Towns Fund Delivery Partner

IMPLEMENTATION PATHWAYS

REFURBISHMENT

ARUP nichols FUTUREGOV copper Grant Thornton savills

CONTENTS

DEFINITIONS

Refurbishment means the renovation and redecoration of an asset such as a building.

Retrofit means to install (new or modified parts or equipment) in something previously manufactured or constructed.

Community Retrofit is understanding the whole building and streetscape as an integrated system in meeting just climate transition targets, where a whole district is retrofitted not one building at a time.

Operational impact of a building corresponds to the impact of heating, cooling, lighting and ventilating it.

Embodied impact of a building relates to the impact of the manufacture and transport of construction materials, in addition to the construction process.

INTRODUCTION

On average, the carbon footprint of a refurbished building is 50% less than a new-build replacement[1]. The UK will only meet net zero 2050 target and address the climate emergency in a meaningful way if it leverages existing building stock.

Our built environment is responsible for around 37% of all carbon emissions, and construction consumes around 60% of all raw materials. To reach our 2050 net zero carbon emissions goals our homes must have EPC rating C or better. Yet only 40% of the existing housing stock currently meet this standard.[2] Housing markets must develop and utilise 'circular' and zero carbon technology, in both construction and use.

When teams mobilise for refurbishment or retrofit activity, we should look at ways of addressing community and public realm renewal. Community retrofitting should be prioritised, and interventions such as replacing carparks with parks or community food producing gardens prioritised.

The inadequacy of Britain's housing has been painfully revealed by the COVID-19 lockdown. Housing is society's infrastructure, yet we are still living in, and building, cramped, dark, unhealthy, isolating homes in neighbourhoods with little or no community infrastructure or green space. In 2019, approximately 13.4% of England households lived in fuel poverty[3], creating multiple chronic crises in health and care, as well as amplifying inequality and harming our wellbeing.

[1]https://aecom.com/without-limits/article/refurbishment-vs-new-build-the-carbon-and-business-case/#:~:text=Figure%201%20shows%20that%20over,of%20the%20newly%2Dbuilt%20replacement.

[2]https://www.housing.org.uk/news-and-blogs/blogs/colin-farrell/epc-challenge/

[3]https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/966509/Annual_Fuel_Poverty_Statistics_LILEE_Report_2021__2019_data_.pdf

Retrofitting as an integrated system

By building an ecosystem for retrofitting means understanding the **stack of integrated services at the level of the neighbourhood** – with the ambition of aggregating demand and reducing the use of discrete, single point solutions in the transition towards net-zero.

This approach means investing in the social, financial and digital infrastructure at a neighbourhood scale, and at each level of the stack. This is what we call 'Community Retrofitting' and is about establishing a local vision for climate transition, built on community wealth building and citizen empowerment.

1 **Upskilling & movement building**
- Upskilling & training workshop
- Encouraging collective action
- Build trust to reduce perception of risk/disruption

2 **Physical**
- Whole house renovation
- Electrification of heating
- Pedestrianisation + urban tree planting

3 **Business models & platforms**
- Platform connecting streets with local retrofit services
- New services for private sector landlords

4 **Financial**
- Energy outcome contracting
- Collective ownership and management

5 **Regulatory**
- Rules based public procurement
- Conservation area 2.0
- Test sites for zero-carbon zoning

Figure 1. Retrofitting as an integrated system diagram, A recovery model for Ladywood, Dark Matter Labs

COVID-19 has dramatically impacted our economy. There's an urgent need to stimulate an inclusive, sustainable economy recovery.

House building and retrofit activity through neighbourhood regeneration is a very effective way to stimulate economic recovery while offering training and trading in new, green, lead markets. However it is blocked by a huge shortage of traditional construction skills and increasingly centralised employment models, destroying opportunities for SMEs and local networks to establish.

House prices have inflated far beyond wages; placing ownership beyond the reach of most, and trapping people in an over inflated rental sector.

