The UN Secretary-General's Advisory Board on Zero Waste

THEMATIC BRIEF

Constructing Sustainable Infrastructure Towards a Circular Economy

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CONSTRUCTION WASTE

The global amount of construction and demolition waste is reported to be about 10,000 metric tons per year, with the larger fraction being concrete, bricks, ceramics, glass, etc. (Rodriguez-Morales et al., 2024).

Additionally, projections indicate that the global total amount will reach approximately 2.2 billion tons by 2025.

While in the USA, a 2018 report by the EPA put the amount of construction and demolition waste generated within the US at about 600 million tons. Out of the 600 million tons, about 145 million end up in landfills, and a larger chunk of this waste, constituting about 90 per cent, comes from demolition alone, accounting for about 567 million tons (EPA).

Among the OECD countries, New Zealand has the highest figure — about 727 kg of waste per capita sent to landfill. Further, globally more than 75% of construction waste is not cur-rently reused or recycled and has residual value (Purchase, C.K., et al., 2021).

Linkage to Zero Waste

A major approach to eliminating construction waste is Sustainable Materials Management (SMM), which encourages the reuse of construction materials as commodities in new buildings and eliminates the need to exploit new materials.

Globally, the closed-loop system or circular economy recycles about 1,085 million tons of steel to eliminate waste. Moreover, steel is highly recyclable; therefore, ensuring that it does not end up in landfills or incinerators but instead finds its way back for reuse is an effective way of **promoting zero waste.**

Additionally, the process mitigates the release of environmental pollutants into the atmosphere. For example, steel recycling saves about 950 million tons of CO2 as well as about 1 billion tons of iron ore, and conserves energy equal to burning roughly 280 million tons of coal.

Objective

To highlight the importance of construction as a sector with an immense volume of waste generation that can be mitigated through sustainable design, efficient infrastructure use/reuse and the creation of markets for demolition materials to be reused.

Key Findings and Implications

Deconstruction for Reuse: Best Practices for Reducing, Re-using, and Recycling Construction and Demolition Materials. Involves dismantling buildings to salvage components for re-use and recycling. This practice is driven by several key motivations, including resource preservation and possibly allowing communities to create a local economy around reprocessing and manufacturing salvage materials. Additionally, the process yields significant benefits by reducing the energy required for the manufacture of new materials.

Rebuying construction and demolition materials: This ultimately has multiple benefits in terms of the local economy, where it creates a local market for those materials, and many people earn a living by buying and selling these used materials, while at the same time lowering the cost of construction materials. Design for deconstruction entails managing the end life of building materials to reduce the consumption of raw materials. The goal is to collect and use materials removed from demolition for another project.

Reduce: To prevent material waste, use a building information modelling (BIM) tool to quantify the required material for a building's completion. Also, the tool may help make predictions about future repairs to buildings to avoid building failure.

Using building materials to reduce construction waste, such as self-healing concrete, which increases the strength and longevity of the concrete; laminated timber, which is stronger and more carbon-friendly; and natural bamboo, which is easy to grow, very strong, and cheap.

Recommendations and Call to Action

Deconstruction for Reuse: Creation of agencies, departments and policies that encourage deconstruction for reuse through Best Practices for Reducing, Reusing, and Recycling Construction and Demolition Materials. Deconstruction and reuse involves dismantling buildings to salvage components for reuse and recycling. This practice is driven by several motivations, including resource preservation and potentially allowing communities to create a local economy around reprocessing and manufacturing salvage materials. Additionally, the process yields significant benefits by reducing the energy required for the manufacture of new materials.

Some organizations that promote deconstruction and reuse include, Build Reuse, Reuse Development Organization and the Institute for Local Self Reliance.

Promoting salvage and reuse construction and demolition material: Salvaging and reusing construction and demolition materials is another great recommendation.

Local government policies often enforce a minimum diversion rate for construction and demolition debris. Any individual or company that demolishes a structure is required to submit a plan that enumerates the materials used in the demolition and specifies the percentage that will not end up in the landfill. Failure to comply can result in licensure suspension. For example, the City of San Francisco requires a 65% minimum diversion rate of construction and demolition debris from landfills.

This requires any person, firm, or company wishing to demolish a structure to submit a plan that lists the materials expected to be part of the demolition and restricts 65% of these materials from going to a landfill. Failure to comply with the ordinance can result in the suspension of required licenses and permits required for the manufacture of new materials.

The use of self-healing concrete and bamboo to strengthen buildings: Bamboo is a material alternative that grows in our planet's tropical zone, an area that coincides closely with the developing world. Construction professionals have been using bamboo for many years. Given its outstanding tensile properties, replacing steel reinforcement in reinforced structural concrete with bamboo is of high interest to many architects who are of a sustainable mindset.

Encouraging efficient use of existing built infrastructure: If properly managed, a shared economy for built infrastructure can also move us closer to zero waste objectives. For instance, since the COVID pandemic, as more people work from home, excess ofice space has been efficiently repurposed for housing in many urban areas.

To find out more, press play **here.**

Contact us on advisoryboard.zerowaste@un.org

and visit our website.

References

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