



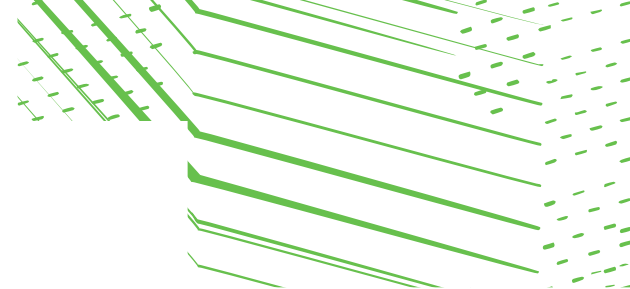
Innovate
UK



Retrofit in Rural Environments

An Insight Report for UK
Local Authorities

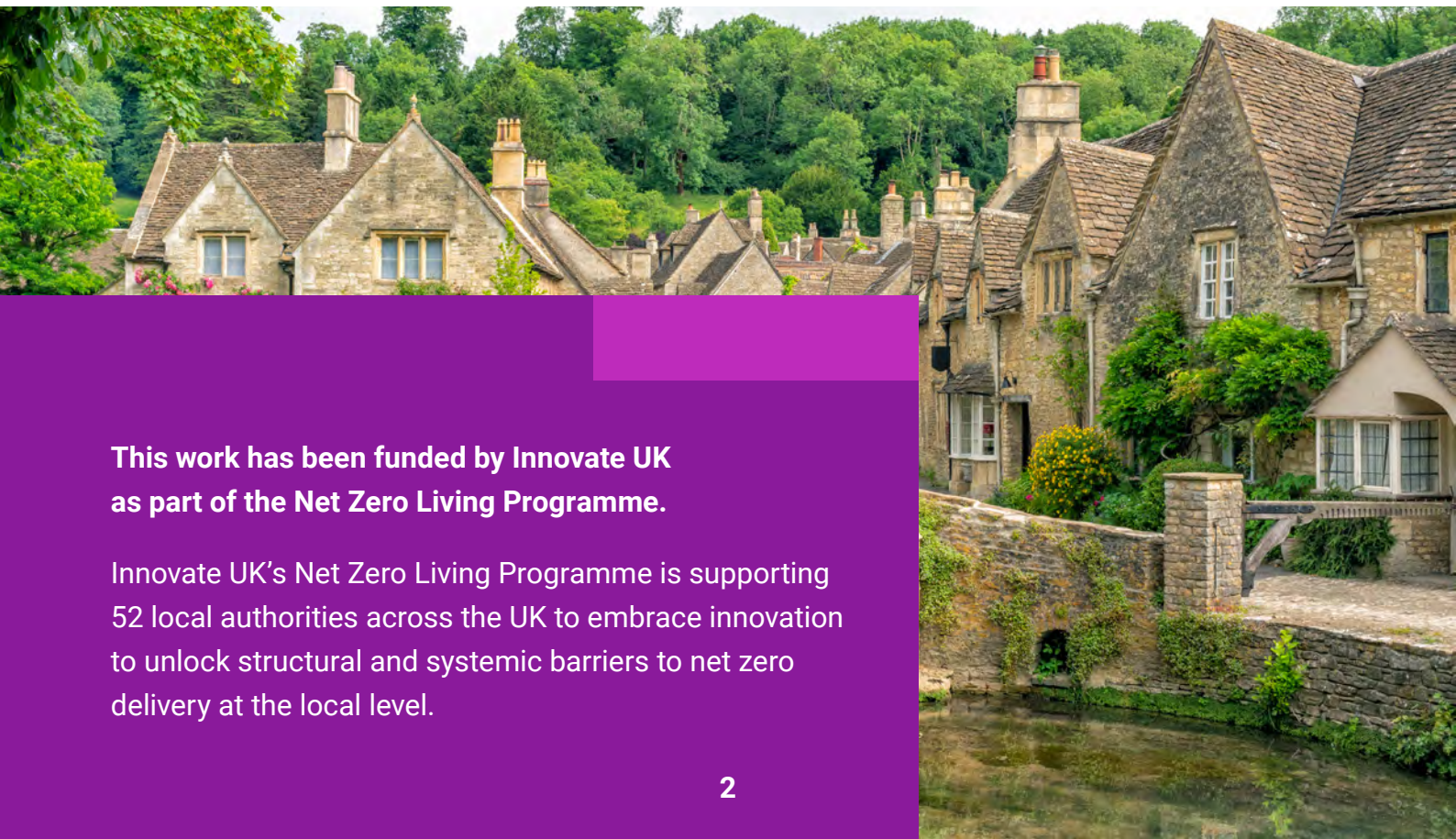
Contents



Executive summary	3
Part 1: What is retrofit, and how does it fit into the decarbonisation strategy?	5
Part 2: Retrofit in Rural Areas	7
Defining Rural	9
The Opportunities of Retrofit in a Rural Environment	13
The Challenges of Retrofit in a Rural Environment	14
Part 3: Technical and Non-Technical Innovations in Rural Retrofit in the UK	17
Part 4: How Local Authorities Can Address and Enable Innovation in Rural Retrofit	21
Local Authority ‘Spheres of Control and Influence’ Adapted to Rural Retrofit	24
Part 5: Conclusions	35
Part 6: Resources and Further Reading	36
References	38

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Innovate UK’s Net Zero Living Programme is supporting 52 local authorities across the UK to embrace innovation to unlock structural and systemic barriers to net zero delivery at the local level.



Executive summary

Local authorities play a crucial role in achieving Net Zero targets, but they face many challenges and opportunities, particularly in rural areas.

Participating in the Net Zero Living Programme, local authorities have expressed concerns that Net Zero policies in the UK overlook the rural context, leaving them unsure of how to tackle the retrofit of public estate and domestic buildings.

The report addresses the following question:

What role can local authorities play in rural retrofit, and how can they address and enable innovation in this context?



Drawing on existing literature, reports, case studies and statistical evidence, the report found:

- Definitions of 'rural' vary across the UK nations, making direct comparisons between the four nations challenging.
- There are common retrofit challenges across geographies, notably the age and location (off-grid, remote, heritage or within conservation areas) of rural housing stock.
- A range of socio-technological barriers prevent a local authority from directly implementing retrofit programmes across rural areas.
- There are many positive drivers and solutions that can enable rural retrofit.
- Innovative retrofit solutions from urban settings can be applied to rural areas; however, to scale them up and adapt them to rural settings, enabling factors need to be put in place by local authorities.

The report emphasises that local authorities can leverage a combination of roles to effectively enable retrofit innovation across both public and private estates. Key roles include engaging stakeholders, working with retrofit solutions providers and overcoming perceived barriers to retrofit implementation, such as planning permissions in conservation areas.