This is not primarily caused by the undersupply of homes, but by oversupply of debt, speculation and landlordism, combining to inflate land values. The result is a whole generation of people stuck paying high rents, alongside spiralling public costs for emergency housing (£937m pa), adult social care (£21.7bn) and housing benefit (£22bn). As the effects COVID-19 continue and unemployment rises, more of the population will be unable to afford the services that these homes require, resulting in greater numbers of fuel poor homes just as the colder winter months arrive.

Activity to achieve net zero is ramping up globally in the face of the climate crisis, and the built environment has a significant role to play in tackling this and many other critical areas mentioned above. **This document sets out refurbishment guidance and signposts useful documents to help towns leverage refurbishment strategies in order to meet the UK requirement that all existing buildings are net zero by 2050.**

UNDERSTANDING THE TOWNS FUND PROJECT TYPE

Below are factsheets for different types of refurbishment projects from four towns.

If you would like to learn more about the projects, please contact your Town Coordinator.

- **Barrow-in-Ferness**
- **Bolton**
- **Crawley**
- **Boston**

BARROW-IN-FERNESS
HOUSING RENEWAL PROGRAMME
RESIDENTIAL PROGRAMME

The Housing Renewal Programme will invest in improving residential and commercial properties to make them more energy efficient and environmentally sustainable through carbon savings whilst revitalising commercial premises impacted by the pandemic. It is part of the Borough's ambition to be net zero by 2037.

The project is a pilot for a wider town renewal as other funding becomes available. The project projects up to 45 tonnes of CO_2 reduction per year as a result of the interventions.

CLEAN GROWTH:

The project aligns with NP11 Energy and Clean Growth by focusing on improving residential energy efficiency. It aligns with the Cumbria Local Industrial Strategy (2019) by addressing poor housing stock and the Cumbria Housing Statement (2020) by improving living standards, creating thriving communities and boosting perceptions of the area.

INCLUSIVE GROWTH:

The project **supports Borderlands Inclusive Growth Deal** as it works to support vibrant and resilient places for communities and businesses.

More information can be found here.

BOLTON
WELLSPRINGS
MIXED USE BUILDING

The project will invest £7.25 million in renovating the Wellsprings Civic Centre. It will become a centre of innovation in creative and digital businesses for the town.

GREEN RECOVERY:

The project will redevelop a council owned building and **will promote innovation and collaboration**. It aligns with the **GMCA Net Zero Target 2038**.

CRAWLEY
GREEN RETROFITTING PROGRAMME
RESIDENTIAL PROGRAMME

The design, launch and delivery of a borough-wide home 'green retrofit' grants programme, will play a key role in the council's drive to deliver zero net carbon emissions by 2050. The project will invest in borough-wide 'green' home retrofitting to deliver sustainable homes and also stimulate job creation in green construction.

This is part of a town aim a 50% reduction in carbon emissions from dwellings by 2030. This will also stimulate business, economic activity and job creation in green construction.

COVID-19:

The stimulation of green construction jobs is part of recovery, as 57% of Crawley's jobs base is at risk due to the significant impact on the aviation sector.

GREEN ECONOMY:

The project is part of Crawley's focus on stimulating a green economy, especially within technology and construction. Invest in Skills programme complements the Green Retrofitting Programme through specific skill development that aims to stimulate business growth and to respond to the net zero carbon emissions by 2050 imperative.

BOSTON
BLENKIN MEMORIAL HALL
MULTI USE COMMUNITY BUILDING

Blenkin Memorial Hall is part of wider regeneration, encouraging people to shop and visit and to address challenges of short term shop closures and provide a self-sustaining future for the historic Hall. The Hall is located within a Conservation Area and has a requirement to maintain its heritage aesthetic. Refurbishment activity includes refurbishing the windows while maintaining the leaded glass and retention of historic features in addition to upgrades to lifts and stair access.

COVID-19:

The refurbishment of historic and characterful properties is part of a boost to the local area to attract people back into the town.

THE BENEFITS AND OPPORTUNITIES OF NET ZERO

The main reasons for a refurbishment project include maintenance and repair, performance improvement, and function change. Refurbishment can also be an effective mechanisms for reducing embodied carbon and operational carbon. The below shows the carbon saving of a refurbishment in comparison to a new build project.

