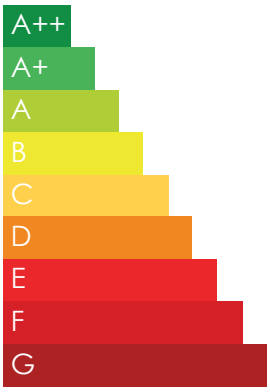
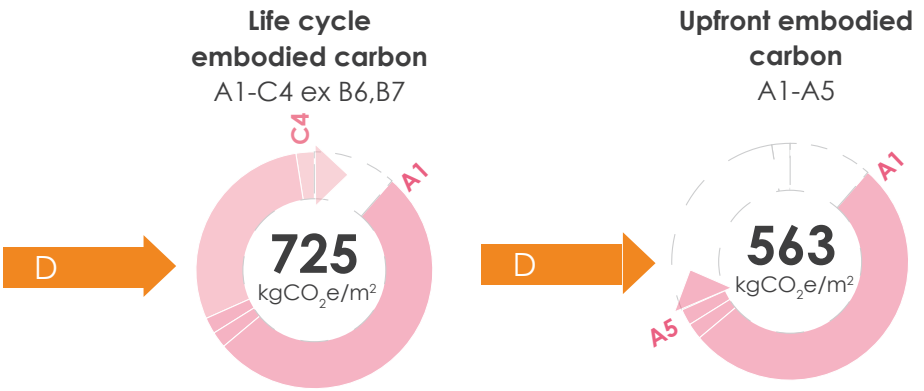
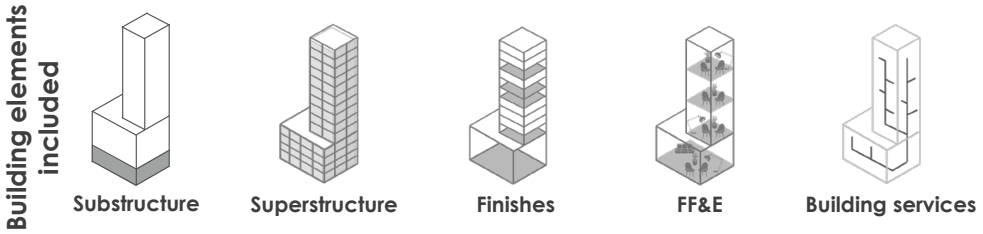
Harris Academy Sutton by Architype







Project overview
Harris Academy Sutton is the first Passivhaus secondary school in the UK. The highly efficient school inspires students with exceptional facilities, flexible teaching spaces and a mature palette of materials, with a university-style feel enhanced to support transitions to higher education. As well as the significant sustainability benefits, the Passivhaus design supports a comfortable learning environment, with stable temperatures, excellent air quality and plenty of natural light.

Project sector
Education

Assessment date
2022 (at RIBA Stage 6)

RIBA work stage
6

GIA (m²)
10,625m²

Year of project completion
2019 (Complete)

Analysis
ECCOLAB export, with addition of estimated embodied carbon for MEP

Database(s) used
ECCOLAB, based on EPDs and ICE

Type of building
New build

Reference study period
60 years

Location
UK

Data notes
4 Storey, Hybrid - CLT/Glulam/timber frame/concrete/steel, copper cladding/ aluminium cladding/brick

Image c. Architype / Jack Hobhouse

Assessment objective

To understand where the building sat relative to building benchmarks, supporting our commitment to measuring genuine sustainability through the carbon impact of our buildings. Also as a pilot project for ECCOLAB, it allowed us to test and refine the software.

Key lessons learned

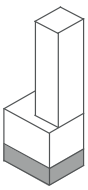
Improvements to the software have allowed us to generate more accurate and detailed reporting information for later projects and ECCOLAB has now been released for commercial use.

Key barriers and challenges

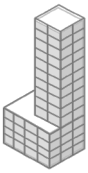
Although a Cross Laminated Timber structure lowered the embodied carbon it did present some challenges relating to connection details, services co-ordination, and fire risk mitigation. It required some secondary steel connections for the geometry which created detailing challenges and increased embodied carbon. We also faced the challenge of getting construction build-ups certified due to lack of fire certification around CLT and associated test data– resolved through a specialist fire engineers detailed calculations.

Additionally, as a high-performance building this resulted in many of the required Passivhaus components coming from Europe, resulting in higher A4 Transportation values, hopefully this will be addressed with more local supply chains shortly.

