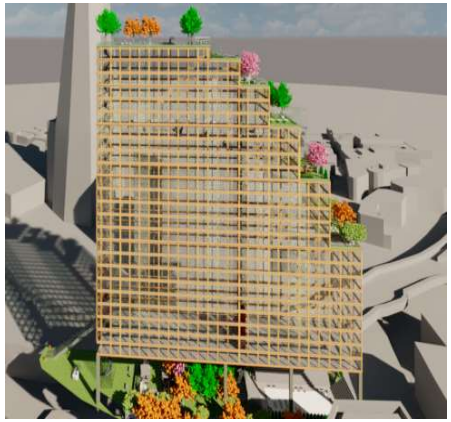
COLECHURCH HOUSE

WORK RELAX ENJOY

This urban regeneration project will provide a social, architectural and environmental landmark in the heart of London.



Designing for Change

Design Objectives

- Maximising comfort for users
- Ensuring iconic views of London
- Become industry leading in sustainability
- Utilising natural ventilation as a key strategy

To address these objectives, the design process was information driven. Vigorous research into the surrounding environment was conducted alongside multiple site visits and using integrated modelling to inform the design.

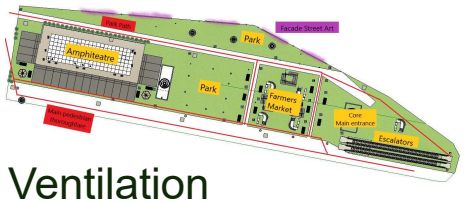
Design Features

- The structure is tiered to the west providing views across London.
- Sky gardens on the roof of each tier give green spaces for social interaction, while reducing heating of the structure.
- Elevating the building on 'stilts' allows space for a diverse, cultural and green public realm.
- The single skin façade with a 3m square triple-glazed glass panel, encased by timber frame
- 0.8m square glass window to allow manual opening of the window

The Place To Be

Unique space that will improve the commuter experience and generate a vibrant atmosphere.

- **Amphitheatre** - a sheltered space for peaceful breaks during the day, transformed into a lively evening venue
- **Farmer's Market** – a selection of healthy, quality, sustainable goods will offered in collaboration with stalls at Borough Market.
- **Façade Street Art** - the original facade will be re-purposed as 'canvasses' for local street artists to come and get creative.
- **Green Park Space** - a urban public park will provide a green space for workers, locals and tourists to meet, relax and have fun.
- **Pedestrian Thoroughfare** – the walking route underneath the elevated building will provide shelter to commuters in rain



Ventilation

Modelling

Computer models of sections of the proposed design were created such that the interior environment could be simulated in the critical months of January and July. This involved iteratively calculating flow rates on each floor and solving systems of PDEs to find their buoyancy and temperature variations.

- **Stack Model** – Consisted of four floors stacked on top of one another with an atrium connecting the airflow between them.
- **Cross Model** – Only analyses one floor since this method is heavily dependent on winds blowing through the depth of the building.

To make these models as accurate as possible, many different site and design specific features were taken into account such as:

- Room Dimensions
- Occupancy
- External Temperature
- Solar Gains
- Thermal Transmittance
- Wind Pressures

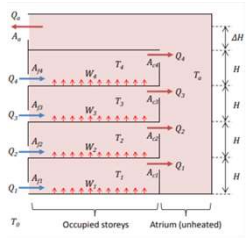


Figure showing stack ventilation model

Feasibility

The feasibility of each natural ventilation method is defined as the percentage of the month within which the internal conditions satisfy both the thermal comfort model and the minimum volume flux. The adopted ventilation strategy for Colechurch House was based on the feasibilities of the ventilation methods: In summer, cross ventilation will be used and in winter, stack ventilation has a higher feasibility.

		Month					
		Jan			Jul		
		Stack		Cross	Stack		Cross
		North	South		North	South	
Floors	1	44.47	48.77	31.00	46.06	59.82	56.86
	2	42.60	46.78		43.57	59.22	
	3	39.22	42.21		43.38	56.51	
	4	30.95	35.07		43.28	52.29	

Table showing feasibilities of natural ventilation methods

Mixed Mode Methods

To keep the internal environment comfortable throughout the year, the required supplementary mechanical heating and cooling was calculated to be around 200MJ/m² per annum. This is an upper bound since the simulations were carried out with constant opening areas. If these areas dynamically varied using a BMS, the operational energy would decrease significantly.

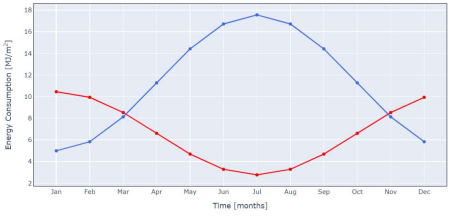
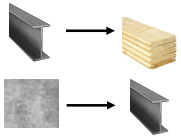


Figure showing the energy required for mechanical ventilation

Sustainability

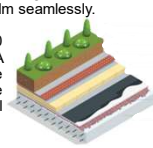
Sustainability was the core of the design process, with focus on carbon neutrality and operational energy.

Carbon Neutrality



Sustainable Materials are selected to reduce embodied carbon by 75-90%. The design process prioritises the use of timber where possible, steel instead of concrete and replace a portion of the carbon-intensive Portland cement.

Smart Underground Bicycle Storage is provided to encourage cycling, a carbon–zero commuting option. Automated and safe underground modules are designed to hold 2000+ bikes, free for all occupants. Fast bike retrieval points are situated at ground level and integrated to the public realm seamlessly.



Sustainable Drainage System is integrated to 1600 m² of greenery in the rooftop garden and terraces. A rainwater collection system is in place to reuse rainwater and reduce runoff to greenfield discharge rates. They also provide sanctuary to the local habitat, enhancing the biodiversity.

Operational energy

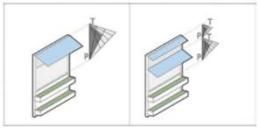


Photo Voltaic Shades are added to every window on the southern side of the building to generate 217 MWh/yr, enabling an annual cost saving of £35,000.

Performance of the design achieves the target values for 2025 – 110kWh/m²/yr and is expected to reach UKGBC 2030 targets with more efficient equipment. The consumption is 65% lower than the CIBSE benchmark of 225kWh/m²/yr, due to implementing the following strategies:

- Adding triple glazing to windows, limiting light and heat transmission.
- Maximising natural light, thereby needing very little artificial lighting.
- Employing two different natural ventilation strategies and building management system to minimise mechanical ventilation use.

Cost for operational energy is £11.90/m²/yr, which includes heating, cooling, fans, pumps, lighting and equipment. This is approximately £384,000 annually.