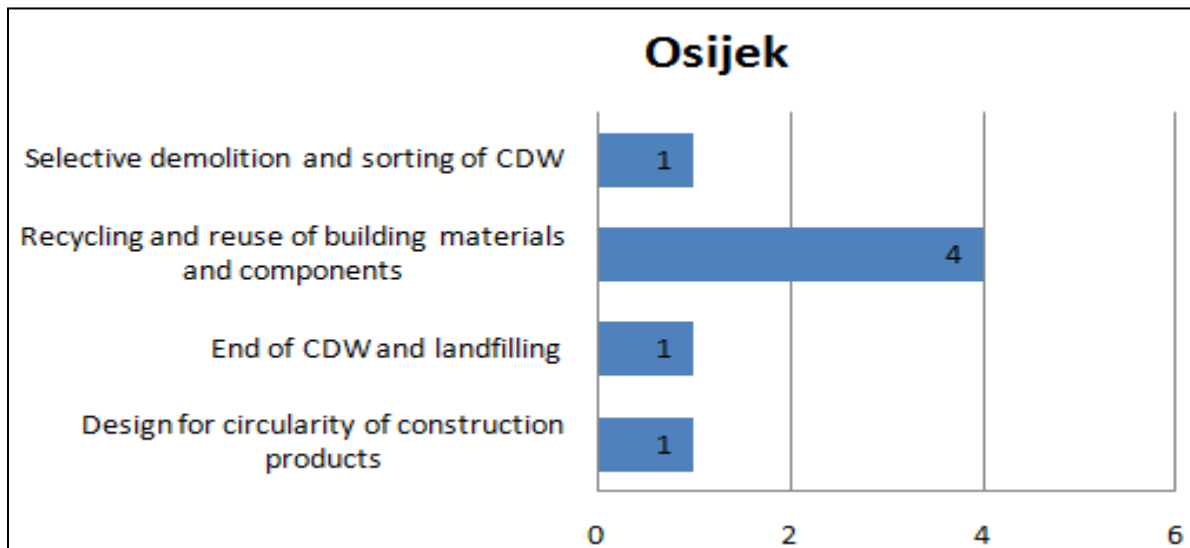


Figure 11: Area of interest. Results from the survey in Osijek

The respondents were asked about their opinion on the most important barriers to implement circular economy measures for CDW in Croatia. Maximum 2 answers were allowed. The following responses were received.

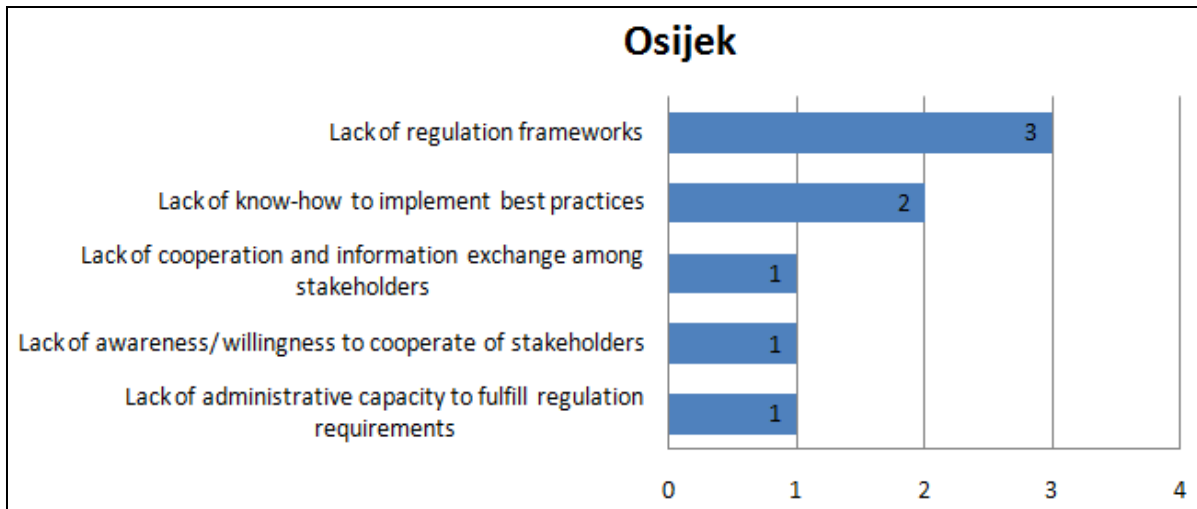


Figure 12. Identified barriers. Results from the survey in Osijek

In regard to the question about the priority measures for promoting circular economy in the CDW sector in Croatia the participants showed the following preferences.