To help illustrate the various roles of local authorities, the report presents a 'circles of control and influence' framework for local authorities engaged in rural retrofit initiatives. The report also provides real-world examples of these roles and examples of innovations in rural retrofit.

Retrofit in rural areas offers significant benefits and opportunities beyond greenhouse gas emissions reduction. When implemented with a place-based approach, rural retrofit can help to:

- **Retain the unique character of rural housing stock:** retrofitting means existing stock, such as heritage buildings and traditional rural dwellings, can be used for generations.
- **Develop local employment opportunities:** retrofit programmes could provide significant opportunities for employment and growth in the local supply chain.
- **Testing a range of technologies:** rural areas are located in diverse geographic locations, lending themselves to being testbeds for different retrofit technologies.
- **Attract innovation:** Rural areas can act as beacon projects for the scalability of innovative retrofit projects.



Part 1:

What is retrofit, and how does it fit into the decarbonisation strategy?

In 2022, one-fifth of the UK's greenhouse gas emissions originated from residential buildings.¹ Given that approximately 80% of the existing building stock is projected to remain in use in 2050,² significant retrofit efforts will be crucial to achieve the national net zero target.³



Retrofit is the process of modifying an existing building to improve its energy performance. The Centre for Sustainable Energy defines a three-step approach to retrofit,⁴ which involves addressing energy conservation, efficiency and renewable energy generation. This can include:



Installing new heating systems such as heat pumps or high efficiency boilers;



Installing or replacing insulation in walls, roofs, flooring, and loft areas to reduce heat loss;



Upgrading older, more draughty windows and doors with more energy-efficient alternatives;



Installing or upgrading ventilation systems to ensure airflow and the removal of any excess moisture;



Installing onsite renewable energy sources such as solar or wind.



By implementing these measures, buildings lose less heat, often leading to reduced heating demand, resulting in lower energy consumption and reduced energy bills. Integrating renewable energy sources for heating and electricity generation can replace fossil fuel energy sources such as gas and oil, further reducing energy costs and eliminating the production of greenhouse gases.

