

RREUSE's Briefing on the Construction and Demolition sector

MAY 2023



Co-funded by
the European Union

INTRODUCTION

The construction and demolition sector is one of the most material-intensive industries and one of the largest contributors to waste production in the EU. In fact, it has become the largest waste stream in Europe, accounting for more than a third of all waste generated¹.

Treating global resources as limitless is not only increasing waste generation and resource depletion, but also aggravating the climate emergency. The extraction of materials, the manufacture of building components, and the construction and renovation of buildings are estimated to contribute 5-12%² of total greenhouse gas emissions.

To increase circularity in the sector while creating social employment, some social enterprises from the RREUSE network have been active in the re-use of building components. This briefing outlines the importance of these activities carried out by social enterprises.

SCALING UP RE-USE IN THE CONSTRUCTION SECTOR

While Member States have reached high recovery rates of construction and demolition waste in recent years, this is mostly due to backfilling and other low-grade recovery activities, such as using construction and demolition waste for road sub-bases³. The original function of building components and materials is not being fulfilled, thus failing to realise their full potential value.

The future of the construction sector lies in the efficient use of resources – starting from the initial stage of planning and building, all the way through to the final stage of demolition. A transition to a circular economy in the sector could reduce by 50% the embodied emissions of building materials⁴. Re-using building materials and components such as steel structures, beams, doors, tiles, bricks and windows into their original function is an essential part of that transition.

Re-use is an effective way to reduce carbon emissions, as it avoids the need for energy-intensive production and recycling processes. Research has found that re-using structural steel sections of buildings decreases environmental impact by 96% compared to recycling⁵. Even when new steel sections with around 60% recycled content are used, their environmental impacts are still 25 times higher than re-used sections⁶. Therefore, recycling should be seen as a second-best strategy in accordance with the waste hierarchy. However, only a small fraction of building components are currently re-used.

¹ EEA (2023) Construction and demolition waste: challenges and opportunities in a circular economy (Available [here](#)).

² European Commission, Buildings and construction (Available [here](#)).

³ EEA (2023) Construction and demolition waste: challenges and opportunities in a circular economy (Available [here](#)). See also Eurostat (2023) Recovery rate of construction and demolition waste (Available [here](#)).

⁴ Build Up Portal (2022) Circularity and Low-Carbon Building Materials in Construction (Available [here](#)).

⁵ Rakhshan, K., Morel, J. C., Alaka, H., & Charef, R. (2020). Components reuse in the building sector—A systematic review. *Waste Management & Research*, 38(4), 347-370. (Available [here](#)).

⁶ WRAP (2008) Reclaimed building products guide. A guide to procuring reclaimed building products and materials for use in construction projects (Available [here](#)).

BOX 1. RETRIVAL, A PIONEERING SOCIAL ENTERPRISE IN CIRCULAR CONSTRUCTION

Retrival was created in 2017 to dismantle industrial installations linked to the steel industry in the Hennuyer basin (Hainaut) in Belgium. However, it was not until 2017 when this social enterprise saw an opportunity to promote re-use in the sector. During a major project to transform offices into a school in Louvain-la-Neuve for the Wallonia-Brussels Federation, Retrival noticed the potential for re-use of the products and materials available. Thanks to the possibility of re-using materials in other sites, from windows and doors to insulating materials to bricks and structural components, Retrival reduced its expected costs in the public procurement process and won the contract. 27% of all the recovered materials were re-used in other sites.

Since then, Retrival has become a pioneering actor in the field. While the current re-use rate in the construction sector is 1%, Retrival has recently inaugurated a new office in Charleroi built with 80% re-used materials. Materials re-used in the new office include sanitary facilities, partitions, insulation components and materials, furniture, electricity components, lighting, doors, cable ducts and more. For instance, desks were built with doors from a building site, sanitary facilities came from the dismantling of a factory, and some of the partitions and the counter for the drivers were made from the old vault of a bank in Brussels.

Retrival has set up Cornermat, a physical and online store that sells second-hand construction products at a reduced price - around a third or a fourth of the cost of new products.