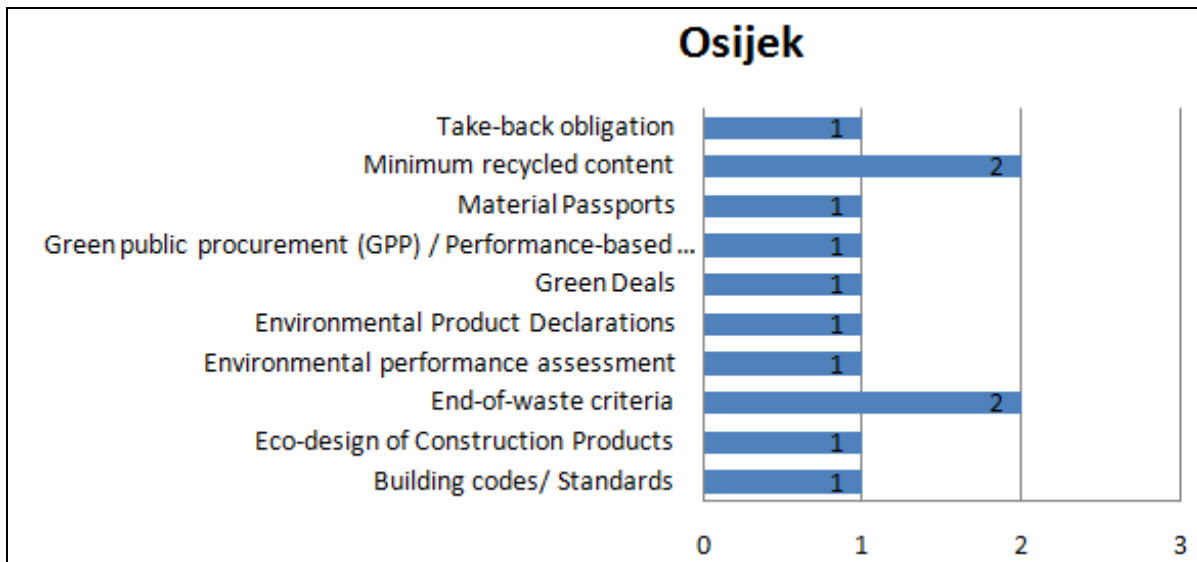


Figure 13: Priority measures. Results from the survey in Osijek

List of participating stakeholders in the event in Osijek

- Virovitica-Podravina County
- Pozega-Slavonia County
- Public institution County Development Agency of Osijek-Baranja County
- VODOVOD – OSIJEK d.o.o.
- Laboratory for materials and structures - RC Osijek
- FLORA VTC d.o.o. Virovitica
- Alfa-test d.o.o.
- GRADNJA d.o.o.
- SOKOL d.o.o.
- Vulkanizer Zdeno d.o.o.
- Folder d.o.o.
- OPG Cudesna Suma Romulic d.o.o.

Training Session Report from Split

A range of measures, of both regulatory and voluntary nature were discussed.

- Gaps in Croatia concerning CDW.

The discussion started with a question to the regional and local authorities' representatives on the aspects of the circular economy that are of the highest interest. Regional and local authorities observed that the companies usually complain about the **slow procedures for giving end-of-waste status**, which require the preparation of many documents. The participants suggested decentralization and administration of these procedures at the county level instead of the Ministry of Economy and Sustainable Development. Another issue mentioned was the **lack of demand for recycled construction materials** and the lack of incentives and policies to boost the market demand. **Cheap landfilling and widespread illegal dumping** of CDW is considered significant obstacles. Another important cause of the unsatisfactory level of development of the Circular Economy, which was identified, was the **absence of GPP practices**. The problem of **managing small CDW quantities** was also an example of the necessity of state support. Households can deliver up to 200 kg CDW to local authorities for free. Still, this quantity is perceived as insufficient, and at the same time, many local authorities cannot allocate enough funding for management even of these quantities. It was suggested that the management of **CDW generated in small quantities** by households must be subsidized, and the state should intervene. The representative from the Municipality of Hvar Island also raised the problem of CDW management in islands and remote areas. They pointed out that on islands, in general, even the provision of essential CDW services such as demolition and landfilling are not implemented, let alone separation, recycling and preparation for re-use.

- Laboratories to test recycled materials.

The **readiness of the laboratories to test recycled materials** was discussed. The representatives of laboratories and scientific institutes explained that currently, the only product certified for recycled content is the use of CDW (crushed concrete) as aggregate in concrete production. There is a standard adopted allowing only 5% intake, and currently, there are no requests for testing, but it is expected that the requests will rise with the development of the legal requirements. The representatives of the scientific institutes highlighted that they developed a program for using plastic waste in concrete, and a technical ordinance is currently under preparation.

- Introduction of building passports.

Concerning the **introduction of building passports**, civil engineering companies welcomed and expressed willingness to implement such an instrument if the legislation requires it. However, they expect it will take a long time before it becomes fully functional (some expect a period as long as 30 years).

- Increasing recycling content.

