

The Built Environment and Carbon

Climate change is one of the greatest environmental, social and economic threats facing the world, and the warming of the climate system is unequivocal according to the Intergovernmental Panel on Climate Change (IPCC).

According to the UN 2022 Global Status Report for Buildings and Construction, the global built environment sector accounts for 34% of energy demand and 37% of energy and process-related CO₂ emissions. Operational energy-related emissions reached ten gigatonnes (Gt) of CO₂ equivalent in 2021 – 5% over 2020 levels and 2% over the pre-pandemic peak in 2019. Operational energy demand for heating, cooling, lighting and equipment in buildings continues to increase. It was concluded that the buildings and construction sector is not on track to achieve decarbonisation by 2050 and that the gap between the actual climate performance of the sector and the decarbonisation pathway is widening.

The United Nations Environment Program (UNEP) have noted that although the built environment sector is responsible for a significant proportion of GHG emissions, it receives relatively little funding in comparison with other sectors. Furthermore, most of the climate-related funding that is received is directed towards addressing operational carbon emissions associated with heating, cooling and lighting. Up to the present time, relatively little resource has been directed to reducing embodied GHG emissions associated with materials for built infrastructure. However, as buildings become more energy efficient, embodied emissions will take greater prominence.

The built environment has an important impact on many sectors of the economy, on local jobs and quality of life. It requires large quantities of resources and accounts for about 50% of all extracted material. Manufacturing of construction products, as well as construction and renovation of buildings are estimated at 5-12% of total national GHG emissions.

In the EU, buildings account for around 40% of overall energy consumption and approximately 36% of the greenhouse gas emissions associated with energy use in the EU. Although operational emissions are decreasing, the projected decline is not on track to meet the overall 2030 GHG emissions reduction target of net 55%, compared with 1990 levels. It is estimated that in the EU27+UK, 9 billion tonnes of construction materials will be needed until 2030, with over 97% used for new buildings.

Increasing attention is being paid to the embodied carbon associated with the materials used in buildings. Guidance on this topic can be found in publications produced by the UK Green Building Council (*Embodied Carbon – Practical Guidance*), The Institution of Structural Engineers (*Carbon: embodied and operational*), the Royal Institution of Chartered Surveyors (*Whole life carbon assessment (WLCA) for the built environment*), Chartered Institution of Building Services Engineers (*Embodied carbon in building services: A calculation methodology (TM65)*) and even the Church of England (*Reducing Embodied Carbon*).

Embodied carbon is NOT the atmospheric carbon that is stored in biogenic products, such as timber!

Embodied carbon is a calculation of the emissions of greenhouse gases (GHGs) associated with the extraction, processing and transportation of materials used for products. These emissions are reported in units of carbon dioxide equivalents (CO₂e).