Retrofitting offers a crucial pathway to address fuel poverty - those households that must spend a high share of their household income on heating their homes

to a comfortable temperature.⁵ By improving energy efficiency, retrofitting helps reduce energy bills, alleviate financial strain and mitigate the negative mental and physical health consequences of living in colder and more energy-inefficient homes. Therefore, retrofitting is essential for a 'just transition' to net zero, ensuring that the decarbonisation process benefits all members of society, particularly those most vulnerable to fuel poverty.



Part 2:

Retrofit in Rural Areas

The effects of global warming are not equally distributed, impacting rural and urban areas in different ways. However, past strategies and rhetoric about reducing emissions have often been “aspatial”,⁶ failing to consider the unique circumstances of rural populations.

Rural areas face unique challenges in decarbonising due to energy infrastructure, geographic constraints and the number of ‘hard to treat or hard to heat’ homes. For instance, limited grid access in some rural areas restricts household energy options leaving residents reliant on more expensive and polluting alternatives (e.g. Oil and LPG)⁷. This can exacerbate fuel poverty, a prevalent issue in rural regions.^{8, 9, 10, 11}

‘Hard to Treat’ or ‘Hard to Heat’

These homes have been defined by the **Energy Saving Trust** as: ‘homes that for a variety of reasons cannot accommodate ‘staple’ energy efficiency measures. They may include: homes that are off the gas network; homes with solid walls; homes with no loft space; homes in a state of disrepair; high-rise blocks; and any other homes where for technical and practical reasons these staple energy efficiency measures cannot be fitted’.

These staple energy efficiency measures could include fabric improvements, such as loft and cavity wall insulation, or upgrades to home heating systems.



Listed buildings and properties that fall within conservation areas also present unique challenges for retrofit. These properties are subject to stricter rules in terms of modifications, both internal and external.^{12, 13} Any retrofit must balance the need for energy efficiency improvements with preserving the building's historical fabric and architectural integrity.

Without place-sensitive approaches to retrofitting, rural communities risk being left behind in the transition to a low-carbon future, missing out on opportunities to improve household comfort through fabric upgrades and the adoption of sustainable energy sources.



Listed buildings

Listed buildings are buildings of special architectural or historic interest with legal protection.¹⁴

Conservation areas

Conservation areas exist to protect the special architectural and historic interest of a place - in other words the features that make it unique and distinctive.¹⁵

Defining Rural

The definition of “rural” depends on the context and specific criteria used and is defined differently across England, Wales, Scotland and Northern Ireland and therefore, figures are not directly comparable. The specific definitions for the four UK nations can be seen in the table below.



Definitions of Rural Areas

Scotland¹⁶	Areas with a population of less than 3,000 people, and with a drive time of over 30 minutes to a settlement of 10,000 or more.
England and Wales¹⁷	Areas which fall outside of settlements with more than 10,000 residents. It is important to note that whilst the above definition is used in Wales, the Welsh Government have no one single agreed definition as the specific definition used will depend on the context and purpose of the analysis.
Northern Ireland¹⁸	All settlements with a population of less than 5,000, and areas of open countryside.

To understand the scale of the challenge in retrofitting rural environments, it is crucial to consider the unique characteristics of each of the four nations in the UK. However, this

assessment is complicated by significant gaps and inconsistencies in the available and up-to-date rural statistical data.

Northern Ireland

678,630²⁰ rural residents



36%
of total
population



Wales

1 million²¹ rural residents



33%¹⁹
of total
population



Scotland

930,000²² rural residents

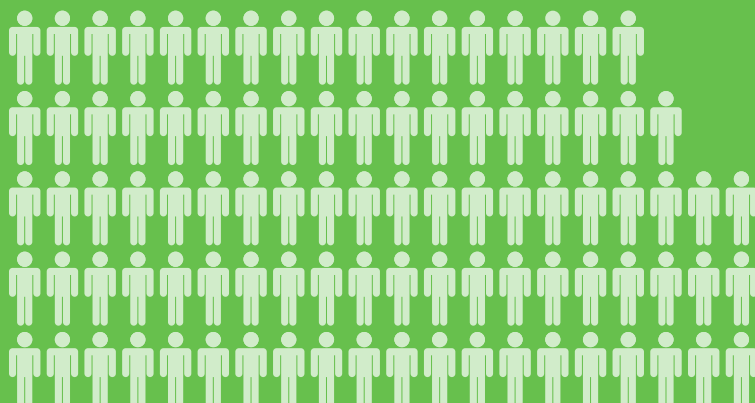


17%
of total
population



England

9.5 million²³ rural residents



17%
of total
population



To provide a clearer picture of how rural housing stock is distributed across the UK, the following table outlines both the absolute rural housing numbers and the percentage of total housing stock by country.