IMPLEMENTING THE WASTE HIERARCHY TO REDUCE ENVIRONMENTAL IMPACT

While re-use is an essential strategy to reduce the environmental impact of the construction sector, it can be combined with rethink and reduce strategies. Rethinking involves finding alternatives that reduce the environmental impact of a construction project, such as using more efficient designs and materials or redesigning a building to prevent its full demolition. Reducing strategies focus on decreasing the amount of materials used while maintaining safety and quality standards, such as using fewer materials in a structure.

BOX 2. THE BOILER HOUSE: RETHINKING AN ICONIC BUILDING IN DUBLIN

In 1966, the Boiler House in Ballymun in Dublin was the largest civic heating scheme in Ireland and the UK. After being decommissioned and scheduled for demolition, in 2014 the social enterprise Rediscovery Centre, the Dublin City Council and the European Commission under its LIFE+ funding programme joined forces to save and repurpose the iconic building which became the Rediscovery Centre's headquarters and a '3D textbook' for circular economy. The initiative was directly supported through a targeted tender from Dublin City Council related to the re-use of the Boiler House, rather than its demolition.

The original structure of the building was maintained, simply adding additional cross bracing to reinforce the frame and extending the foundations around the perimeter. Materials such as steel components, timber, bricks, louver fins, or windows were re-used on site. The architects estimated that the retention of concrete slabs and steel resulted in 55 tonnes of carbon savings, equivalent to the sequestering of 5,000 trees over 20 years.

By combining re-use, rethink, and reduce strategies, the construction sector can become more circular and sustainable. The combination of strategies high in the waste hierarchy extend the lifespan of building components, minimise waste, and reduce emissions associated with the extraction and treatment of materials. In addition, these strategies can be cost-effective by reducing the amount of new materials required for a construction project.

BOX 3. ENVIE LE LABO: PRIORITISING WASTE PREVENTION AND LOCAL RE-USE

Created by Envie, [Envie Le Labo](#) aims to offer alternatives to citizens to get involved in a sustainable way of life. In line with these principles, its new 560m² building in Paris prioritised waste prevention and re-use, becoming an example of circularity: Envie Le Labo avoided the use of 19,6 tonnes of new materials – approximately 45% of all the materials used in the interior of this building.

This was done by reducing the use of resources (no false ceilings, very few paint) and locally re-using. In fact, a wide range of building components and materials could be re-used, including wood for cladding exterior, bricks, sinks, toilets, radiators, doors, carpets, and more.

At a time when there is an urgent need in Europe to carry out a renovation wave to reduce energy consumption, the re-use of building components and the redesign of existing buildings must be prioritised to both save resources and reduce energy usage.

PUTTING PEOPLE AND SKILLS AT THE CORE OF CIRCULAR CONSTRUCTION

Re-use has a high job creation potential because of its intrinsically labour-intensive activities⁷. This is also the case in the construction and demolition sector. With selective deconstruction, more time is required to carefully remove and sort building components – the time required to deconstruct a 90 to 180m² building, for instance, is three to five times higher than the time needed for the demolition of the same building⁸. These activities are more labour-intensive and require manual skills which are accessible for individuals with a low skills baseline.

BOX 4. BAUKARUSSELL: LEADING THE TRANSITION TO CIRCULAR CONSTRUCTION IN AUSTRIA

BauKarussell is a consortium based in Austria that specialises in the re-use and high-quality recycling of building components and waste materials from construction sites. Their innovative approach has earned them multiple awards and nominations.

For instance, in summer 2020, prior to the construction of a new campus for the Medical University of Vienna on the site of the former Energy Centre of Vienna, BauKarussell collected 140 tonnes of materials from the existing buildings. Overall, more than 60 tonnes of re-usable components were provided by BauKarussell via its online component catalogue to be used by the buyers in new construction projects. The remaining 80 tonnes included various materials that were sorted and prepared for recycling or removal, including fluorescent tubes, false ceilings and various fractions of non-ferrous metals such as aluminium or copper.

⁷ RREUSE (2021) Job creation in the re-use sector: data insights from social enterprises. (Available [here](#)).

⁸ Dantata, N., Touran, A., & Wang, J. (2005). An analysis of cost and duration for deconstruction and demolition of residential buildings in Massachusetts. Resources, conservation and recycling, 44(1), 1-15. (Available [here](#)).

