

The case for retrofit; What is preventing a return to the mainstream?

Lucas Wolman | Supervised by Jennifer Schooling

Introduction:

We live in an era where CO₂ emissions from buildings and construction hit record highs despite the growth in climate awareness. Building energy use creates over 6.5 billion tonnes of CO₂e, making up 17.5% of global greenhouse gas emissions (Ritchie & Roser, 2020). While prevalent thinking has led to the demolition and reconstruction of our buildings to improve performance while meeting stakeholder values, retrofit is an alternative that is attempting to overcome many challenges and barriers to reclaim a place in the mainstream. Our understanding of circular economy principles and their application in the built environment provokes the proper discussions about retrofit's role in decarbonising our buildings.

Basis for retrofit:

Retrofit is essential in achieving net-zero targets. It encompasses a range of improvement activities to enhance existing buildings and return them to regular use. Retrofits promote sustainability by substituting fossil fuels with renewable energy sources, making temperature control more straightforward, and integrating modern design requirements. Well-done retrofits can deliver enhancements for all building stakeholders, save energy, preserve heritage, and reduce greenhouse gas emissions, with no heavier financial burden than rebuild and similar environmental and social parameters.

Challenges faced:

There is a need for adequate communication flows twinned with radical collaboration. All stakeholders must express their wants and needs to identify which information flows are vital for project success and what education might be required across parties.

A change of thinking about our historic structures is required to assess buildings across their whole life cycle. The focus should be on holistic thinking, linking the brief to the end use and how well the existing structure links with the intended future use. Plans should be created for interim uses between longer tenancies to retain value during refurbishment periods. Refurbishment cycles must also be extended to maximise lifetimes and reduce waste. A change in building trends will also be valued, focusing more on designing for reuse while not limiting sustainability through a lack of optimisation.

The Entopia Building:

A 1930s Telephone Exchange in Cambridge has been transformed into the new home for Cambridge Institute for Sustainability Leadership. Improvements were introduced through fabric improvements, such as better environmental sealing, while introducing more efficient building services like heat pumps.

(University Of Cambridge, 2021)

- 35% cut in heat loss
- 15% energy requirements of original building
- 62,332kg CO₂e avoided in construction materials



Pre-intervention (University Of Cambridge, 2021)



Post-intervention (Lane, 2022)

Avenues for advancement:

Regulatory oversight must be bolstered in line with a change in legislation to incentivise retrofit. A strengthened governmental position twinned with effective leadership incorporating a culture of change can effectively enforce available levers while changing regulations to keep in line with market trends.

Historic protections work both for and against retrofit. While it can enforce the protection of building fabric and preserve culture, it can inhibit the envelope changes required to maintain our structures' social, economic, and environmental value. More significant guidance and a rethinking of the work permitted upon historic structures must be included with greater allowance for sympathetic modifications while streamlining the listed building consent process.

References:

Lane, T., 2022. *A deep green retrofit crafts a sustainability HQ*. [Online] Available at: <https://www.building.co.uk/buildings/a-deep-green-retrofit-crafts-a-sustainability-hq/5116123.article> [Accessed 28 July 2023].

Ritchie, H. & Roser, M., 2020. *Emissions by sector*. [Online] Available at: <https://ourworldindata.org/emissions-by-sector> [Accessed 28 July 2023].

University Of Cambridge, 2021. *Building Entopia*. [Online] Available at: <https://www.cisl.cam.ac.uk/building-entopia> [Accessed 28 July 2023].