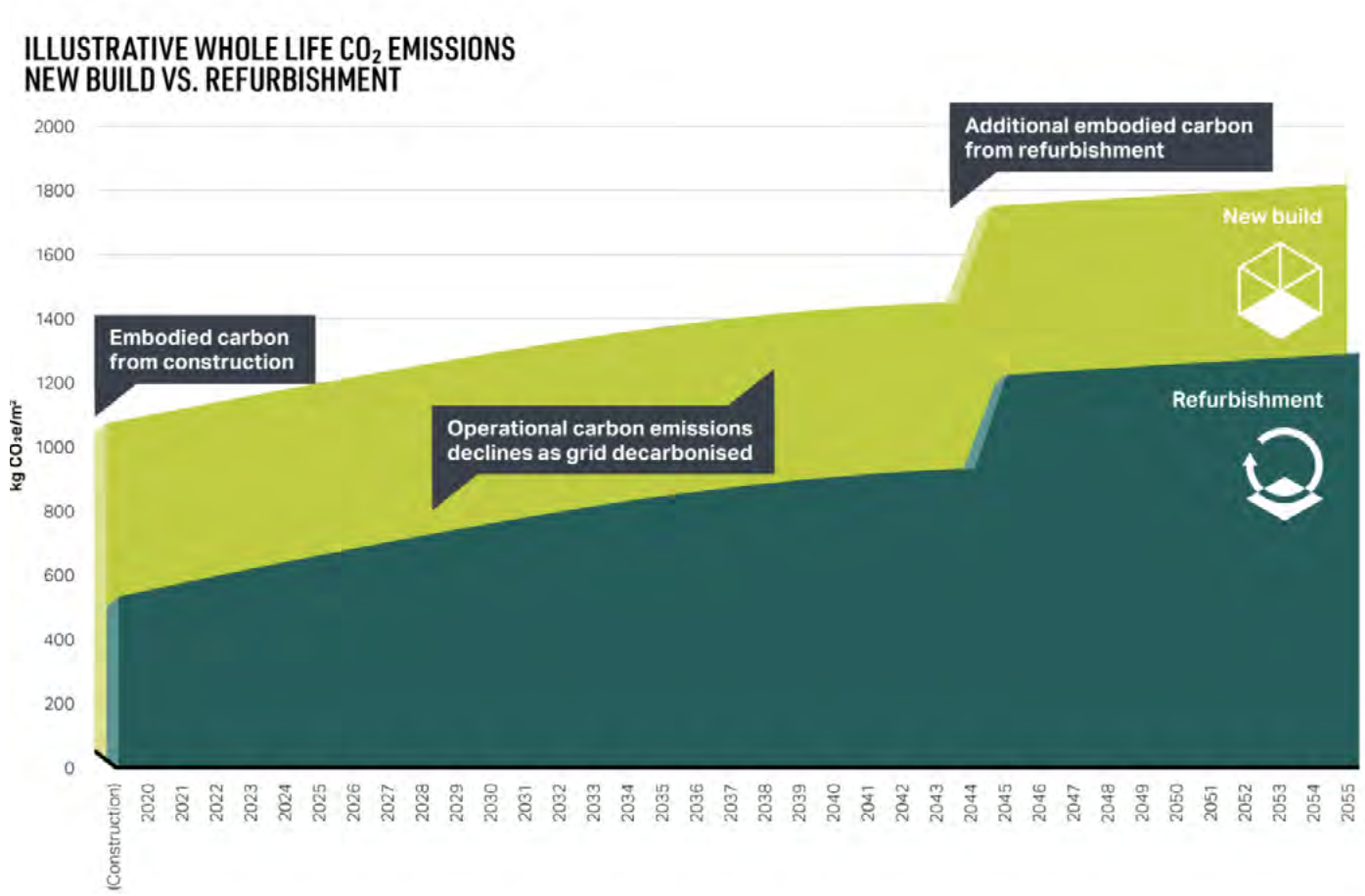

Figure 2: Illustrative Whole Life Carbon emissions of a new build vs. refurbishment

THE BENEFITS AND OPPORTUNITIES OF NET ZERO

The below presents an overview of retrofitting a system.