The barriers to **increasing recycled content** were also discussed. Representatives of asphalt producers shared the difficulties they encounter in **recycling old asphalt**. They can currently utilize up to 20% recycled asphalt, but they are trying to raise it to 30%. The biggest obstacle was the paperwork and expertise needed to prove environmental compliance. They believe such complicated procedures are unnecessary as recycled asphalt is the same as new, and more harmful environmental impacts should not be expected.

A representative from asphalt producers further explained that they participate in regular meetings for road construction organized by the Chamber and the Government (once a year) to discuss the issue. The representative elaborated that there is a mutual agreement between the asphalt industry and the state that the recycled content should be increased from 15% (in average) to at least 30%. It was pointed out that the main obstacle in increasing the usage of old asphalt is the limitation that old asphalt cannot be exchanged between different construction sites but can only be taken from construction sites run by the same company.

It was explained, that the limitation is due to government restrictions on taking waste asphalt from reconstructed roads and internal (company-specific) regulations because asphalt from other sources has different properties. There is a need for storage capacity together with required quality testing. There are also financial benefits because it is cheaper if the asphalt comes from the company's sites, and storage and testing is not necessary. The construction companies expressed their willingness to increase the recycled content in asphalt production to strengthen environmental protection and working safety even if the earnings would be reduced. It was also recognized that recycling asphalt entails cost reduction as the bitumen and aggregates from old asphalt are obtained at much lower prices.

- Experiences from Austria to increase recycling rates of CDW.

The experts of the Austrian Recycling Association explained the **driving forces behind achieving high recycling rates of CDW in Austria**. Initially, CDW recycling was driven entirely by market forces for materials cheaper than corresponding raw materials. In 1990 a landfill tax was introduced, making landfilling more expensive than recycling. Another supportive measure taken by the Government was the introduction of clear quality criteria to prove that the quality of the recycled CDW equals that of primary materials – the same standards apply for recycled and natural materials. The third important step was the adoption of the Recycled Material Ordinance, which allowed the use of recycled CDW in different construction applications. There were 2 (two) follow-up questions by the audience. The first was about the **ownership of recycling plants and recycled materials** in Austria. It was responded that recycling facilities are private companies, and the ownership of materials is only partly private because many buildings in Austria are public, and demolishing of such buildings is performed through GPP. The next question was about the **timeframe needed to obtain a stationary and mobile recycling facilities permit**. It was explained that the usual time for issuing the permit to the mobile plant is 9 (nine) months. The mobile plant could work everywhere if certain site-specific conditions are met, such as minimum distances from sensitive buildings like schools, kindergartens, etc. For stationary plants, the procedure takes 2 (two) years as the site should be agreed upon with the neighbors and community; also, heavy property taxes must be paid for stationary sites.

Another question was raised to Austrian experts regarding which of the 2 mentioned supportive measures is deemed **more important and impactful – quality standards or landfill tax** that increased landfill price. The Austrian explained that the quality standards aim to boost the demand for recycled CDW, while the role of the tax is to restrict landfilling of CDW. They stated that both instruments are important and needed, but if one of them should be preferred, this should be the quality criteria.

- Implementability of measures in Croatia.

Some participants expressed doubt that some GPP instruments, such as third-party auditing for verifying compliance with the GPP criteria during the contract execution phase and commissioning, are implementable. It was stated that third-party auditing could be very costly. The experts explained

that this instrument is used for the biggest projects and that for some EU-funded projects, it is standard practice.

Likewise, binding the achievement of the 70% recycling target with the issuance of construction and commissioning permits was seen by some participants as an effective instrument. Still, they expressed doubt about its implementability in Croatia. Concerns were also expressed regarding the applicability in Croatia of an Information system that tracks every shipment of CDW. Examples from other countries were provided to demonstrate the applicability of these instruments (such as the EDM system in Austria).

- Contaminated soil management.

The problems of **contaminated soil management** were also discussed. Examples from Italy were provided where in some cases, the contaminated soil could be pre-treated and prepared for recycling. Still, if it is impossible, the contaminated soil is disposed of in a landfill for hazardous waste.

The **inclusion of recycled content** was commented on by the participants and the experts from Austria and Italy. A representative from the CDW recycling industry in Croatia noted that they have already started to incorporate recycled content, mainly in concrete. Still, they face difficulties with the requirements for chemical analysis. Also, the supply of adequately sorted waste is often not enough. The Austrian experts shared the experience of addressing the feedstock quality for recycling plants. High quality is ensured through legal requirements for on-site separation and quality criteria and procedures applied at the recycling plants. In several regions of Italy, there are mandatory requirements for CDW producers to remove components that could have a negative impact on recycling. Another option is to install advanced techniques for the separation of mixed waste. Selective deconstruction is hampered in Rome due to the lack of storage space, but in other regions, it is the priority to enhance recycling and increase recycled content.

- GPP in Austria and Italy.

