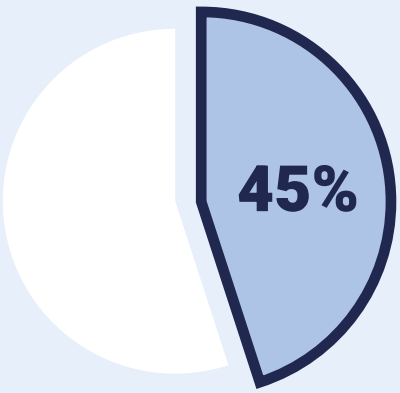
STEEL REUSE SCENARIO MAPPING

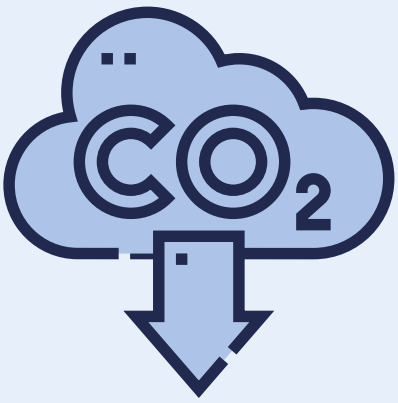
Four scenarios have been developed for structural steel reuse. These scenarios include one current scenario for 2023, and three future scenarios for 2030, 2040, and 2050. Each scenario includes the annual availability of structural steel for reuse, as well as the carbon and socioeconomic impact of steel reuse. Please note that scenarios focus specifically on ***columns and beams** as the main structural elements currently reused.

Scenario	2023 (current)	2030	2040	2050
Description	This current scenario includes beams and columns reused at a **5%** rate.	In this scenario, **15%** of beams and columns are reused	In this scenario, **30%** of beams and columns are reused	In this scenario, structural steel reuse is a widespread practice and **45%** of beams and columns are reused
Annual availability of structural steel for reuse, tonnes	313,038[1]	338,081[2]	338,081[3]	331,319[4]
Reused structural steel, tonnes	15,652	50,712	101,424	149,094
Embodied carbon savings due to steel reuse, tonnes per year[5]	26,499	85,856	171,711	252,416
Annual costs savings from steel reuse to construction projects[6]	£4,226,013	£13,692,282	£27,384,564	£40,255,309

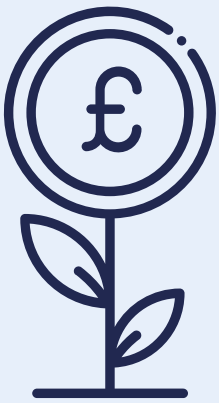
By 2050...



45% of all structural steel* in construction is being reused



Steel reuse could save 250,000+ tonnes of embodied carbon per year



Construction projects could save £40m annually by using reused steel

DISRUPT - Delivering Innovative Steel ReUse ProjecT

Scenario	2023 (current)	2030	2040	2050
Forecasted employment, employees per year (based on blast cleaning, cutting, and removing welds and shear studs)[7]	40	131	262	385
Land usage required for storing reclaimed steel, acres (assuming 1 acre per 1000 tonnes of steel required)[8]	16	51	101	149

Notes to the table:

1. The annual availability of steel for reuse was estimated based on the following:
According to the research by Warwick and DEFRA (Hall et al., 2021), the annual steel scrap arising from demolition is 1,054,000 tonnes. This includes both buildings and infrastructure. Around 75% of scrap steel is used in buildings (Moynihan and Allwood, 2012), which is 790,500 tonnes. Within buildings, around 60% of the steel is in the superstructure of which around 34% of steel is in slabs (which tend to be encased in concrete and therefore less susceptible to reuse), and the remaining 66% is in beams and columns that most commonly reused (Alwood, 2002). Therefore, the annual availability of beams and columns suitable for reuse is estimated at 790,500 *60%*66% = 313,038 tonnes.

2. Assuming an 8% increase in structural steel from the previous period. Based on the historic demand for structural steel in the UK (https://www.theconstructionindex.co.uk/news/view/big-sheds-drive-demand-for-structural-steel) and assuming a 30 years life span of buildings (https://www.ribaj.com/culture/lifespan#:~:text=But%20in%20the%20commercial%20sector,not%20just%20the%20commercial%20secto)

3. Assuming a 0% increase/decrease in the availability of structural steel from the previous period.

4. Assuming a 2% decrease in the availability of structural steel from the previous period.

5. Carbon savings were estimated based on the EPD for reusable steel by EMR of 46.6 kg/CO2e/t (https://uk.emrgroup.com/what-we-do/our-specialist-areas/emr-reusable-steel-edp-2023) and the EPD on structural sections EPD for virgin steel of 1,740 kgCO2e/t (https://www.newsteelconstruction.com/wp/uk-average-embodied-carbon-of-structural-steel/). The difference is: 1,693.4 kg/CO2e/t = 1.693 tonnes of CO2e per tonne reused.

The current scenario for 2023 includes a 5% reuse rate for beams and columns each year, resulting in 15,652 tonnes of structural steel being reused and 26,499 tonnes of carbon savings. However, as we move forward, the reuse rate for structural steel is expected to increase gradually to 15% in 2030, 30% in 2040, and finally, to 45% in 2050 when it becomes a mainstream practice. As a result of this increase, the carbon savings from reuse will rise to 85,856 tonnes in 2030 and up to 252,416 tonnes in 2050.

6. Significant cost savings from steel reuse to construction projects are expected, as reclaimed steel can be purchased at a 20% lower rate than new steel. In 2023, the estimated annual cost savings from steel reuse are around £4 million. This figure will increase to c.£14 million in 2030 and over £40 million in 2050.

7. The industry will require more employees. In 2023, it is estimated that 40 employees are required for the initial processing of steel, including blast cleaning, cutting, and removing welds and shear studs. This number will rise to 131 employees in 2030 and 385 employees in 2050.

8. Finally, as the uptake of steel reuse increases, more land will be needed for storing the reclaimed steel. Assuming 1 acre per 1000 tonnes of steel is required, 16 acres of land is needed in 2023, rising to 149 acres in 2050.

Download a free steel reuse toolkit and view case studies at asbp.org.uk/toolkit/disrupt-steel-reuse