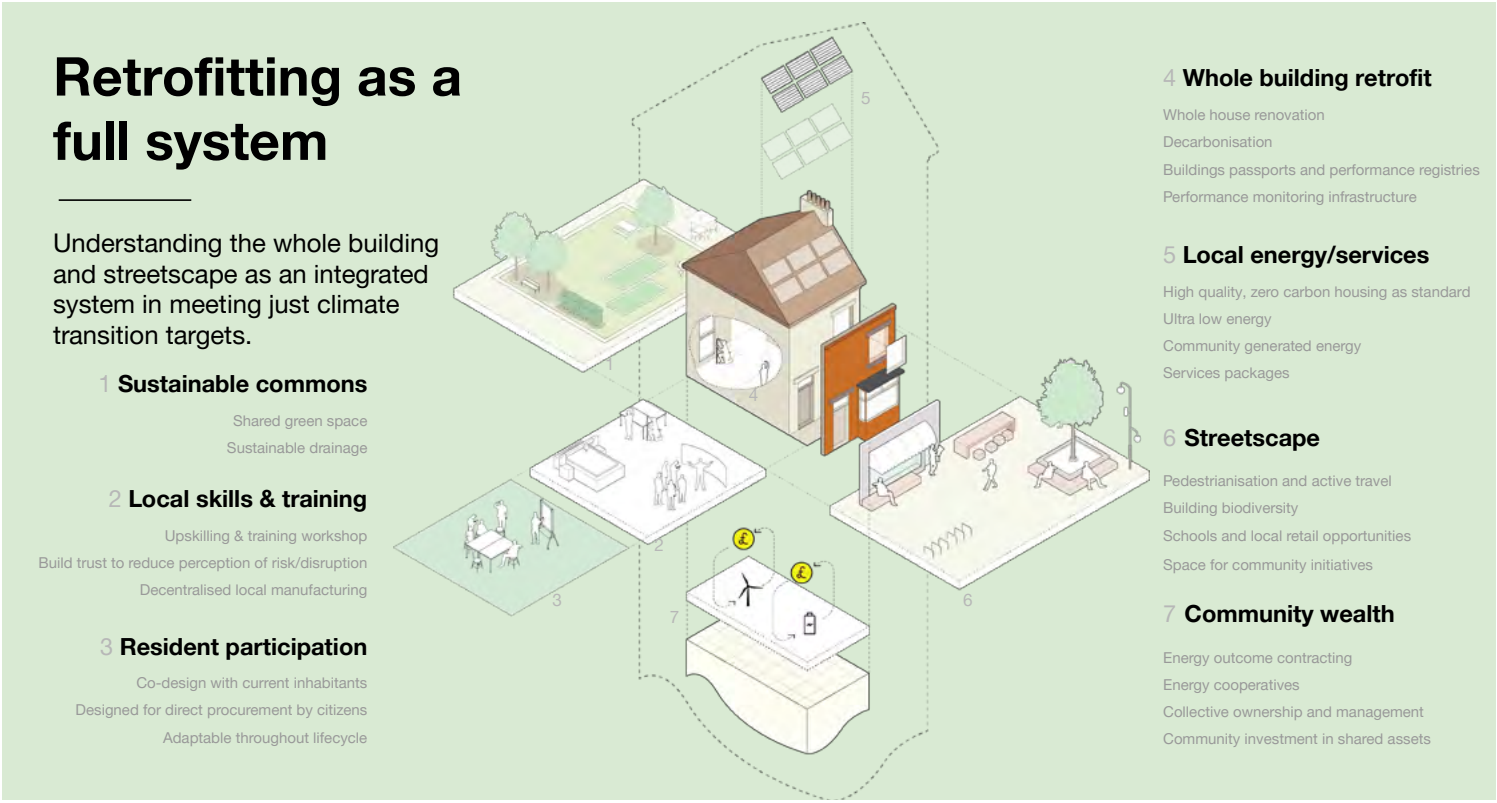

Figure 3. Retrofitting as a full system, A recovery model for Ladywood, Dark Matter Labs

BUILDING A BUSINESS CASE

Tenants and occupiers are becoming more discerning about the buildings they occupy and procure and are increasingly looking at net-zero credentials and operational and embodied carbon savings before investing. Refurbishment can offer embodied and operational carbon savings to meet net zero or other sustainability targets. However, before undertaking a refurbishment project, the decision to reuse or demolish requires many factors to be considered.