The international experts were asked to describe **how GPP was introduced** in the construction sector in Austria and Italy. In Italy, the adoption of GPP practices started in 2010. Initially, it was unsuccessful because the building companies did not trust the recycled materials, and there was no knowledge on preparing the tender documents. Then, information activities were initiated to involve local authorities in applying standard documentation in GPP. Secondly, communication measures were applied to educate stakeholders on how the recycling process works, and training courses were organized regarding the quality of recycled materials. Third, the national legislation on minimum recycled content was adopted. In Austria, the primary approach was to make the price of recycled materials and recycling of CDW more competitive by introducing a landfill tax. A third factor was the regulation of tendering. In the case of similar prices of recycled and primary materials, the selection criteria give more points to the technical proposals that envisage the usage of recycled waste. In this regard, guidelines on sustainable procurement were adopted. Currently, the concept of minimum recycled content is under consideration in Austria. It was also confirmed that price is an important selection criterion in public procurement in Italy. Still, there could also be criteria that would give an advantage to recycled waste in tender procedures.

The problem of recycling **bricks, tiles, and other clay-based waste and problematic construction waste** was also discussed. Bricks are not very strong and, therefore, unsuitable for road construction. In Austria, the possible application of bricks is regulated by the Regulation on Recycled Construction Materials. In Italy, plasterboard and mortar are considered to have a higher environmental impact. There are examples of the production of gypsum powder from waste gypsum boards. Bricks are used

for unbound applications, and gravel substitutes for road maintenance in rural areas. There are pilot studies to recover old tiles in producing new tiles.



Picture 7: Training session in Split

Outcomes from the training evaluation reports

The survey questionnaire was filled out by five respondents from Split region.

The results of the survey show the following areas of interest among the participants in the workshops. Maximum two answers were allowed.

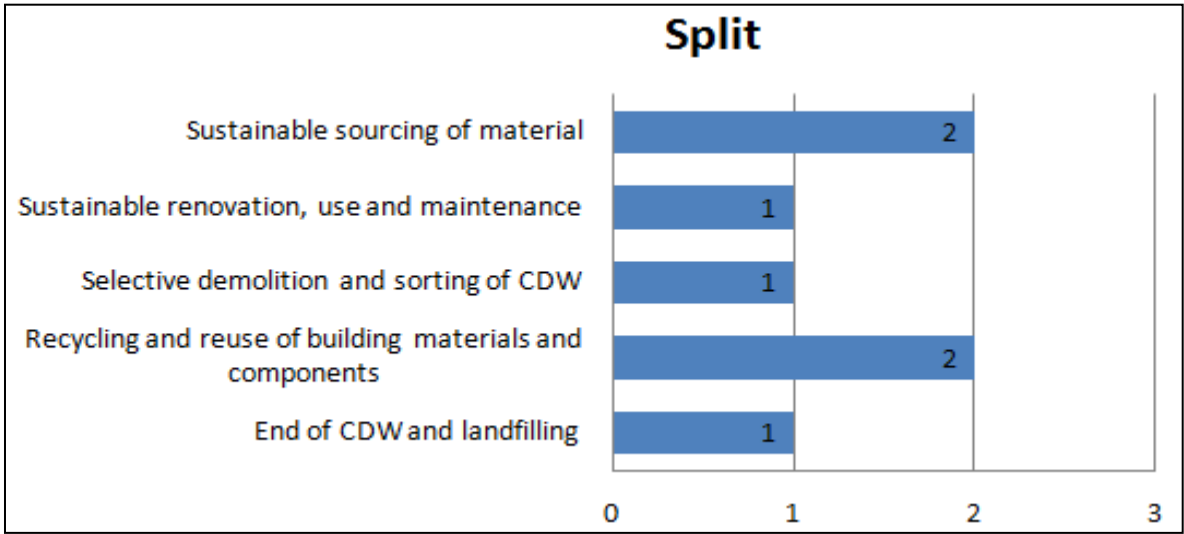


Figure 14: Areas of interest. Results from the survey in Split

The respondents were asked about their opinion on the most important barriers to implement circular economy measures for CDW in Croatia. Maximum two answers were allowed. The following responses were received.