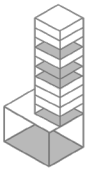
Building elements embodied carbon (A1-A5)



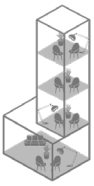
Substructure
14 kg CO_2e/m^2 (A1-A5)



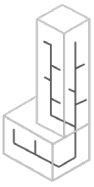
Superstructure
392 kg CO_2e/m^2 (A1-A5)



Finishes
23 kg CO_2e/m^2 (A1-A5)



FF&E
N/A kg CO_2e/m^2 (A1-A5)



Building services
90 kg CO_2e/m^2 (A1-A5)

Success stories

Embodied carbon modelling tools were used along-side Passivhaus PHPP from the outset to communicate the whole carbon story which helped influence specification decisions throughout the project. The anticipated operational savings over 60 years are greater than the total Embodied Carbon A-C of the project. The use of timber was included wherever possible and appropriate to do so - timber cladding, timber frame infill, timber batten ceiling finishes etc. The predominant external wall insulation system utilised timber I-joists with blown cellulose insulation. Substituting concrete for CLT / glulam structure where technically viable to do so resulted in over 1M kg/CO2 ended up being sequestered in the structure, with exposed elements of structure avoiding additional material finishes.

Material selection

Materials were chosen to be robust, long-life materials, which would cope in a secondary school. Concrete was chosen for critical areas, below ground and fire rated cores with 50% GGBS replacement. Dark bricks were used at low level. Timber was chosen for health and well-being as well as its carbon reduction. Natural copper cladding were chosen to distinguish the specific civic and science spaces.

Design decision justification

The design of the building had to achieve Passivhaus, and therefore simplification of foundations was essential on this building. Through use of timber structure above upper ground level we significantly reduced the weight of the building and were able to change from deep concrete piles to a minimal raft slab. The switch from concrete to timber alone represented a 20% saving in embodied carbon in our early-stage analysis. Cross Laminated Timber floors and roof slabs were chosen to allow future flexibility of spaces by allowing internal partitions to be adjusted and moved post completion.

Client engagement

The council were committed to championing all round sustainability including a parallel target of lowering embodied carbon. The school are very pleased with the timber and daylight commenting that it is a spectacular learning environment.

Life cycle embodied carbon reporting summary

Lead consultant, architects, principal designer and passivhaus designer:
Architype

Contractor:
Willmott Dixon

Education consultants:
Lloyd Wilson Partnership

Services engineer:
BDP

Structural engineer:
Price & Myers

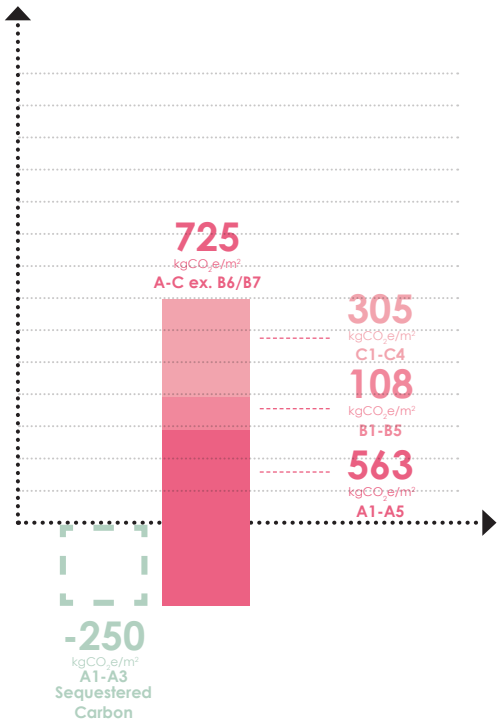
Landscape architect:
Churchman Thornhill Finch

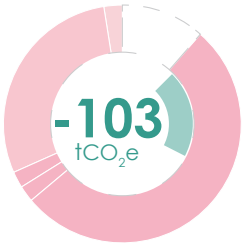
Quantity surveyor:
Synergy

Planning consultant:
Nathaniel Lichfield & Partners

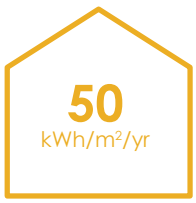
CLT supplier:
KLH UK

Passivhaus certifiers:
WARM Low Energy Building Practice





Module D



B6 Operational energy

Operational energy estimation method:

PHPP at design stage