UKGBC have detailed guidance here. They note implementing circular principles, such as refurbishment, is a helpful mechanism to meet goals for the reduction of embodied carbon.

BUILDING A BUSINESS CASE

Three key considerations before making the choice to reuse and refurbishment included in the UKGBC guidance are:

Individual business models

- Financial returns and profit margins.
- End-user requirements.
- Lease/tenancy cycles.
- (i.e. when would be the prime opportunity to upgrade).
- Reputational implications for the developer.
- Limited value chain expertise in refurbishment.
- Open house / building data (i.e. prototyping, developing and deploying public registries of open housing data, accessible with public data licenses. This could start with energy use, construction type and age, and in the future be adapted to include performance and usage data.)
- Performance based contracting (i.e. By using open, modular contracts complex work can be broken up into individual stages along the supply chain – rather than relying on one company to provide everything. This encourages local supply chains by allowing SMEs or even individuals to be part of neighbourhood or city level plans for deep renovation and public realm improvements.)
- Neighbourhood action and upskilling (i.e. Providing the right support, services and infrastructure to citizens and community groups can help to scale up retrofitting across a town , and help to aid a green recovery post COVID-19)

Physical conditions of a building

- Age (i.e. can it meet requirements for daylight, design standards, etc.).
- Quality of M&E services.
- Preferred aesthetics of the end-user.
- Adaptive flexibility of the building.
- Location (i.e. proximity to other buildings).
- Risk (i.e. what are the unknowns about the building).
- Heritage requirements.

Sustainability

- Rising importance of environmental sustainability (i.e. net zero agenda).
- Operational and embodied carbon targets (i.e. internal and external targets).
- Health and well-being of occupants (particularly with the rise of Covid-19).
- Social value implications (for inhabitants or surrounding communities).
- Heritage (i.e. ensuring social fabric intact with existing building)
- Community retrofitting to establish a local vision for climate transition, building on community wealth and citizen empowerment.

BUILDING A BUSINESS CASE

New business models, such as leasing, can reduce carbon emissions. Climate-Kic with partners explored façade leasing through the use of long-term service contracts. Leasing could offset initial capital investment with the aim of accelerating renovation projects, while extending producer liability to the operative and End-Of-Life stages of materials and components.

It is increasingly important to get buildings to market quicker and refurbishment offers a way to do this. New build can take five years from inception to hitting the market, refurbishment can get a building to market faster.

Innovate has a guide that identifies four busines models to facilitate renovation works with increasing responsibility levels.

THE PROJECT LIFE-CYCLE AND KEY INTERVENTIONS

1. The local economy can be stimulated due to skills and material requirements. Improved training, skills and undertaking of refurbishment and adaptive use can be facilitated.

2. To enable retrofit, leveraging local supply chains, local skills, and local networks of knowledge can ensure that projects do not just deliver short term emission reductions but also support community resilience and economies.

3. Data will be integral to successful retrofit projects and material reuse strategies. In addition, improved digital technologies will make material reuse more practical.

4. Material passports (for example, a material platform is Madaster) could be adopted across assets to facilitate reuse of materials between building projects. This is relevant if refurbishment is underway as internal finishes could be shared between assets in a town.

5. Utilising digital technologies such as Internet of Things (IoT), sensor technology and automation can enable performance of refurbishment projects to be understood and support future decision making.

6. Embodied carbon savings can be made through maintaining core parts of a building, such as the structure and skin.

7. Cultural or heritage elements can be retained whilst operations are modernised. It has potential to improve the local aesthetic which can help attract visitors and boost the local economy.

