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Interreg Europe

European Union
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# POLICY BRIEF 8

# THE CONDEREFF PROJECT

"CONDEREFF - Construction waste management and demolition policies to improve resource efficiency" is an INTERREG Europe project that aims to accelerate policy work on construction waste management and demolition (CDW), improving resource efficiency in partners' countries. Accordingly, the project aims to support the development of legislative frameworks and strengthen the capacities of public authorities in regulating C&D waste management, public procurement practices, landfill restrictions, recycling facilities, public perception, awareness and acceptance. To achieve these objectives, the project will exchange experiences and practices, as well as studies on C&D waste, on how project partner regions can move towards adoption and greater exploitation of best practices and measures applied in the field of waste management. The overall objective is to transfer lessons learned to regional policies and action plans.

# POLICY BRIEF OVERVIEW

The CONDEREFF project brings together 8 partners from 7 countries to exchange experiences and practices on how to move from existing procedures in the management of CDW to the adaptation and greater exploitation of best practices and measures applied in the field.

This policy brief discusses the application of five concepts that can facilitate the transition to a circular economy. According to the report, the actions that could facilitate this transition are:

1) Obtaining high-grade products with high-recycled content.
2) Designing for disassembly.
3) Implementation of material passports.
4) Extending the service life of constructions.
5) Applying selective demolition procedures to enable reuse and high-quality waste for recycling.

# CONCEPT 1-OBTAINING HIGH GRADE PRODUCTS WITH HIGH RECYCLED CONTENT

## Concept 1. Obtaining High-grade products with high recycled content

### Example used: High grade concrete aggregates

High-grade products are defined here as materials or components with high durability used in buildings or infrastructure. High grade means products or components that withstand degradation, such as products with sufficient strength. 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. Furthermore, recycling of materials with high embodied energy can result in significant CO2 savings. Finally, keeping waste in the material loop reduces the generation of waste for disposal.

### Case study examined: Advanced Dry Recovery (ADR)

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 a mechanical low-cost process and can be applied to moist materials, without prior drying or wet-screening.

### Conclusions

The case study presented revealed the main barriers in recycling concrete. These are the reasonable processing costs and the low trust in quality of the products highlighting the need of traceability systems, which are still lacking in many countries. The main environmental benefit relates to savings of natural resources.

### Action proposed

Coarse aggregate obtained from demolition works can be used to (partially) replace natural aggregates in high-grade concrete applications. This can be achieved through the recovery of a high-quality stony fraction for recycling, and can be applied in all steps of the value chain, starting from the planning of demolition activities. However, this requires tighter quality controls and new agreements between stakeholders in the value chain to guarantee high-quality feedstock from demolition activities.

# CONCEPT 2-DESIGNING FOR DISSASEMBLY

## Concept 2: Designing for disassembly

### Example used: Renovation using reusable materials

The possibility of recycling and reusing building products in the future largely depends on how buildings are designed today. Design for disassembly, or deconstruction, (DfD) is a resource and waste-efficient design approach that takes the total lifecycle of products into consideration. Applied to the building sector, design for disassembly enables the reclamation of individual building components without damaging others and without a loss of quality or value. Additionally, buildings designed according to DfD principles can function as material deposits that can then be reused in the future.

### Case study examined: Circular Retrofit Lab (CRL)

The Circular Retrofit Lab (CRL) is a pilot project within the Horizon2020 Buildings Strategy. In this project, eight existing student housing modules at the Vrije Universiteit Brussel (Belgium) were renovated according to DfD principles. Dismountable solutions were also developed for the internal partitioning and the façade, with the main goal of turning student rooms into dissemination and office spaces that can later be transformed again into other functional spaces without requiring new resources or generating additional C&DW. The result was a set of adaptable and reusable wall partitioning that had diverging properties in terms of material use, connection techniques, number of elements, prefabrication, reuse potential and sub-layering.

### Conclusions

Design of buildings and components that support future dismantling, selective sorting, reuse and remanufacturing can significantly lower the amount of C&DW produced. Currently, the high rate of heterogeneity of C&DW leads to large streams being downcycled. Design for disassembly not only lowers the amount of materials that are disposed as waste at the end of life of a building, but also offers opportunities for recycling, so building materials that cannot be reused can easily be deconstructed and sent for high-quality recycling.

### Action proposed

Appropriate use of reversible technologies like bolts, nuts, clip systems, screws or even lime mortars instead of nails, glues, welded solutions or cement mortars is key to facilitating and increasing the future reuse of components. This will ensure that the quality of the chosen materials can withstand dismantling, transport and reuse stages over time.

# CONCEPT 3- IMPLEMENTATION OF MATERIAL PASSPORTS

## Concept 3: Implementation of materials passports

### Example used: Documentation of material produced

Materials passports, also referred to as building passports or circularity passports, can provide the necessary database and data structure for collecting, handling and providing information concerning the type of materials used in a building. Their aim is to maintain or even increase the value of materials, products and components over time, as well as facilitate reverse logistics.

### Case study examined: Circularity passports by EPEA GmbH

Circularity passports have been developed by EPEA GmbH in the light of the BAMB project. These 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 interested parties.

### Conclusions

Materials passports have the potential to bridge the information gap between actors involved along the construction value chain by providing reliable and standardised information on the material composition of the building stock and material flows. In this way they preserve material and product value over the building's entire lifecycle, facilitating circular design, recovery and reuse practices and minimising waste.