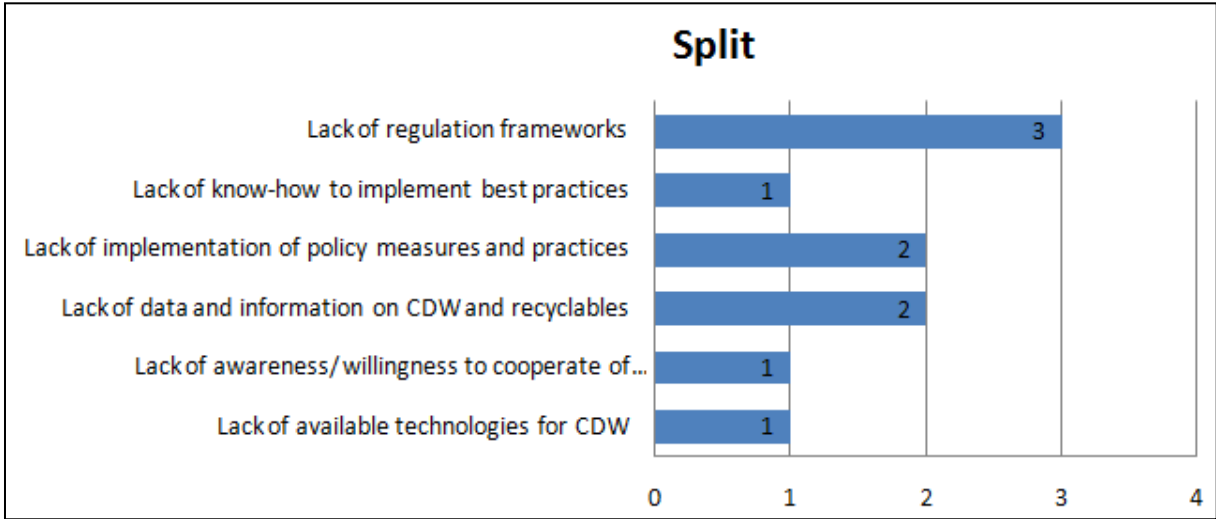


Figure 15: Identified barriers. Results from the survey in Split

In regard to the question about the priority measures for promoting circular economy in the CDW sector in Croatia the participants showed the following preferences.

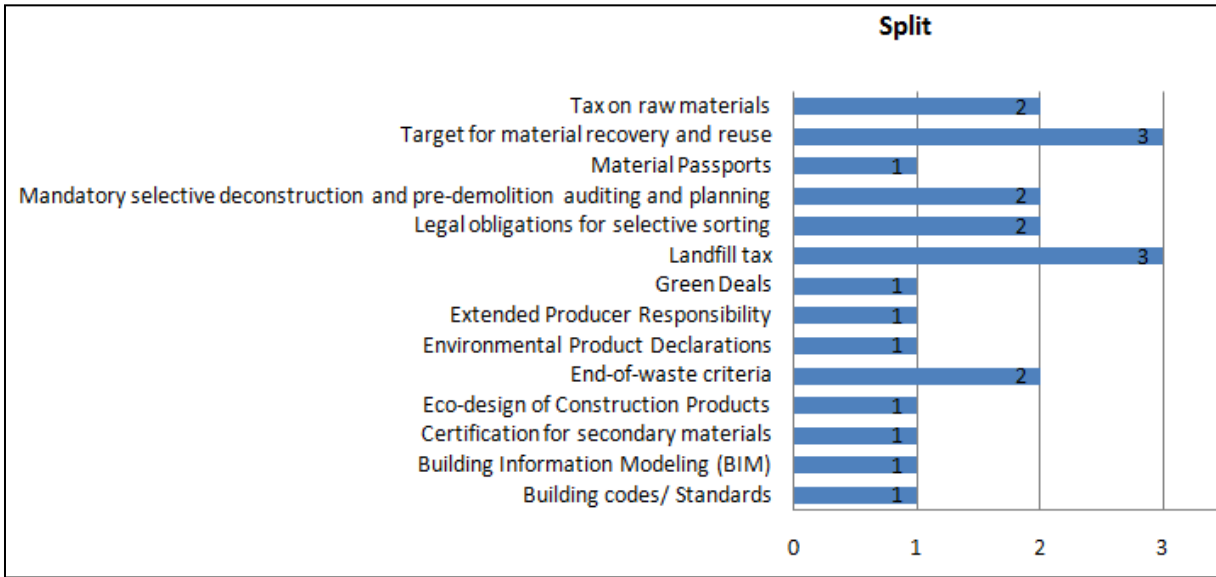


Figure 16: Priority measures. Results from the survey in Split

List of participating stakeholders in the event in Split

- Split-Dalmatia County
- Šibenik-Knin County
- The City of Split
- Municipality Company Hvar
- Chamber of Commerce Split
- IGH Institute d.d.
- A3 d.o.o.
- COLAS Hrvatska d.d.
- Realiance d.o.o.
- Spegra d.o.o.
- Cemex Hrvatska d.d. Reciklator d.o.o.
- ALAS-SEGET d.o.o.

Training Session Report from Dubrovnik

A range of measures, of both regulatory and voluntary nature, was discussed.

- Implementability of Environmental product declarations.

The discussion started with a question to the audience regarding the **implementability of Environmental Product Declarations** in Croatia. The construction sector representatives pointed out that environmental product declarations can be implemented, but this process has not started yet. At the same time, it was noted that the implementation will face problems such as too much paperwork, slow permitting, and licensing. When asked whether the slow procedures are due to national or local authorities, it was answered that part of the blame lies with local authorities, but the process should be accelerated at the national level.

