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**POLICY BRIEF 5**



# THE CONDEREFF PROJECT

“CONDEREFF – Construction and Demolition Waste Management Policies for Improved Resource Efficiency” is a project under the INTERREG Europe programme that aims to accelerate policy work on **Construction and Demolition (C&D) waste management**, improving resource efficiency in the countries of the partnership. Accordingly, CONDEREFF supports the development of infrastructures and methods for recycling and re-using C&D waste materials, as well as the introduction of relevant green growth opportunities.

As such, the project’s specific goals are:

1. Support the integration of the EU C&D Waste Management Protocol into territorial policies.
2. Strengthen public authorities' capacities in managing C&D waste, public procurement, landfill restrictions, recycling facilities, and public perception.
3. Transfer the lessons learnt into partners’ territorial policies.

## POLICY BRIEF OVERVIEW

This policy brief aims to discuss **the challenges and opportunities of C&D waste management** within the context of circular economy, as well as to present and discuss the application of the **EU Construction & Demolition Management Protocol**.

As such, the main topics of this policy brief are the following:

- Presentation of five concepts that can facilitate transition to a circular economy model, their application in exemplary cases, lessons learnt and recommendations for the future.
- Presentation of the management protocol for C&D waste, its aims and principles, a few selected applications and recommendations for integration into territorial policies.



# CONCEPTS OF CIRCULAR ECONOMY FOR C&D WASTE MANAGEMENT

The application of a circular economy model on C&D waste management focuses on five concepts as described in the “Construction and Demolition Waste: Challenges and Opportunities” [report](#). These can be applied in different stages of the construction and/or demolitions process.

## **Concept 1. Use of waste in high-grade products**

High-grade products are defined as highly-durable materials or components used in structural elements of a building or infrastructure. This means that they are products or components that withstand degradation. The durability of components directly influence the end-product’s lifetime. Use of waste in high-grade products means that waste retains its value and contributes to the supply of raw materials and recycling of materials.

## **Concept 2: Design for disassembly and Deconstruction**

Design for disassembly and deconstruction is a resource and waste management method that takes the total lifecycle of products in consideration. When applied to the building sector, design for disassembly enables the reclamation of individual building components without damaging others and without a loss on quality or value of the materials. Additionally, buildings designed according to DfD principles can function as material banks in which building products are temporarily stocked and can then be reused in the future, as well as producing considerable resource.

## **Concept 3: Use of Materials passports**

Materials passports also referred as building or circularity passports can provide the necessary framework and data structure to collect, handle and provide information of the materials. By cataloguing and disseminating the circularity and other characteristics of building materials (i.e. components or products of waste material) the passports contribute to bridging the existing information gap between relevant actors in the construction value chain and deliver them the needed data at the desired time.

## **Concept 4: Extension of service life of buildings.**

For new constructions, designing for longevity is the foundation for long-term durability. To achieve this longevity, durable materials and robust construction standards have to be implemented.

This can lead to a series of benefits such as lowering the overall generation of waste during the lifetime of a structure and prolongs their lifetimes by increasing their adaptability(i.e. switch from residential to commercial and vice versa).

## **Concept 5: Selective demolition to enable reuse and high-quality waste for recycling**

The overall aim of selective demolition is to recover high-quality (pure) material fractions for recycling or reuse. The purpose of such a process is to identify hazardous materials that have to be removed prior to demolition and assess their recycling potential. The selective demolition is followed by the processing of the material fractions to ensure high-quality recovery.



# APPLICATION OF THE FIVE CONCEPTS

## **Use of waste in high-grade products (Concept 1)**

The advanced dry recovery (ADR) technology was developed and demonstrated by TU Delft for separation of mortar from concrete in the FP7 project C2CA and the H2020 project HISER. The ADR is essentially a mechanical low-cost process for waste separation. The specific example provided focuses on the separation of cement as an illustrative point, yet similar processes can be applied in other types of C&D waste materials.

## **Design for disassembly (Concept 2)**

In the Circular Retrofit Lab (CRL) is a pilot project of disassembly of materials within the Horizon2020 Buildings as Material Banks innovation project (H2020 BAMB-project). The project was deployed in eight existing student housing modules at the Vrije Universiteit Brussel (Belgium).

## **Use of material passports (Concept 3)**

Circularity passports have been developed by EPEA GmbH in the light of the BAMB project. Material passports essentially consist of datasets containing the characteristics of materials in building products with the purpose of generating value by mapping their recovery, reuse and recycling potential at different levels and making them available to the right parties at the right time. Over the duration of the BAMB project, more than 300 materials passports for various products, components or materials were developed.

## **Extension of service life of buildings (Concept 4)**

Extension of service life of building can be applied in four potential scenarios: ordinary building maintenance, consolidation – insulation measures, transformation – change of the floor plan to meet new needs, and rebuilding – the demolition of the old building and rebuilding/reconstruction of a new floor plan. Transformation, rather than demolition and rebuilding, is a much more environmentally efficient way to achieve the same result. However, transformation must be possible, which implies that the building must have a certain degree of flexibility from the design phase.