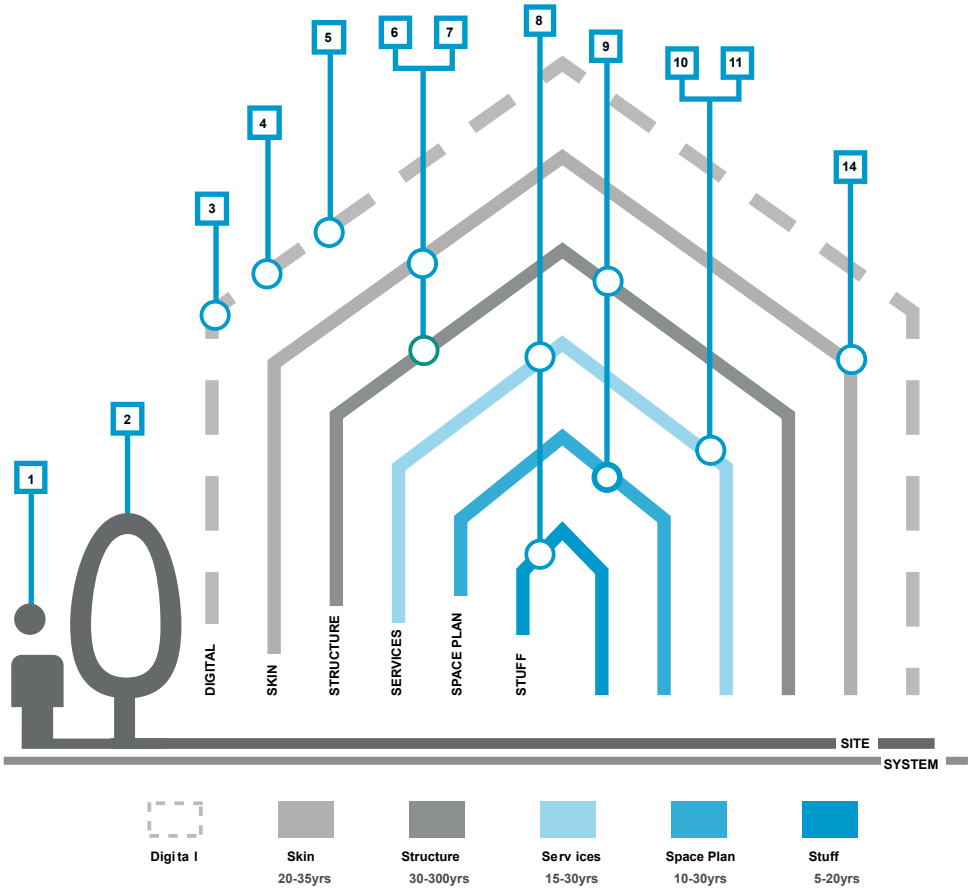

Figure 4: Building layers for circular buildings

Digital is the technological layer of todays building, including data and services for example.

Site is the fixed location of the building

Structure is the buildings skeleton including foundation and load-bearing elements

Skin is the facade and exterior

Services are the pipes, wires, energy and heading systems

Space Plan is the solid internal fit-out includin walls and floors

Stuff is the rest of the internet fit-out including the furnature, lighting and ICT

8. Low carbon materials and solutions such as reused materials, recycled materials, natural or low energy manufacturing products can be specified in the design.

9. Designing in a modular, flexible way can enable deconstruction and facilitate replacement during the building life. Adaptive reuse of vacant commercial buildings for example can re-use the 'skin' of the building for a new use, such as homes or public services.

10. Operational energy performance and reduced emissions can be prioritised during a refurbishment project.

11. Wider comfort conditions might enable mixed mode ventilation or passive cooling.

12. Modular elements permit the efficient use of materials and reduce costs and waste.

13. Loose fit design enables refurbishment and reuse, it enables flexible and adaptive spaces. Removable partitions can enable space to be reconfigured with minimal change required.

14. Maintain cultural elements to support sense of place in the town.

THE PROJECT LIFE-CYCLE AND KEY INTERVENTIONS

There are various stages of a project when refurbishment can be considered. The linked document provides guidance on the RIBA stages (briefing, designing, constructing, operating) and the opportunities to reuse building materials. The RIBA 2030 Climate Challenge Resources provide various tools and guidance documents that focus topics including embodied carbon, operational carbon and water savings throughout a project lifecycle too.