- Use of recycled material and other bio-based materials.

Representatives of construction companies stated that they face problems using old asphalt in new road constructions mainly because the old **asphalt is considered waste**, but it is a readily reusable material.

The Development Agency of Dubrovnik shared **experiences from recent projects** about the possibilities of using bio-based materials such as seashells in various applications, including construction, and marine waste such as nets used in 3D printing. The Agency expressed interest in starting new projects that meet the criteria for sustainability and circularity, including in the construction sector.

- Repurposing of existing buildings.

Another topic of discussion was about **repurposing and restoration of old historical buildings** in Dubrovnik County. A representative of the Development Agency of Dubrovnik stated that the region is rich in heritage buildings, and they are involved in many restoration projects. Numerous guidelines have been adopted by the Conservation Department and are currently in force. The next step would be to include mandatory sustainability criteria in GPP for restoring and conserving historic buildings. The construction companies also confirmed that they had a lot of reconstruction projects funded by the EU and under the auspices of UNESCO and there is a need to implement circularity aspects in public procurement.

- Waste status of excavated soil.

The construction sector representatives were particularly interested in whether Austria treats the excavated soil as waste and how it is recycled. The Austrian experts answered that if the soil is used on site, it is not considered waste, but it is waste if it comes from another site. It is normally landfilled, but it could be recycled in two ways:

- Using it as the soil in other constructions – 20% of the excavated soil in Austria is used in this way;
- Making construction material out of excavated soil such as concrete, asphalt, and other unbound applications – 22-25% of the total quantity.

Another question posed by the participants was **when the excavated soil becomes a waste and when it obtains end-of-waste status**. The Austrian experts explained that it is not waste if used on-site and becomes waste if transported to a recycling plant. The soil must be tested in terms of environmental compliance and quality in the recycling plant, and if the criteria are met, it could become a product. If

it does not have enough good quality to be classified into one of the quality classes, then it gets the waste status. For the soils that meet the criteria for the highest class (UA class), the end-of-waste status is obtained at the recycling plant. It ceases to be a waste for the other (lower) classes when used in the specific construction application allowed for the respective quality class.

- Network of recycling facilities in Austria.

The participants asked the Austrian experts how the **network of recycling facilities** works and what its main elements are. They elaborated that the network consists of stationary plants located in the cities and mobile plants in rural areas. The mobile plants can operate everywhere, but specific requirements for minimum distances should be observed. There are also sites for the temporary storage of CDW where the waste is collected until enough quantity is accumulated so that it would be efficient for the mobile plant to come and treat the waste.

There were also comments on the driving forces behind Austria's recycled waste market. The Austrian experts explained that the market works due to the measures for ensuring higher quality of the recycled CDW. The recycling market was boosted 30 years ago with the elaboration of a guideline defining the conditions that should be met so that a recycled CDW is considered “green” and of high quality. The guidelines were based on the existing EU CEN standards. The quality of recycled CDW was defined as the same quality required for products made from primary materials. The second step was the adoption of a landfill tax making recycled material cheaper by at least 3% than primary materials. The next step was the adoption of GPP to further increase the uptake of recycled CDW.

- Implementation of GPP in Croatia and Austria.

The main problems of the implementation of **GPP in Croatia** were discussed. A representative of the Development Agency of Dubrovnik commented that in most cases market research before public procurement is not carried out, except for some EU-funded projects. Other problems include the lack of knowledge and the fact that GPP is not mandatory. Austrian experts explained that **mandatory GPP criteria in Austria** are currently under discussion. Sustainability criteria are needed, and it is considered that every project type (such as road construction, residential buildings, etc.) should have a specific minimum percentage. More points shall be awarded if a technical proposal achieves a higher percentage.

- Illegal dumping of CDW

The problem of **controlling the illegal dumping of CDW** was also debated. Austrian experts pointed out that it was difficult to eradicate CDW illegal dumping because throwing CDW outside of settlements was also the normal practice in Austria before adopting strict environmental protection requirements. Another reason for the illegal dumping was the need to pay a gate fee to the landfill and the lack of alternatives for handing over the waste back at that time in Austria. To address the illegal dumping, it was necessary to provide cheaper alternatives to landfilling and implement strict penalties for those who dumped CDW illegally. In this regard, a landfill tax was introduced, recycling of CDW was made free of charge, and the possibility to report illegal dumping was provided to people who visit woods and other unpopulated areas (tourists, hunters, etc.). Also, a waste information system that tracks every shipment of waste from the waste generators to the final treatment facilities was established (EDM system). The Ministry of Finance was engaged in checking and penalizing companies for which the information system revealed discrepancies in reported data and lack of payment of the landfill tax. The audience commented that in comparison to Austria today, there is still a lack of awareness in Croatia. People need more training and education; the inspection procedures should be improved, and people should feel that there is a real risk of being punished in case of illegal dumping.

