UK GBC

The voice of our sustainable built environment

RETROFIT

PRACTICAL GUIDE

This Practical Guide covers the key principles of domestic and non-domestic retrofit in the built environment.

IN A SNAPSHOT

The term 'retrofit' describes the strategic upgrade of a building's fabric, services, and/or technological systems, to improve energy, water and waste efficiencies and to reduce overheating. Retrofit is often perceived as complex and risky due to the inherent uncertainties of working with existing buildings. However, it is an essential part of our transition to net zero, it can save money through reducing the energy wasted in inefficient buildings, add value through investing in a higher quality, more comfortable, and healthier indoor environment, and most importantly ensure our buildings are fit for the future.

Why is it important?

18% of the UK's carbon footprint is from 'operational emissions,' or the energy needed to heat, cool and power our buildings. Retrofitting existing buildings generally results in lower whole life carbon emissions than demolition and new build, whilst reducing the wider ecological impacts of construction waste and resource usage.

It is estimated that 80% of our current building stock will still be in use in 2050, so retrofit is essential to meet our climate targets. Indeed, the Carbon Risk Real Estate Monitor (CRREM) estimates that 87% of the improved performance needed for the European real estate sector to meet a 1.5°C aligned pathway, will need to come from existing buildings.

The UK has one of the oldest and leakiest housing stocks in western Europe, whose operational emissions are responsible for 48% of the UK's built environment emissions. Because of this, upgrading the nation's homes is one of the biggest opportunities the UK has to reduce carbon emissions whilst tackling the cost-of-living crisis, energy security and levelling up. In practice, this looks like improving insulation levels and upgrading the building fabric to stop heat escaping our buildings, replacing gas boilers with low or zero carbon alternatives, and solar panels, and reducing our energy consumption through smart meters and heat recovery systems to prevent wasted energy. We can also retrofit to improve the resilience of a building by installing shutters and ventilation systems to reduce overheating, and adding flood resilience details where appropriate.

Principles of retrofit in the built environment

Retrofitting domestic and non-domestic buildings often involves quite different approaches as projects can be very different scales, however the key principles are the same:

1 | Take a whole-building approach

How well buildings work is affected by their physical (building fabric) and technological (building services and systems). Retrofit projects need to consider all these components as a whole system as they are all interconnected.

2 | Plan a long-term retrofit strategy

Retrofit necessitates a strategic approach that aligns with existing maintenance and/or lease cycles, or other key 'trigger points', to both minimise the cost and carbon impact of retrofit measures, but also to minimise disruption to building occupants. In homes especially, this can also help to phase works according to personal priorities and financial constraints, while ensuring retrofit measures implemented first, do not preclude or frustrate retrofit measures planned for later.

3 | Use data to guide the process and measure success

We must improve the quality and transparency of building performance data, both to understand the impact of retrofit, but also to optimise in-use energy performance. Using more holistic metrics can bring to life the wider benefits of retrofit, beyond reducing energy use and carbon emissions. UKGBC's BUILD UPON 2 Framework offers a tool to track and report the diverse positive impacts of retrofit, including health, wellbeing and social value

4 | Minimise whole life carbon

Whole life carbon assessments support evidence-based decision-making and illustrate the carbon savings of retrofit over new-build. However, building level considerations must be balanced with the need to drive down operational energy demand across the built environment, which in turn facilitates grid decarbonisation.

5 | Invest in the value of our built environment

At its core, retrofit is about gaining deeper knowledge of and engagement with our buildings, and how we can upgrade, improve, and reinvent them to add value, and meet current and future needs. This requires a shift in values and mindset towards a renewed stewardship model where all stakeholders involved in design, delivery and management of buildings take pride in the quality of our built environment, and in contributing towards achieving common sustainability goals.

6 | Collaborate and share lessons learnt

The scale of the retrofit challenge and the rate of decarbonisation needed, requires an unprecedented level of collaboration. We have the opportunity to leverage this radical collaboration, and the mutual understanding that comes with it, to move beyond zero-sum thinking and achieve the net zero, resilient and regenerative built environment that is necessary for us to thrive in the decades to come.

PRACTICAL GUIDE

How can it be done?

The type and scale of retrofit project will depend on the type of existing building, its construction, and how it is used, however common measures include: optimisation of systems, tenant/ resident behaviour change, low energy lighting, smart controls, improved airtightness, building fabric upgrades, Mechanical Ventilation and Heat Recovery (MVHR), CO2 Ventilation Control, replacing gas boliers with low or zero carbon alternatives, and solar PV.

