# Carbon saving in perspective

## Three Chamberlain Square, Birmingham

Three Chamberlain Square stands at the forefront of workplace design. This striking new architectural landmark in the Paradise development in central Birmingham is designed for forward-thinking occupiers, blending sustainability, heritage, and innovation to set new standards in commercial spaces.

We all know that nearly everything around us costs carbon. To show the scale of climate impact buildings can have, our sustainability experts have compared the carbon savings on Three Chamberlain Square to everyday things and activities.



The original brief set a target for upfront embodied carbon not to exceed **600 $kgCO_2e/m^2$**, aligning with LETI Band C for offices, with opportunities for reductions to be implemented throughout the project lifecycle.

Through a combination of significant design and construction decisions, Cundall and the project team successfully reduced the upfront embodied carbon to just **449 $kgCO_2e/m^2$**, achieving compliance with LETI Band B for offices. So, the total embodied carbon saved during this project from the initial brief is:

**3,520,867 $kgCO_2e$**

This equates to...

**5.87**
Trips to the ISS on SpaceX Falcon 9

**3,520,867**
15 minute showers in a 11kW electric powered shower

**620,570**
Train journeys from London Euston to Birmingham New Street

**1,006**
Return flights from London to Hong Kong

**271**
Average Briton's annual carbon footprint

**1,760,434**
Loads of laundry washed at 40ºC and tumble dried

**49,589,676**
Mugs of tea made with cow's milk

*Source: "How Bad Are Bananas? The Carbon Footprint of Everything', Mike Berners-Lee (Revised 2020 Edition)*

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# How was carbon reduction achieved?

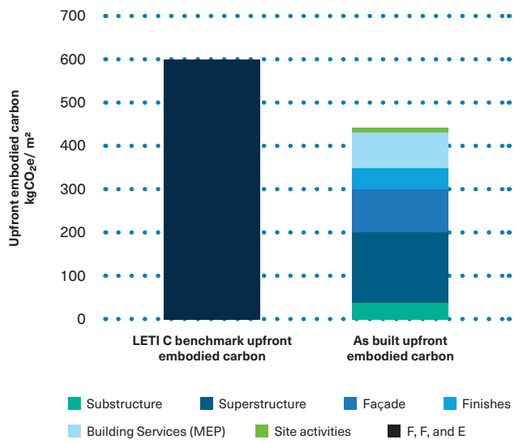
We considered the embodied carbon of six structural frame options early in Stage 2, before choosing a post-tensioned flat slab floor solution. The structural design was further developed to provide significant upfront embodied carbon savings compared to a typical commercial development. For example, the columns are no more than 7.5m apart where most office developments have columns which are between 9 and 15m.

Whilst this approach has many structural engineering benefits, it requires more columns in the office floorplates. We held early dialogue with commercial property agents during Stage 2 to agree that this closer column spacing wouldn't impact on the ability of the floorplates to be let. By reducing column spacing and using post-tensioned concrete, the floor slabs were only 215mm thick.

A conventionally reinforced concrete flat slab with columns 9m apart would typically need a 300mm thick slab, hence a 30% reduction in the concrete volume of the structural floors was achieved. By using columns at close centres, the loads from the structure were relatively evenly spread across the basement floor. In combination with natural sandstone being present below the basement level, the basement floor structure was used to support the building above without the need for any piled foundation, a first for the Paradise development. Design loading on the floor plates was kept to a minimum; we used the British Council for Offices (BCO) guidance but no more; we made accurate allowances for floor finishes and cladding without adding extra unrequired load allowances wherever possible. Keeping the loading as low as possible enabled reductions in material use for the floors, column and foundations, resulting in reductions in upfront embodied carbon.

In addition to the structural design considerations, careful material choices were made including:

- The external façade comprised pre-fabricated terracotta cladding panels, which reduced waste from offcuts and enhanced material efficiency.
- The façade incorporated aluminium with a high recycled content, lowering the embodied carbon by minimising the need for virgin materials.
- Double glazing was specified instead of triple glazing, resulting in significant carbon savings.
- Ceilings were typically left with exposed finishes, rather than typical suspended ceiling systems, while others incorporated biogenic materials such as timber baffle ceiling to lobbies, as well as acoustic panels.
- Low carbon raised access flooring was specified for office areas, greatly reducing overall embodied carbon by limiting the requirement for virgin materials, and there by the embodied carbon associated with their sourcing and production processes.




## Services Cundall provided

- Acoustics
- Building Services Engineering
- Civil Engineering
- Fire Engineering
- Geotechnical and Geoenvironmental
- Information Technology
- Lighting Design
- Smart
- Structural Engineering
- Sustainability
- Transportation
- Vertical Transportation

## Helpful definitions

**Embodied carbon** - the supply chain carbon emissions of the materials and construction processes throughout the lifecycle of buildings.

**Upfront embodied carbon** - the supply chain carbon emissions of the materials and construction processes throughout the lifecycle of buildings.

**LETI framework** - a framework for collecting and reporting building performance data, which is simple and prioritises reporting basic information well, rather than complex information badly.

To access our entire glossary of sustainability and ESG terms **click here.**



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