- The role of the demolition expert in Austria.

The role of the demolition expert in Austria was also discussed. The Austrian experts explained that the demolition expert is mandatory on the demolition site. The expert should be trained and experienced in knowing the difference between hazardous and non-hazardous construction products, contaminants that might hamper the subsequent recycling, and safety precaution measures. Usually, demolition experts are construction engineers that have passed 2-3 days of training to know the waste legislation. The demolition experts bear full responsibility for the demolition works and selective deconstruction.



Picture 8: Training session in Dubrovnik

Outcomes from the training evaluation reports

The survey questionnaire was filled out by 3 respondents from Dubrovnik region.

The results of the survey show the following areas of interest among the participants in the workshops. Maximum 2 answers were allowed.

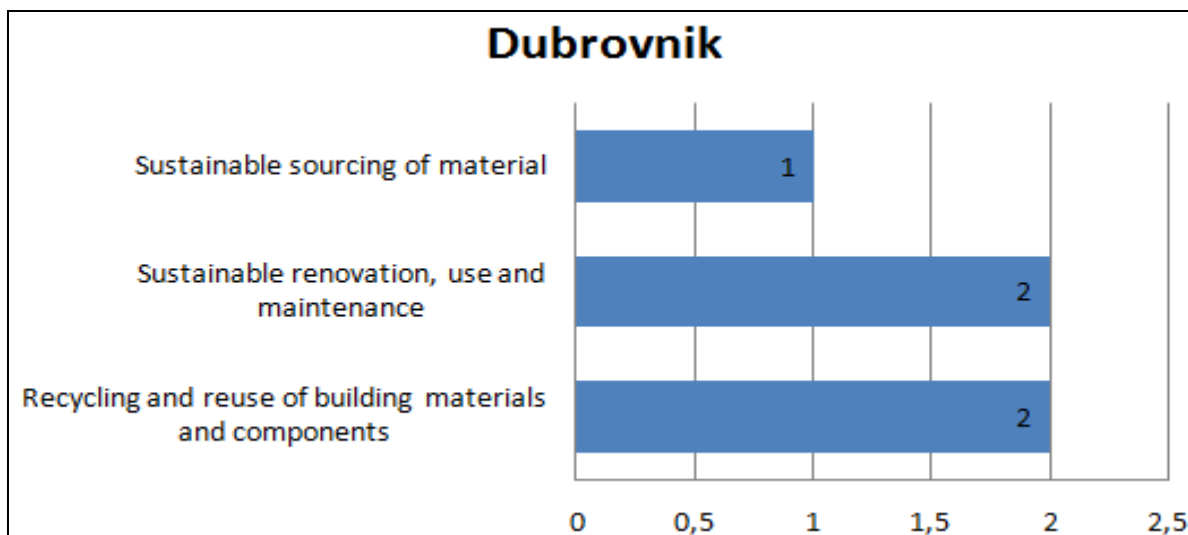


Figure 17: Areas of interest. Results from the survey in Dubrovnik

The respondents were asked about their opinion on the most important barriers to implement circular economy measures for CDW in Croatia. Maximum 2 answers were allowed. The following responses were received.

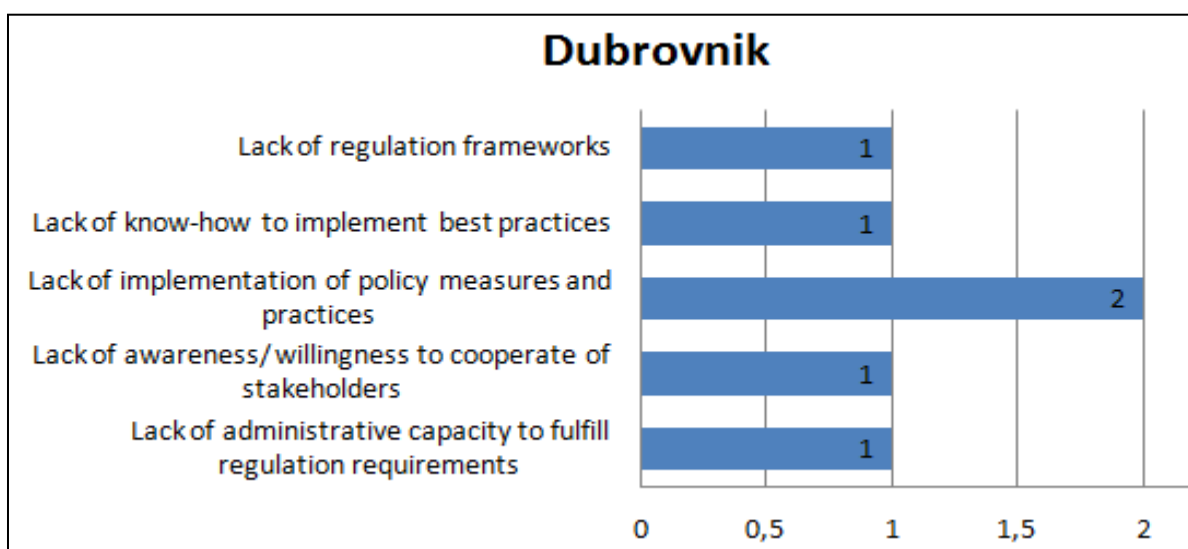


Figure 18: Most important barriers – results from the survey in Dubrovnik

In regard to the question about the priority measures for promoting circular economy in the CDW sector in Croatia the participants showed the following preferences.