### Action proposed

To promote resource efficiency, minimise C&DW and realise the transition to a circular economy in the building sector, reliable and standardised information on the material composition of the building stock and related products is considered a valuable asset. By cataloguing and disseminating the circularity and other characteristics of building materials, components and products, 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 – EXTENDING THE SERVICE LIFE OF CONSTRUCTIONS

## Concept 4: Extending the service life of constructions

### Example used: Design for longevity

For new constructions, designing for longevity is the foundation for long-term durability. Durable materials and robust construction standards lower subsequent maintenance costs and increase the value of a building or structure. Designing for longer lifespans and continuous maintenance also lowers the overall generation of waste during the lifetime of a structure. Furthermore, adaptability of buildings reduces the generation of waste, for example, by enabling a switch from commercial to residential. Design for disassembly also allows for the easier replacement of specific elements while the offsite manufacturing of standardised components enables the use of higher quality-control standards.

### Case study examined: Study on environmental effects of two housing blocks

Itard and Klunder's (2007) comparison of the environmental effects of two housing blocks was conducted for four scenarios: ordinary building maintenance, consolidation (i.e. insulation measures), transformation (i.e. change of the floor plan to meet new needs) and rebuilding (i.e. the demolition of the old building and rebuilding/reconstruction with a new floor plan).

### Conclusions

One clear conclusion was drawn from this study: transformation, rather than demolition and rebuilding, is a much more environmentally efficient way to achieve the same result. Additionally, maintaining and extending the lifetime of buildings and other structures through the use of smart maintenance, repairs and renovation saves the use of new construction materials.

### Action proposed

It is possible to extend the lifetime of existing buildings through the use of maintenance, upgrades and rehabilitation. Rehabilitation involves the retrofitting outdated buildings to meet current energy efficiency regulations, construction guidelines and/or standards on comfort and usage. Different degrees of rehabilitation can be carried out, from the retention of all parts of a structure to the retention of (part of) the building's envelope.

# CONCEPT 5 – APPLYING SELECTIVE DEMOLITION PROCEDURES TO ENABLE REUSE AND HIGH-QUALITY WASTE FOR RECYCLING

## Concept 5: Applying selective demolition procedures to enable reuse and high-quality waste for recycling

### Example used: Use of tracing systems for high quality materials.

The overall aim of selective demolition, based on information from the pre-demolition audit, is to recover high-quality (pure) material fractions for recycling or reuse. The purpose of such an audit 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. Selective demolition does not reduce the total amount of waste generated but enables the recovery of fractions for high-quality recycling.

### Case study examined: Tracimat- traceability system for waste recycling

The Tracimat traceability system was developed in Flanders, Belgium and covers the following elements, a) pre-demolition inventory, b) monitoring and supervision of flows and c) certification system for the construction and demolition material from selective demolition to be accepted as "low environmental risk material". Tracimat currently focuses on decontamination, the removal of hazardous materials, as a pure stony non-contaminated waste stream fraction has a greater upcycling potential. The certificate enhances trust in the quality of the material, resulting in an improved and more widespread market for the recycled products.

### Conclusions

Selective demolition does not necessarily lead to increased recycling levels, but it is a prerequisite for the recovery of high-quality fractions from constructions and their subsequent high-grade recycling, thereby avoiding downcycling. The environmental savings in the use of selective demolition are highly case dependent, for example, on the recovery potential of fractions. The CO2 savings are influenced by the need for processing and machinery, and the distances to recycling facilities.

### Action proposed

Application of traceability systems to facilitate an increase on the rate of reusable materials.

# LESSONS LEARNT FROM CONCEPTS PRESENTED

The biggest barriers to the application of circular economy concepts are economic, due to a lack of demand for recovered waste and poor quality due to unpurified residuals. Policy measures can alleviate these, through the encouragement of green public procurement, taxes for landfilling, establishing end-of-waste criteria and applying extended product responsibility (EPR).

- The use of traceability systems for recyclables and reusable products has been highlighted in several cases as a crucial tool for creating confidence among value-chain stakeholders. Relevant policy measures can further promote these systems, especially in cases of government construction works contracted through, for example, green public procurement.
- The synergistic effects of traceability measures can be further amplified with the use of materials passports containing details of the materials in building products to enable their maintenance, recovery, and reuse and recycling potential at different phases.
- Standardization of methods can be achieved with the use of circularity passports that are currently employed by a wide range of stakeholders, ranging from product manufacturers, through building owners and users to dismantlers, urban miners and materials suppliers. This can also facilitate the wider use of these certificates for business and trading purposes.
- The involvement and commitment of stakeholders should be aligned, to achieve a common circularity objective and ensure that the benefits of circular economy solutions are equally shared among different actors of the value chain.
- The role of the client or end user of a construction should be considered as crucial for the uptake of circular economy principles as they set the targets for sustainability.
- Storing and record keeping of information about construction products and buildings for circular C&DW management should be expanded as it opens the possibility of sharing data and practices between different actors.
- New business models are also needed. These could be designed to address manufacturing and construction of products which last for a long time and allow for easy maintenance set requirements for information documentation and sharing.
- Expansion of cooperation and commitment among all stakeholders is also crucial for the future as it allows the implementation of all other highlighted actions (e.g. use of relevant data, certification schemes etc.)
- Financial support for research on innovative circular technologies and solutions for material handling in construction and demolition sector should be a priority as it provides a solid base to transition to circular economy in built environment.

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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.

CONDEREFF is an INTERREG Europe project and is co-funded by the European Regional Development Fund (ERDF)

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