## **Use of selective demolition (Concept 5)**

Tracimat is a traceability system that provides quality assurance for the selective demolition process and the waste streams produced. Tracimat certified, means that the demolition waste has been selectively collected and gone through a tracing system, thereby assuring the quality of the recycled demolition waste and guarantee its origin/source and quality as free of contaminants. The certificate enhances trust in the quality of the material, resulting in an improved and more widespread market for the recycled products.

Please, find more here at the link: <https://www.eionet.europa.eu/etcs/etc-wmge/products/etc-reports/construction-and-demolition-waste-challenges-and-opportunities-in-a-circular-economy>

# CHALLENGES IDENTIFIED

## **Challenges concerning the use of waste in high-grade products**

The main obstacles for recycling aggregates are the comparatively lower price of virgin materials and the processing costs of demolition waste to ensure the high-quality of secondary raw materials. Other barriers involve the variability in the quality of demolition waste processes and the purity of the quality control system.

## **Challenges concerning the design for disassembly**

The main barriers identified are increased costs in processing and a lack of trust in the quality of recycled materials as a result of the lack of traceability systems that control the origin of waste streams. Lastly, the report highlighted the presence of uncertainty in terms of the financial savings as they are highly context dependent thus difficult to estimate precisely. This act as a barrier as clients cannot see any tangible short-term benefit of the process and choose short term investments instead.

## **Challenges concerning the use of material passports**

The presence of uncertainty in terms of the benefits, costs and amount of information required. That act as an impediment to the implementation of material passports and further highlights the importance of a clear set of guidelines on how to fill and implement it.

## **Challenges concerning the extension of life of constructions**

The environmental and economic benefits of using recycled materials are evaluated as less comfortable, more prone to potential material degradation and the need of expert labour skills. All these can be summarized as barriers that relate to socio-economic factors and decision making processes. Examples of such barriers are the higher structural and comfort standards for new buildings and a lack of knowledge and trust in contractors.

## **Challenges concerning the use of selective demolition**

The biggest barriers relate to economics- the value of separated fractions, distance between construction site and recycling plants and the extra time required for selective demolition, a lack of clarity about the quality of the separated fractions and risk of damage during dismantling that may lead to a lower value of the aggregate.

**Overall**, the common factors that affect the smooth transition to a circular economy model are time availability, space, structural or procedural safety of the demolition process.

# RECOMMENDATIONS FOR FUTURE APPLICATIONS OF THE FIVE CONCEPTS

- Use of follow-up checks on the successful removal of contaminants prior to demolition, introduction of sensors for increased traceability of materials and development of tools for early detection of signs of degradation in the products.
- Widespread adoption of design-for- disassembly (DfD) procedures that, till now, remain widely unknown to the general public. The success of such adoption will expand the current market and will effectively stimulate an increase in supply and demand of secondary raw materials.
- Further integration of material passports in demolition procedures and existing regulatory framework. This could facilitate an increase in the added value of material passports as it will establish its value to potential users, data suppliers and other stakeholders leading to an increase in trust to the recycled materials.
- Adoption of less complex products that prevent selective demolition due to their integration in energy-efficient designs.
- Introduction of re-use materials in the design and construction phases that could facilitate a decrease in the environmental impact of waste by preventing waste from being generated and lowering the amount of the waste generated.
- Introduction and enforcement of governmental measures, aimed at landfill bans, reduced taxation for environmental friendly processes and sharing of available equipment between companies or any other interested parties.
- Standardization of demolition procedures between stakeholders and commitment to preserve it.
- Development of further research on life cycle analysis indicators, especially for the saving of other natural resources (i.e. water and air pollution) that can further highlight the importance of following specific procedures in the demolition or construction of buildings.
- Creation of network of accredited or supporting companies that can provide solutions for waste management on a local (in case of lack of transportation) level and on a short notice.

# C & D WASTE MANAGEMENT PROTOCOL

To facilitate the successful implementation of the five concepts proposed, the second part of the policy brief elaborates on the EU C&D Waste Management Protocol. The protocol is guided by eight principles, and can be applied on the different stages of the C&D process.

## Aims of the protocol

The overall purpose of the protocol is to increase confidence in the C&D waste management process and build confidence on the quality of secondary raw materials.

More specifically, the EU management protocol is designed to facilitate:

- Improved waste identification, source separation and collection
- Improved waste logistics
- Improved waste processing
- Quality management
- Accordance with policy and regulatory frameworks



## PRINCIPLES OF C&DW PROTOCOL

**Principle 1:** Market-based and promoting competitiveness.

**Principle 2:** Ownership by practitioners and acceptance and support from policy makers.

**Principle 3:** Transparency and traceability throughout the C&D waste management process.

**Principle 4:** Promoting certification and audits throughout the entire process.

**Principle 5:** Use established practices.

**Principle 6:** Consideration of geographical location.

**Principle 7:** Respecting environmental, health and safety rules and standards.

**Principle 8:** Data collection and generation throughout the C&D waste management process.

# DIFFERENT STAGES OF INTERVENTION

## **IMPROVED WASTE IDENTIFICATION, SOURCE SEPARATION AND COLLECTION**

Waste identification has a set of requirements. These include a clear and unambiguous definition of the term, good quality pre-demolition audits and waste management plans adequately prepared and executed. Another crucial part of source separation involves the identification and elimination of hazardous waste materials as well as the separation of any other materials that may hamper recycling. Another key aspect of proper waste management is to ensure that the materials are adequately sorted. This can lead to more effective recycling and increase the quality of recycled aggregates and materials. However, the degree in the separation of the materials depends strongly on the availability of space at the site or the transport costs of separated materials.