List of participating stakeholders in the event in Dubrovnik

- Dubrovnik County Chamber
- The Regional Development Agency Dubrovnik-Neretva County DUNEA
- University of Zagreb Centre for Mediterranean
- Center For Advanced Academic Studies, CAAS
- Dubrovnik ceste d.d.
- Texo Gradnja d.o.o.
- Obšivač d.o.o.

ANNEX V. Agenda of the training and capacity building sessions

Regional workshops on Circular Economy Approaches in Solid Waste Management for Croatia with a focus on Construction and Demolition Waste

Agenda

Day 1

- 08:30 Registration
- 09:00 Greetings and welcome from the Government and the World Bank – introduction to Circular Economy; CERCLE series of CE in CDW capacity building training
Ms. Sanja RADOVIC - Ministry of Economy and Sustainable Development (MoESD)
Mr. Vladimir KALINSKI - World Bank
- 09:10 Overview and objectives of the capacity building and training activities
Ms. Francesca MONTEVECCHI - Environment Agency Austria
- 09:25 Circular economy in the EU and Croatia - an overview
Mr. Darko BIZJAK - Environment Agency Austria
- 09:50 CDW in the context of CE in Croatia and approaches along the value chain
Mr. Michael ASENOV - Environment Agency Austria
- 10:15 Coffee Break
- Session 1: Circular design of buildings**
- 10:45 Concept, barriers, and enabling conditions for the implementation of circular design of buildings' policies.
Mr. Michael ASENOV - Environment Agency Austria
- 11:05 Integration of sustainable criteria into the construction process – the experience of Austria
Mr. Thomas KASPER- PORR Recycling GmbH
- 11:25 Requirements for issuance of building permits or in public procurement. Best practices from the EU
Mr. Michael ASENOV - Environment Agency Austria
- 11:45 Moderated Q&A session and discussion

12:30 Lunch Break

Session 2: Increasing recycling content in construction products

13:30 Introduction to measures to increase recycling content in buildings and products

Mr. Michael ASENOV - Environment Agency Austria

13:50 Overview of EU and Croatian legislation on the status of recyclability, and recycling of construction and demolition

Mr. Darko BIZJAK - Environment Agency Austria

14:10 Closing the loop of materials in the construction and demolition waste sector. Recycling yards and permits in Austria

Mr. Martin CAR - Austrian Construction Materials Recycling Association (BRV)

14:30 Moderated Q&A session

15:15 Outlook towards the second day and closing of day one

Day 2

Session 2: Increasing recycling content in construction products – focus on GPP

09:00 GPP as policy measure for CDW in a circular economy. Concepts, the process of procuring construction works along the value chain, and documentation and verification procedures

Mr. Michael ASENOV - Environment Agency Austria

Session 3: CDW end of life and landfilling restrictions

09:20 Introduction to measures for CDW management at its end of life

Mr. Michael ASENOV - Environment Agency Austria

09:40 Overview of EU and Croatian legislation on landfilling with a focus on construction and demolition

Mr. Darko BIZJAK - Environment Agency Austria

10:10 Coffee break

10:40 CDW: end of life, recycling possibilities and landfilling restrictions in Austria

Mr. Tristan TALLAFUSS - Austrian Construction Materials Recycling Association (BRV)

11:00 Guidelines for the waste audits before demolition and renovation works of Buildings

Mr. Michael ASENOV - Environment Agency Austria

11:20 Moderated Q&A session

12:00 Final Remarks and closing the meeting

ANNEX VI. Certificate of attendance – Template



CIRCULAR ECONOMY
APPROACHES IN
SOLID WASTE
MANAGEMENT

Training Program Participation Certificate

Awarded to

Jane Doe

of Faculty of Civil Engineering, Zagreb

For successfully completing the **Circular Economy in Construction and Demolition Waste** two-day in-person training program organized by the *Ministry of Economy and Sustainable Development* and the *World Bank*, and delivered by the *Environment Agency Austria*, on 23–24 May 2022 in Zagreb, Croatia.

The training is part of the Technical Assistance to the Ministry of Economy and Sustainable Development on Circular Economy Approaches in Solid Waste Management, provided by the World Bank.


Jehan Arulpragasam
Country Manager for Croatia and Slovenia
The World Bank

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