

Between now and 2060, the equivalent of the city of **Paris** will be built each week. In growing cities, making space for new buildings sometimes requires demolishing old ones. In **Europe**, about 850 million metric tons of **construction and demolition waste** (CDW) were created in 2020 alone.

When a building is demolished, most materials are downcycled. Concrete might find its way into road fillings, but it is rarely recycled into new buildings. To decrease the use of fossil fuels and virgin materials, more effort is being directed towards recovering waste materials as well as valuable mineral products and reusing them in the construction of buildings. Called "**urban mining**," this circular approach makes the most of materials such as concrete, bricks, steel reinforcements, roofing materials, **copper** pipes and aluminum. It is a key component to making cities carbon neutral.

"As an industry, we already have solutions to make circular construction a reality today," says Miljan Gutovic, Region Head, Europe and Decarbonization, and Executive Committee Member at Holcim. "But a paradigm shift towards the systematic adoption of circular solutions across the construction value chain still needs to happen."

A solution for the public sector with some challenges

The 2020 **EU Commission Circular Economy Action Plan** is an ambitious proposal to reduce waste and increase circularity. "In Europe we have seen an incredible policy push in the past two years," says Martin Pauli, Global Circular Economy Services Leader at Arup, a built environment consultancy. "The private-sector actors are increasingly adopting circular principles – for compliance or to receive a competitive edge. But what we hear when we talk to cities is that they don't have the means to strategically decarbonize their sectors." That's where urban mining comes in: Using buildings like material banks is already possible. "We can do it. It's not an issue. But there's behavior and tradition in building and procurement that is not aligned with those principles," Pauli says.

The EU Waste Framework Directive called for 70 percent of CDW to be recycled by 2020. However, except for a few EU countries, only about 50 percent of CDW is currently being recycled. Reasons include uncompetitive pricing and lack of trust in the quality of secondary materials, as well as lack of information on the composition of materials used in existing buildings. The logistics of tracking local materials and the cost of processing and storing CDW are also major barriers to urban mining.

Countries in Europe that do have high recovery rates of CDW in Europe are mostly using recovered waste for downgraded uses such as backfilling.

Concrete action

Concrete is the world's most widely used building material, and it is infinitely recyclable.

The cement industry can use waste as a resource, as raw material to replace natural mineral resources in final products.

Holcim, a Swiss-based manufacturer of building materials, is developing alternatives to natural sand, such as manufactured sand, which is produced from aggregates such as limestone and granite or from CDW. Holcim is also creating mineral waste recycling centers that will effectively become tomorrow's quarries, as well as producing Susteno, the world's first cement containing 20 percent recycled CDW.

The Ellen MacArthur Foundation, which promotes a circular economy, says that circular approaches to the built environment such as urban mining could reduce global CO₂ emissions from building materials by 38 percent by 2050, by reducing demand for materials. "By sourcing materials strategically, cities can recapture more value in the construction/demolition process," says Sarah O'Carroll, Cities Lead at the Ellen MacArthur Foundation. "Selecting construction materials that can be sourced locally can reduce virgin material demand and enable the reuse of materials made available during deconstruction."

Venlo City Hall in the Netherlands, for example, which opened in 2016, was designed to be circular, built according to Cradle 2 Cradle (C2C) principles. The building's components are catalogued in a digital material passport that includes how to disassemble, recycle or return them to the manufacturer. The building's south frontage is made of fully reusable aluminum, and the living north exterior is made of wood and plants in C2C-certified pots.

Connections to drive change

To embrace urban mining and circular cities, developers, architects, contractors and governments must be mobilized to seize circular opportunities. Policymakers must help match demand and supply.

"Cities need a digital infrastructure to facilitate urban mining," says Pauli of Arup, which created the Circular Buildings Toolkit with the Ellen MacArthur Foundation to assist developers in making real estate decisions that are futureproof. "In an ideal world, every building would have a digital twin, and the city would have an overview at all times of how many resources are bound in buildings — how many tons of steel, glass, concrete, aluminum."

Material passports that detail the resources in buildings are just the first step to using buildings as material banks. **Governments** should require cities of a certain size to set up CDW recycling centers and ban the deposit of such waste in landfills. Startups are helping to fill this gap: Site Depot is the first software that enables the procurement, disposal and optimized reuse of primary and secondary raw materials.

"Recent experiences in several countries have shown us that we can create a supply-

demand momentum with a dynamic standardization and public procurement framework, while avoiding a non-harmonized approach which hampers effectiveness, speed of deployment and cross-country optimization within the single market," says Gutovic of Holcim.

Scaling-up market demand for circular building solutions requires a flexible European standardization system that can keep up with the innovation happening in the construction sector. Within Construction Products Regulation, harmonized standards would enable companies to roll out innovative techniques to all 27 [EU member states](#), respecting the principle of the single market. The cement industry, for instance, needs harmonized product standards to build trust in its circular products and drive demand to make circular construction a reality.

"Accelerating the **transition from a linear to a circular economy** can't happen if private-sector stakeholders operate in isolation," says Pauli. "We need to operate at scale and build partnerships upstream and downstream and across value chains. The business case will only emerge if stakeholders build coalitions and innovate across the value chain."

Source: Politico