A refurbishment process can be leveraged to reduce carbon emissions through not only reuse but recycling and recovery. The waste hierarchy sets out the priority for prevention of material use through to the least preferred option of disposal. If reusing, locally sourced materials should be prioritised reduce transportation emissions too.

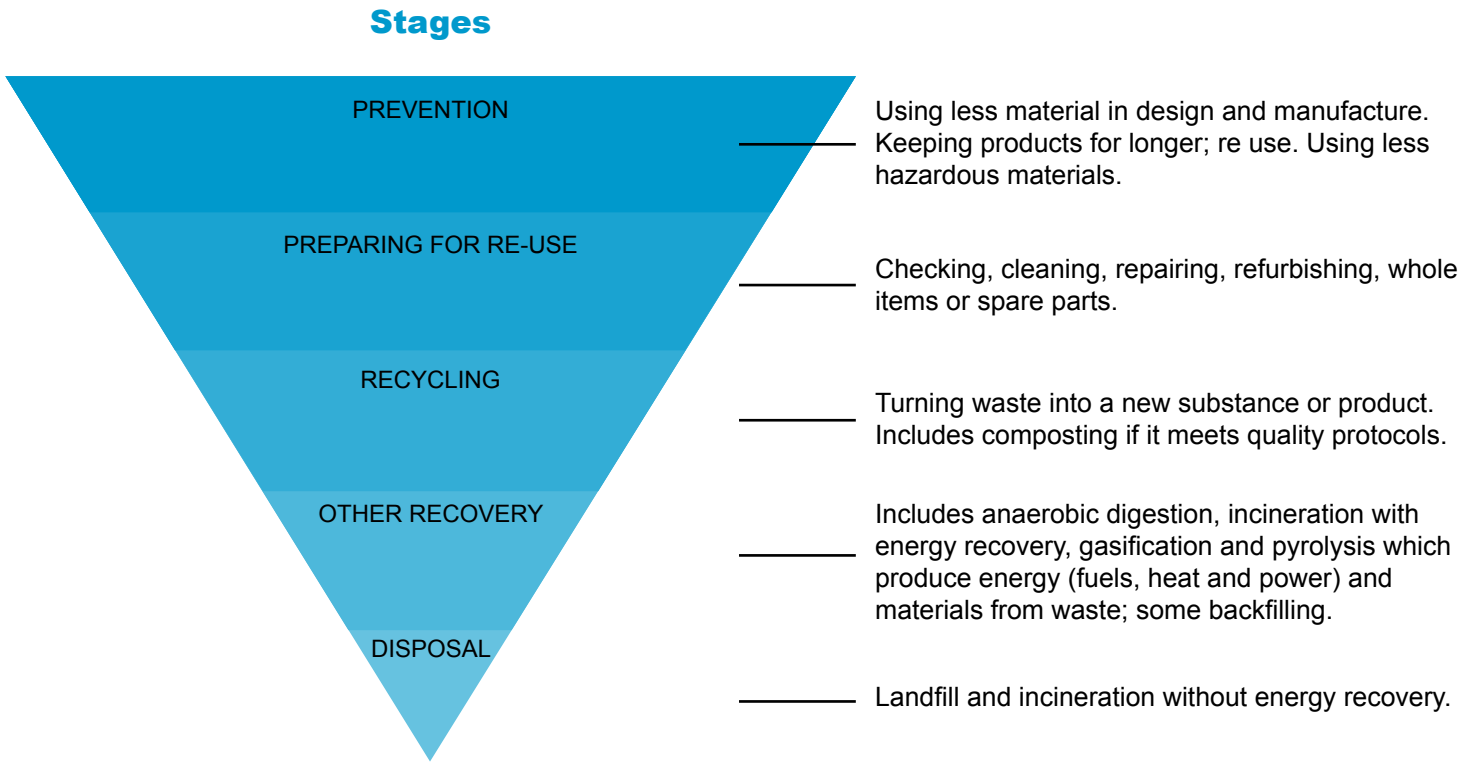

Figure 3: The Waste Hierarchy

THE PROJECT LIFE-CYCLE AND KEY INTERVENTIONS

Operational savings can be made when refurbishment improves the standards for the building. Water efficiencies can be designed into a refurbishment project leading to water savings. Savings for operational water can be facilitated by investigating opportunities to install rainwater harvesting or specifying water-efficient fixtures and fittings for example. For energy, a refurbishment is an ideal opportunity to boost performance. Improvements could include energy efficient lighting, thermal insulation improvements, solar installation or HVAC plant updates.

