





Circular buildings: Paving the way to a net-zero industry

POLICY BRIEF FINDINGS

5 key messages

- A circular economy can contribute significantly to reduce carbon emissions and achieve the climate targets in the hard-to-abate sectors.
- Buildings are a key value chain related to a high demand for energy-intensive materials and characterised by high circularity potentials.
- Within the EU-funded project newTRENDS, a modelling approach and data basis were developed and applied, that quantify the contribution of circular buildings to the industry decarbonisation.
- Besides the cycling of materials, actions addressing building design and use can reduce steel and cement demand for buildings by up to 38% respectively 26% in 2050.
- The current EU policy mix is not sufficient to exploit these material demand emissions reduction potentials.

5 points for improving the policy mix for circular buildings

-  **A life cycle perspective:** The policy mix should address all stages of a building's lifecycle well-balanced and without contradictions.
-  **Broaden the scope:** An understanding of the circular economy beyond the cycling of materials is necessary to fully exploit its potentials.
-  **Push and pull:** The instruments should support both - a market push and a market pull, to equip the EU market for a circular economy.
-  **From voluntary to obligatory:** Instruments such as green public procurement can be used to roll out obligatory requirements to all consumers.
-  **Stay focused:** Product-specific requirements are necessary to meet the special requirements for buildings (affordability, liveability and sustainability).

The circular economy and the 9Rs

While the initial idea of the transformation from a linear to a circular economy was based on the cycling of materials (Boulding 1966), more recent studies also consider strategies addressing consumption patterns. For instance, Kirchherr et al. define the circular economy "as an economic system that replaces the 'end-of-life' concept with reducing, alternatively reusing, recycling and recovering materials in production/ distribution and consumption processes" (2017). A well-known framework to categorize and prioritize these strategies are the 9Rs:

Circular economy		Strategies	
↑ Increasing circularity	Smarter product use & manufacture	R0 Refuse	Make product redundant by abandoning its function or by offering the same function with a radically different product
		R1 Rethink	Make product use more intensive (e.g. by sharing product)
		R2 Reduce	Increase efficiency in product manufacture or use by consuming fewer natural resources & materials
Extend lifespan of product & its parts	R3 Reuse	Reuse by another consumer of discarded product which is still in good condition & fulfills its original function	
	R4 Repair	Repair and maintenance of defective product so it can be used with its original function	
	R5 Refurbish	Restore an old product & bring it up to date	
	R6 Remanufacture	Use parts of discarded product in a new product with a different function	
	R7 Repurpose	Use discarded product or its parts in a new product with a different function	
Useful application of materials	R8 Recycle	Process materials to obtain the same (high grade) or lower (low)	
	R9 Recover	Incineration of material with energy recovery	
Linear economy			

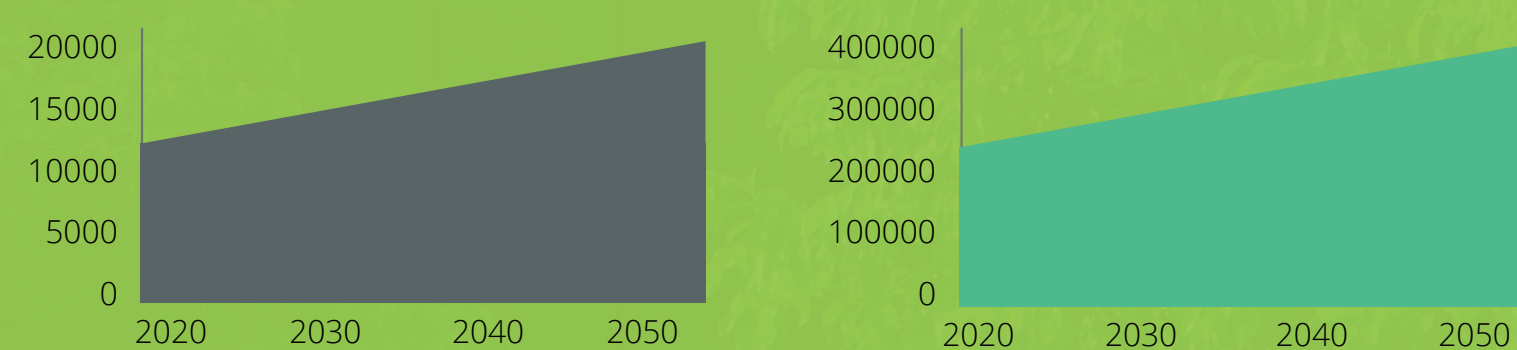
The 9R framework from Kirchherr et al. 2017

The relevance of circular buildings for the industry decarbonisation

Buildings are one of the main demanders for energy-intensive materials such as steel and concrete (including the precursors cement and clinker), responsible for a large share of carbon emissions in the industry sector (Lotz et al. 2022a). Furthermore, several studies showed that a circular economy can contribute significantly to reduce the demand for building materials (Circle Economy 2022; Hertwich et al. 2020; Le Den et al. 2020; Material Economics 2018).

Using the modelling approach and the data basis developed within the newTRENDS project (see info box: Modelling approach and data basis developed within the newTRENDS project), a reference case for the steel and concrete demand in buildings until 2050 were modelled.

If building use and construction method do not change, the material demand will increase and drive industry emissions (see figures). It is therefore crucial to reduce the prospective demand for building materials to achieve the European climate goals.



Steel and concrete demand for EU buildings in the reference (Lotz et al. 2022b)