Apart from the low skilled manual tasks, the achievement of a circular economy in the construction and demolition sector requires also a high-skilled workforce⁹. The majority of tasks related to re-use in this sector differ from conventional practices and require a significant level of knowledge, flexibility, and a good understanding of tools and methods. These skills span from the evaluation and deconstruction of building components to their careful transport and stockage.

The identification of building components and materials is a complex task which requires an assessment of the re-usability of the components and materials present in the building. Deconstruction of components requires specialised knowledge of building components and in some cases techniques such as carpentry, electrical wiring, and plumbing. In some cases, components must be prepared for re-use by conducting small repairs and cleaning. Safety must be taken into account during deconstruction and demolition, requiring a good knowledge of appropriate tools, safety equipment, and the correct handling and disposal of hazardous materials.

The drafting of specifications on the construction components available to potential buyers is also necessary to increase the chances of the product being sold second-hand. Finally, logistics also need to be managed carefully, including careful storage and transport of building components to maximise local re-use.

BOX 5. BAUKARUSSELL: INCLUSIVE UPSKILLING AND RESKILLING

BauKarussell also provides inclusive training opportunities in the sector by delivering an effective, low-level, and concise training course held by their partnered social enterprises.

This one-week course teaches selective deconstruction and re-use of building components and has a focus on practical skills and safety practices. The participants learn how to properly assess the re-usability of components, as well as techniques such as carpentry, electrical wiring, and plumbing. They also learn how to safely handle hazardous materials and how to use tools and safety equipment.

At the end of the course, participants must take a test, and if they pass, they receive their certification, awarded personally by the CEO of the organisation. This is an important moment for the participants as it gives them a pathway to further education and better employment opportunities. It also provides a sense of personal achievement, which is particularly important for those who have a background of low educational attainment.

Since its creation in 2016, BauKarussell has created work opportunities for around 170 people, most of which disadvantaged individuals distanced from the labour market. On average, it creates between 15 and 20 FTE job opportunities 1,000 tonnes of products collected.

Public authorities can use a wide range of policy levers to support the provision of training in the sector and therefore increase the number of skilled professionals within the value chain, including incentives and financial support for skills development, the provision of internal training for practitioners and staff, and the inclusion of clauses in public procurement¹⁰.

⁹ RREUSE (2023). Putting people and skills at the core of the circular economy: 18 stories from social enterprises. (Available [here](#)).

¹⁰ ICLEI Europe (2023) Stimulating demand for circular construction skills - a guide for public authorities. BUS-GoCircular project. (Available [here](#)).

CONCLUSION

Social enterprises can contribute to a circular transition in the construction and demolition sector, leading to waste reduction, reduced carbon emissions, and the creation of jobs for those who have difficulties entering the job market.

However, to achieve this, an enabling policy framework needs to be in place.

Obstacles to the re-use of building components and its scaling up includes lack of experience and knowledge, increased labour intensity and design costs when working with re-used components, lack of or high cost of storage space, standardisation and regulation of materials and components permitted in new construction projects that prevent re-use of components, tight project schedules not compatible with the time required for the deconstruction and re-use of components, and lack of an established market.

The use of recovered components and materials requires flexibility in the design and/or timeframe of a construction project, since there is some uncertainty in the availability of desired sections and extra efforts are needed to find certain components. In some cases, visual appearance and stakeholders' negative perception of re-used components can also decrease re-use rates.

Those barriers, however, do not exist in a vacuum: they are often shaped by specific regulations, policies, and economic incentives that can be reversed by a sound policy framework.

The grand urban renewal operations carried out in Paris in the second half of the 19th century gave floor to a vibrant re-use scene. Building components and materials from demolitions were required to be sold at public auctions, allowing small enterprises and craftsmen to benefit from the low cost of these resources and creating local jobs¹¹.

Current statistics show that only 1% of the components used in buildings today are re-used. At a time when Europe needs to proceed quickly with a renovation wave to improve energy efficiency, we must learn from previous experiences and avoid that the renovations will put extra pressure on the use of resources and create waste.

¹¹ Rotor (2021) Urban Mine Inc. (Available [here](#)).