Northern Ireland

259,893²⁴ rural housing stock



31%
of total
housing stock



Wales

443,207²⁵ rural housing stock



33%
of total
housing stock



Scotland

416,000²⁶ rural housing stock



20%
of total
housing stock



England

6.1 million²⁷ rural housing stock



24%
of total
housing stock

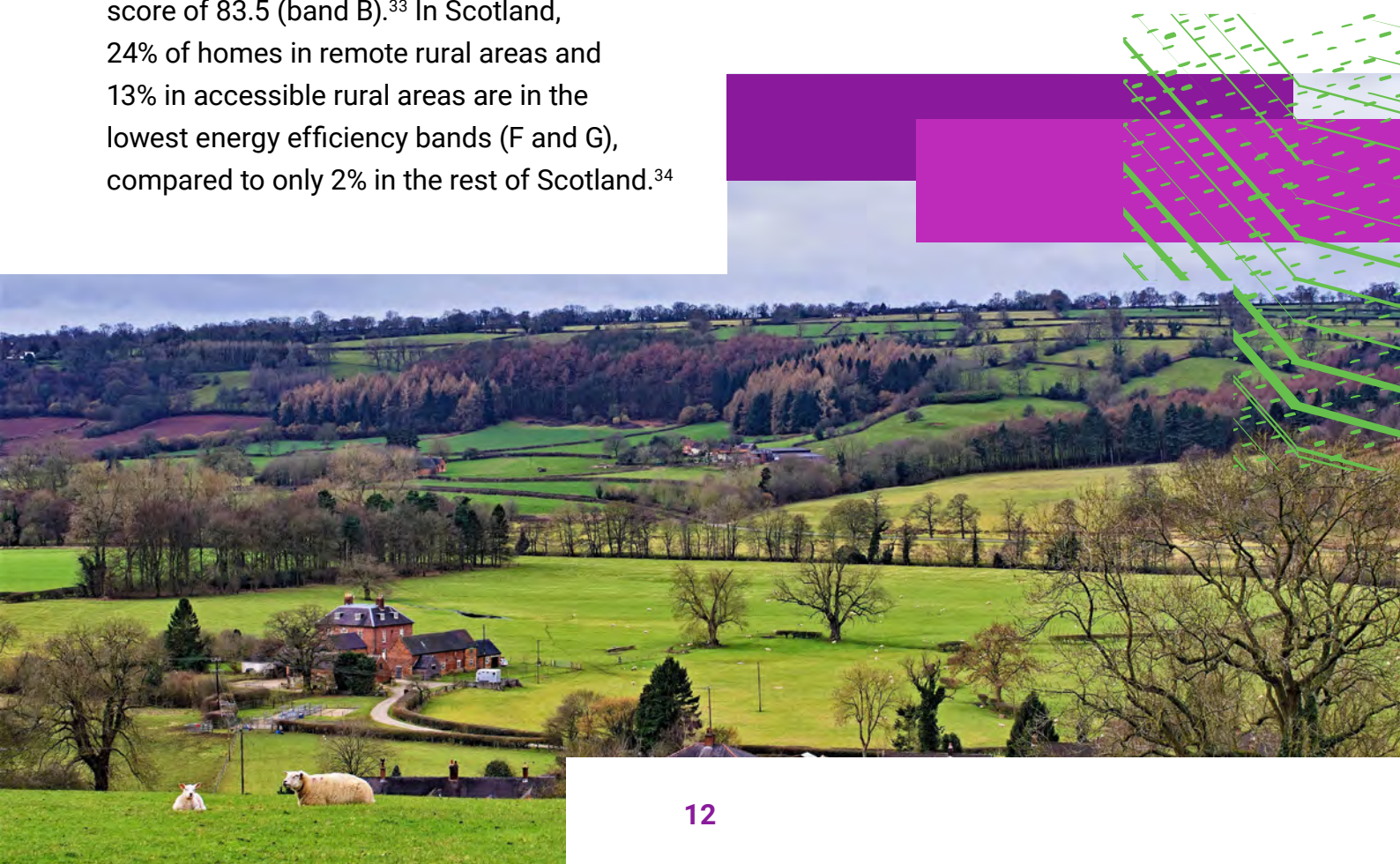


A significant portion of rural housing is pre-1919, which marks a turning point in construction methods, separating traditional and modern methods of house building. In Wales, 32% of the housing stock was built pre-1919,²⁸ while in England, there are over 1 million pre-1919 homes in rural areas, accounting for 28% of rural housing stock.²⁹ Scotland has around 455,000 pre-1919 dwellings, making up 19% of the total stock,³⁰ and Northern Ireland has 81,630 pre-1919 dwellings, accounting for 11% of the overall stock.³¹

Many rural homes are not connected to the gas grid and instead rely on alternative fuel sources such as electricity, oil, or liquefied petroleum gas. In Wales, 19% of properties are not connected to the gas grid, and almost a third of rural households use oil for heating.³² In England, pre-1930 properties in predominantly rural areas in 2024 had an average energy efficiency score of 54.2 (band E), while modern homes have a score of 83.5 (band B).³³ In Scotland, 24% of homes in remote rural areas and 13% in accessible rural areas are in the lowest energy efficiency bands (F and G), compared to only 2% in the rest of Scotland.³⁴

The average energy efficiency score for rural homes in Northern Ireland is 58.3, which corresponds to band E.³⁵

Rural homes generally exhibit lower energy efficiency compared to urban counterparts, leading to higher space heating demands and increased fuel poverty rates. This is due to factors such as older housing stock, the number of detached properties, solid walls, and limited insulation. In England, pre-1930 properties in predominantly rural areas in 2024 had an average Energy Efficiency Score of 54.2 (band E), while modern homes have a score of 83.5 (band B).³⁶ In Scotland, 24% of homes in remote rural areas and 13% in accessible rural areas are in the lowest energy efficiency bands (F and G), compared to only 2% in the rest of Scotland.³⁷ The average SAP score (Standard Assessment Procedure, used for Energy Performance Certificate (EPC) ratings) for rural homes in Northern Ireland is 58.3, which corresponds to EPC Band E.³⁸





The Opportunities of Retrofit in a Rural Environment

