

- A1 Raw materials supply
- A2 Transport raw materials
- A3 Manufacturing
- A4 Transport
- A5 Site works

Ryder

# Tombola House Reducing Energy Demand

On the banks of the River Wear, Tombola House is leading the redevelopment of Sunderland's historic quayside. This landmark building is designed to be a socially enriching workplace of the future. A requirement to maximise natural lighting in the workspace challenged the design team to seek the most sustainable solution to maintain optimum building performance.

- B1 In use
- B2 Maintenance
- B3 Repair
- B4 Replacement
- B5 Refurbishment
- B6 Energy use
- B7 Water use

## High specification office net zero challenges

Delivering a sustainable open plan office space with a large atrium, while maximising natural lighting, challenges a design team seeking to reduce emissions. When delivering energy efficient buildings, increasing insulation and reducing glazing to improve thermal performance and reduce energy demand, is a typical response.

Tombola House was never set to be a net zero building but it encapsulates many incremental design improvements to realise a more sustainable building. The heating and cooling of the building is generated by air source heat pumps, allowing the building to benefit from the decarbonisation of the electrical power grid. As the carbon emissions from electrical supply reduce, so in turn will those of Tombola House.

## Electrochromic glass supported the buildings passive heating and cooling strategy. Negating the need for extensive air conditioning and creating a more sustainable building.

Electrochromic glass is an electrically tintable glass that can be directly controlled by the building occupants and the building management system.<sup>1</sup> High levels of sunlight darken the glass preventing solar gain and glare. SageGlass delivered a practicable solution to reducing operational energy when large amounts of glazing were required to realise the client's vision. We achieved a 40 percent reduction in artificial lighting and a 30 percent reduction in air conditioning usage.

# -40% -30%

artificial lighting demand

air conditioning use



## 2 Internal air quality

The fresh air exchange design rate per occupant is 12 litres per second, with an increased rate in the on site health and fitness facility. Consequently, internal carbon dioxide levels are reduced to well below 900 parts per million.

## Key areas of improvement:



## 1 Operational energy reduction

SageGlass improved energy conservation, taking less electricity to operate 2,000sqft of electrochromic glass than a 60 watt light bulb. Over the building's lifecycle, overall energy loads will be reduced by an average of 16 percent.

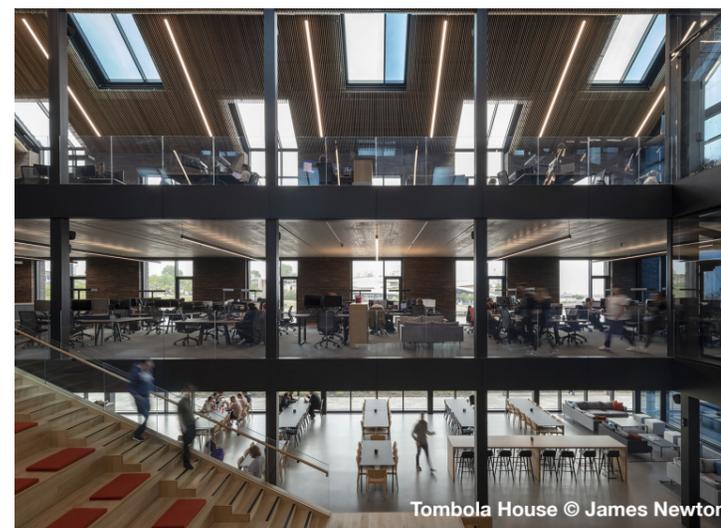
Chilled slabs and a ceiling cooling system, via embedded pipework, also work to prevent overheating while reducing energy demand for cooling in the building — around 30 percent less than conventional HVAC systems.



## 3 Health and wellbeing

Increased daylight improves occupant wellbeing and productivity through better regulation of our circadian system and our sleep wake cycle. The SageGlass allows optimum daylight penetration while achieving a comfortable ambient atmosphere.

Generous floor to ceiling heights and a density of 10sqm per person also aid workplace wellbeing. Maximising visual connection to nature and creating accessible external green spaces was important for wellbeing<sup>3</sup> and has also been shown to increase mental performance by up to 20 percent.



- C1 Deconstruction
- C2 Transport
- C3 Waste processing
- C4 Disposal
- D House

# References

1 SageGlass Saint-Gobain. (2018) What is electrochromic glass? Retrieved from <https://www.sageglass.com/eu/article/what-electrochromic-glass>

2 RIBA. (2021) 2030 Climate Challenge. Retrieved from <https://www.architecture.com/about/policy/climate-action/2030-climate-challenge>

3 Public Health England. (2020) Improving access to greenspace: A new review for 2020. Retrieved from [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/904439/Improving\\_access\\_to\\_greenspace\\_2020\\_review.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/904439/Improving_access_to_greenspace_2020_review.pdf)

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