## **IMPROVED WASTE LOGISTICS**

Waste logistics focus on three aspects of waste management: Transparency and tracking and tracing of the process. Transparency refers to the need to be assured throughout all phases of the C&D waste management process. Traceability and tracking are important for promoting building confidence in the products and processes, and to mitigate any negative environmental impacts. Application of these results in improved record keeping through the use of electronic registries and is particularly important to increase the economic benefit of C&D waste materials.

## **IMPROVED WASTE PROCESSING**

Waste processing and treatment provide a plethora of benefits in terms of resource efficiency, increase in sustainability and cost savings. However, prior to processing or treatment, non-inert materials and products need to be sorted depending on their economic value. Additionally, many materials need to be processed or treated on the basis of primarily environmental criteria. That means that hazardous waste always needs to be separated and disposed according to the national regulations. Lastly, adequate sorting between hazardous and non-hazardous waste has to be implemented.

## **QUALITY MANAGEMENT AND ASSURANCE**

To achieve an increase in confidence and trust in the quality of recycled materials, appropriate quality management procedures and protocols have to be properly implemented both in the primary processes of waste identification and waste processing as well as to the provision of reliable and accurate information about the performance of the recycled or re-used products for future reference.

## **ACCORDANCE WITH POLICY AND REGULATORY FRAMEWORK**

Successful C&D waste management as set out in this Protocol can be performed only within the context of a regulatory framework. To achieve this public sector representatives, active on local, regional or national level have to be brought together to discuss on an appropriate regulatory framework, its enforcement, the right public procurement and incentives and ways to raise the awareness, perception and acceptability of recycled materials.

# RECOMMENDATIONS FOR THE FUTURE APPLICATION OF THE PROTOCOL

## IMPROVED WASTE IDENTIFICATION AND SOURCE SEPARATION

- Preparation and implementation of a waste-management plan with information on the different steps of the demolition.
- Supervision of the process by a local authority or by an independent third party.
- Keep materials separated and distinctions according to their treatment options.
- Proper decontamination processes for hazardous material.

## IMPROVED WASTE LOGISTICS

- Ensure transparency throughout all phases of the C&D waste management process.
- Strengthen record keeping and traceability mechanisms through the establishment of electronic registries.
- Proximity to sorting and recycling plants to reduce transport costs.
- Use of road networks and waste transfer stations.
- Guarantee of the integrity of the materials from dismantling to recycling.

## IMPROVED WASTE PROCESSING AND TREATMENT

- Follow the waste hierarchy framework to achieve higher levels of resource efficiency, sustainability and cost savings.
- Sorting of materials and products according to economic value.
- Proper sorting between hazardous and non-hazardous waste.
- Promotion of re-use and creation of a market for these materials.
- Options of recycling materials on-site or of-site at a recycling plant.
- Promotion of recycling with a focus on dense populated areas.

## QUALITY MANAGEMENT AND ASSURANCE

- Introduction of quality management checks and tools and implementation of existing documentation (ISO 9000).
- Quality management steps during new construction of expected amounts of waste produced.
- Guidelines for employees to make sure that they have obtained the necessary equipment to work.

## POLICY AND FRAMEWORK

- Clarity in terms of ownership of the waste.
- Use of demolition, renovation permits or licenses issued by local authorities.
- Integration of waste management strategies by local, regional or national governments to promote a more systematic change on C&D waste management.
- Documentation and regulation of existing landfills and steps towards reduction.
- Increased taxes on virgin material and decrease for secondary materials.
- Engagement of public by stimulating identification and reporting of illegal dumping.



## REFERENCES

Elionet (2020) *Construction and Demolition Waste: challenges and opportunities in a circular economy*, Elionet, January, CONFEREFF Input Paper, Elionet, January 2020

European Commission, (2016), *EU Construction and Demolition Waste Management Protocol*, European Commission, Brussels, Belgium. [https://ec.europa.eu/growth/content/eu-construction-and-demolition-waste-protocol-0\\_en](https://ec.europa.eu/growth/content/eu-construction-and-demolition-waste-protocol-0_en) [accessed 20 March 2020].

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# About us

The CONDEREFF project brings together 8 partners from 7 countries to exchange experiences and practices on how to promote green growth and circular economy through sustainable constructions & demolitions (C&D) waste management.

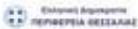
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