

Urban Acceleration of a Circular Economy Transition in the Construction Sector

The Case of the City of Helsinki

Finnish city governments have taken a determined approach to supporting the construction sector's efforts and prerequisites for enhancing resource efficiency. The nation's capital, Helsinki, aims to conserve dwindling natural resources and reduce the volume of construction waste. To this end, it has launched a circular economy roadmap. In addition, the city facilitates the testing of construction technology solutions that promote circularity and supports the dissemination of circular economy expertise.

The City of Helsinki's Circular Economy Objective

As the City of Helsinki (with 685,000 residents) continues to grow, with an average annual increase of 6,000 new residents, there has been a consistent need to demolish old building stock to improve the efficiency of land use and develop new urban areas. The city's roadmap states that the aim is to enhance the reuse of soil masses and demolition materials in the construction of new infrastructure and buildings. The overarching goal is to achieve the sustainable consumption of natural resources and carbon-neutral methods of land use and construction by 2035. According to the road map, the circular economy transition can also support employment and improve job opportunities for individuals in vulnerable labour market positions.

Multi-faceted Policy Measures

The city is reforming land use planning, building regulations, and zoning to steering new construction towards low-carbon and sharing economy solutions (e.g., shared cars and saunas). Additionally, new zoning regulations aim to preserve existing building structures and elements on a case-by-case basis to facilitate their reuse.

In infrastructure and green space construction, the city seeks to replace virgin plastics with recycled plastics or alternative materials. Furthermore, it is piloting lifecycle projects in railway, street, and park construction.

When the city commissions the construction of new buildings for its own use, it aims to incorporate material data management, adaptability, modularity, the use of secondary and recycled materials, maintainability, repairability, deconstruction without damage, and reusability. Municipal demolition projects are also being reformed by improving the city's demolition guidelines and requiring pre-demolition audits.

Knowledge Brokering of Circular Economy Know-how

The city has also established the *Helsinki CE Cluster*. Despite its name, it does not align with the classical definition of a cluster, which refers to a geographic concentration of interconnected circular construction enterprises, specialised subcontractors, and related not-for-profit institutions. Instead, the Helsinki CE Cluster is an economic policy project run by the city's Department of Economic Development, aimed at advancing circular economy practices in the construction sector. It disseminates circular economy knowledge by organizing seminars, demonstrations, innovation competitions, and study visits. The City of Helsinki fully finances the cluster's activities from its own budget.

Helsinki Testbed

The *Helsinki Testbed* is the city's long-standing concept for public-private collaboration. Its aim is to enable businesses and research, development, and innovation (RDI) actors to develop and test new products or services in collaboration with the city. According to the concept, the city government provides authentic physical environments within the city, such as municipal buildings and parks, or virtual platforms as spaces for private sector experimentation and piloting.

Examples of Circular Economy Tests and Pilots

The Helsinki CE Cluster utilises the action model of the Helsinki Testbed by co-funding experimental circular economy projects together with construction enterprises. For example, the CE cluster contributed to a test examining the use of mechanical methods to remove perforated bricks bonded with cement mortar intact. The test team discovered that the reuse of bricks involves multiple stages, each requiring sufficient time allocation. Estimates suggest that viable business

operations, based on cost efficiency and quality assurance, can be achieved if manual labour is minimised and production is scaled to an industrial level.

The CE Cluster also partially funded a pilot conducted in a privately owned office building to explore the feasibility of reusing external windows as internal windows within the same building. The test found that the cost of reused glass was equivalent to that of new windows. However, window reuse significantly reduced CO₂ emissions and provided a more sustainable alternative to material recycling. According to the report produced alongside the trial, key challenges include the lack of established operational models for window reuse, the difficulties associated with storing dismantled windows, and the shortage of skilled professionals and appropriate techniques at the demolition stage, which complicates reuse planning.

Piloting Experiences of Enterprises

The representatives from construction companies that have collaborated with the city have expressed satisfaction with the testbed format and capable knowledge brokering team of the city. According to the companies, the concrete examples of technical solutions and networking opportunities have been the most valuable benefits for them. Some feedback has highlighted that the selection criteria for the pilots have not always been transparent. Additionally, companies have expressed a desire for the city to engage in more collaboration with other cities in the capital region.

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