It is also important to think about your assets **end of life options** from the start. Design for deconstruction is an important part of sustainable design. While refurbishment and retrofitting offer carbon savings now, designs should consider future adaptations that will be required and be designed accordingly.

Capturing and **monitoring** data on the impacts of different refurbishment interventions will be crucial in establishing which interventions work best. To monitor carbon emissions, whole lifecycle carbon assessments can be undertaken. These look at asset emissions resulting from the construction and the use of a building over its entire life, including its demolition and disposal. The BuildUpon project is creating an impact framework for places to measure the benefits of renovation projects across environmental, social and economic factors.

ADDITIONAL READING:

FRAMEWORKS OF INTEREST:

- EnerPHit – A Passive House retrofitting standard for energy efficiency in retrofitted dwellings
- Energiesprong - A standard for whole-house refurbishments and new builds that requires contractors to achieve affordable, year-round comfort for three decades at no extra cost to households
- BREEAM – Building Research Establishment Environmental Assessment Method, first launched in the UK in 1990. It sets best practice standards for the environmental performance of buildings through design, specification, construction and operation. The refurbishment and fit out guide can be found here.
- LEED – a competitor to BREEAM, Leadership in Energy and Environmental Design is a voluntary environmental certification system developed by the U.S. Green Building Council in 2000. It covers design, construction, operation and maintenance.

POLICY:

- The UK's Clean Growth Strategy provides an ambitious blueprint to decarbonise all sectors of the UK economy, and, more recently, the UK became the first major economy to make a legal commitment to net zero emissions by 2050. This included an ambition to upgrade all homes to Energy Performance Certificate (EPC) Band C by 2035, where "cost effective, affordable and practical".
- Social Housing Decarbonisation Fund has launched £3.8 billion over a ten-year period for social housing improvements.
- Green Home Grants totalling £2 billion are available to make energy efficiency improvements.
- Public Sector Decarbonisation Scheme of £2.9 billion over a five-year period will provide grants to fund heat and energy decarbonisation.
- Our Waste, Our Resources: A Strategy for England has a focus on households and keeping resources in play longer
- Waste Management Plan for England focuses on prevention of waste.
- National Planning Policy Framework sets out planning policy for England.
- Clarity over how reuse/circularity can support net zero carbon ambitions and other ESG goals and reporting frameworks include Science Based Targets and TCFD.

LIST OF OTHER USEFUL GUIDES

GUIDE	AUTHOR	LINK
The Retrofit Playbook 2021	UK GBC	Link
Net Zero Carbon Buildings: Three Steps to Take Now	Arup	Link
The carbon and business case for choosing refurbishment over new build	AECOM	Link
Sourcing reclaimed construction materials	Re.London	Link
Is the UK up to the task of retrofitting homes to zero-carbon standards?	RICS	Link
Whole Life Carbon Net Zero Roadmap	UKGBC	Link
Advancing Net Zero	UKGBC	Link
Deep Dive: The choice between demolition and resuse: Developer insights	UKGBC	Link
Circular economy guidance for construction clients: How to practically apply circular economy principles at the project brief stage	UKGBC	Link
Introducing RetroFirst: A new AJ campaign championing reuse in the built environment	Architects Journal	Link
Retrofit Playbook	UKGBC	Link
National Planning Policy Framework: What is it?	Homebuilding & Renovating	Link
Designing for a Circular Economy Primer	GLA	Link
Building back better: Circularity and BREEAM	Designing Buildings	Link
Embodied Carbon Review	OneClickLCA	Link
Climate Emergency Design Guide s	LETI	Link
2ndSKIN Case Study	Climate-Kic	Link
Climate Emergency Retrofit Guide	LETI	Link

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