CONCRETE RECYCLING

Recycling and limiting our use of natural resources to within the boundaries of what the planet can supply are high priorities for the public and policy-makers alike. In the words of the European Commission, "[T]here is only one planet Earth, yet by 2050, the world will be consuming as if there were three". This need to move to a more circular economy also applies to construction, and the most-used man-made material in the world, concrete. Luckily, concrete has much to offer in terms of circularity.

In the move to a more circular construction sector, the waste hierarchy (prevention, re-use, recycling, recovery, disposal) gives an indication of which practices are preferable to ensure the most value is retained. As these principles suggest, in the case of concrete, re-use of structures or elements is preferred (Re-use of concrete). However, where this is not possible (for instance, when concrete has already fulfilled a complete life cycle, being in service sometimes more than 100 years), recycling of concrete from demolition is a widely-used practice which also contributes greatly to the circular economy.

Concrete is 100% recyclable

Upon demolition, concrete is crushed and processed to create crushed concrete aggregate, also known as recycled concrete aggregate. Recycled concrete aggregates are traditionally used in "open-loop" recycling: in unbound applications (i.e. without a binder like cement), such as road base. Using recycled concrete aggregates in "closed-loop" recycling, that is, in new concrete, is more demanding. However, "closed-loop" recycling of concrete aggregates is increasing, with product standards across Europe being continually updated to specify criteria for their use.

Which type of recycling is the more sustainable option?

Both types of recycling of concrete— "open-loop" recycling in unbound applications or "closed-loop" recycling into new concrete—have environmental benefits, as extraction of virgin aggregates is avoided. Although the perception is sometimes that "closed-loop" recycling into new concrete is environmentally preferable to "open-loop" recycling, studies show that this is often not the case when additional processing and transport distances are taken into account. Life-cycle analysis can be used to find the optimal approach for each case.

Innovation

The practice of concrete recycling has a long history, and continuous innovation is being carried out to further enhance its environmental benefits.

- Several projects look to optimise the crushing and processing of demolition concrete to allow for recycling in ever-more-demanding applications.
- Various projects are looking at how the fine particles, generated when concrete is crushed, can be used in clinker or cement manufacture, reducing the CO_2 emissions of cement.
- Work is also ongoing to develop methods to enhance the natural uptake of CO_2 by concrete (called recarbonation) during the recycling process.

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Policy requests

Various changes in practice at each point in the concrete life cycle, from design to end of life, will improve the availability of clean and high quality recycled aggregates to be able to reach high recycling rates. To further encourage the recycling of concrete while also ensuring the best environmental outcomes, the right policy is needed:

- Encourage pre-demolition audits and sorting of demolition waste, to ensure high-quality recyclable material can reach the market
- Phase out landfilling of construction and demolition waste
    - Diverting demolition waste from landfill keeps the material in the economy and encourages the market to find solutions for its use.
- Avoid simple targets on recycled content
    - Recycled content targets for concrete are difficult to meet and do not necessarily lead to an overall reduction in the environmental impact. This is because: supply of recycled materials may not always be available locally and may require transport; concrete made of recycled aggregates may not have the lowest environmental impact; and recycled aggregates are often technically more suitable for other applications. Instead, encourage all recycling that results in a reduced use of virgin materials & energy, be it “open loop” or “closed loop”.