All buildings are different and will need a different combination of measures!

UKGBC have developed several strategies/toolkits to support different stakeholders in advocating for, supporting, and implementing retrofit projects:

1 | Through a National Retrofit Strategy

Scaled-up investment and game-changing national policies can drive a once-in-a-generation upgrade of Britain's homes. Working with industry experts and academics, the UKGBC created a Home Retrofit Investment Calculator to open the books so you can 'play' Chancellor and Secretary of State. The calculator has been developed to allow an evidence-based debate on the magnitude of investment and policies needed and to help us all assess policy decisions and priorities.

2 | Local Authorities supporting and accelerating home retrofit in their local area

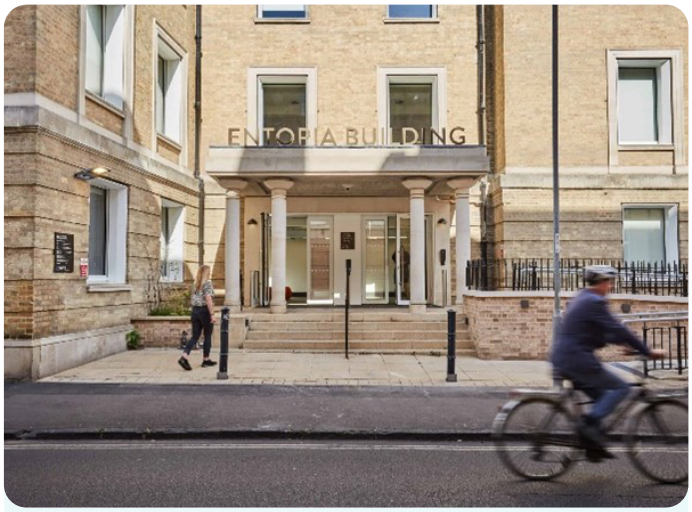
Our Local Area Retrofit Accelerator (LARA) 'Getting Started Toolkit' is an online guide that supports Local Authority officers to build the business case for, and deliver retrofit facilitation services as well as scaling them up. Our Retrofit Playbook, aims to support local and combined authorities in developing retrofit policies and initiatives, through sharing best practice and guidance.

3 | UKGBC guidance for non-domestic retrofit

Our Advancing Net Zero (ANZ) programme has an ongoing Commercial Retrofit workstream aimed at building an evidence base around the cost and carbon effectiveness of retrofitting towards net zero, and guidance around how to develop an 'Overarching Retrofit Strategy' for any non-domestic building type.

Our Retrofitting office buildings guidance reframes retrofit as an iterative process, rather than a standalone project, and demonstrates that upgrades should be planned and implemented to align with critical 'trigger points', or opportunities to unlock higher levels of performance, such as lease and maintenance cycles. It also emphasises that retrofits can add value, especially through integrating wider considerations, like resilience to climate change, health, wellbeing, and social value, and ensuring our buildings are designed to supporting the transition to a net zero carbon electricity grid.

Our Delivering net zero: key considerations for commercial retrofits guide summarises the fundamental considerations for retrofit projects including definitions for light and deep retrofits, and 10 key considerations for net zero carbon focused retrofits projects to support net zero pathways and goals



Case Study: Entopia Building

The Entopia Building is a deep retrofit of a 1930's telephone exchange with both low embodied carbon and high energy efficiency. Reuse of the original structure saved around 60% of the embodied carbon compared to demolishing and rebuilding. Reused materials were used throughout the building including 350 light fittings, reused flooring, reused steel, reused carpet tiles and the reception desk. Materials not required were passed to the community. The project specified 35% biobased materials and used recycled paint where possible to further lower levels of embodied carbon. Retrofit to Enerphit standard ensure that Energy Use Intensity (EUI) was in line with what is anticipated the UK Net Zero Carbon Building Standard for new build office.

IN SUMMARY

Retrofit is a critical part of the transition to net zero across domestic and non-domestic buildings. As the majority of our current buildings will still be in use in 2050, it is critically important that they are upgraded to reduce carbon emissions, improve quality, and ensure our buildings are able to withstand the effects of climate change.

FURTHER RESOURCES

- National Retrofit Hub
- Ashden: Retrofit: Creating Warmer Homes
- LETI: Climate Emergency Retrofit Guide
- Retrofit Unpicker
- Better Building Partnership: Our Resources: Retrofit & Refurbishment
- Green Lease toolkit | Better Buildings Partnership