Given the variations in housing age, fuel sources, and energy efficiency across the UK's rural regions, targeted retrofit solutions are essential to address the unique challenges and unlock the potential benefits for rural communities. Tailored retrofit strategies can help to leverage local knowledge and resources, foster community engagement and ensure solutions are well-suited to each area's unique characteristics. Use of renewable energy sources and off-grid solutions can reduce dependency on fossil fuels, enhance energy security, and lower carbon footprints in rural areas. Additionally, investing in innovative retrofit techniques for older homes can help to preserve historical architecture while enhancing energy performance, creating a model for sustainable heritage conservation.

Retrofit projects can also stimulate local economies by creating jobs in construction, energy services, and related industries, increasing property values, and attracting investment. Leveraging government policies and funding streams can provide the necessary financial support for large-scale retrofit projects, ensuring they are sustainable and impactful in the long term. Addressing these challenges and opportunities can lead to significant environmental, social, and economic benefits, contributing to a more sustainable and equitable future for rural communities across the UK.

The Challenges of Retrofit in a Rural Environment

Retrofit in rural areas faces a range of challenges, both technological and non-technological. Research has highlighted the following key challenges for both local authorities and consumers: ^{39, 40}

Technological

- Many rural areas lack access to the electricity grid or have limited grid capacity, which restricts the deployment of electric retrofit technologies e.g. heat pumps and smart electric radiators.
- Integrating renewable energy sources such as wind and solar can be challenging due to intermittent generation.
- Integrating supply into the grid can lead to challenges where capacity is limited. While energy storage solutions can help address this issue, they also face capacity constraints and can be cost-prohibitive. However, an innovative combination of storage, photovoltaic (PV) generation, and time-of-use electricity tariffs can prove both effective and economical.⁴¹
- Modern and cost-effective insulating techniques might not suit traditional, solid wall and listed buildings.
- Switching to a heat pump should be considered as part of a whole systems approach, starting with insulation but also considering connection to electricity networks.⁴² Depending on the type of connection, it may be necessary to obtain approval from the local Distribution Network Operator to confirm that the local network can accommodate the increased load.⁴³
- District heat networks are not suitable for sparsely populated areas.
- Off-gas grid properties won't be suitable for switching to hydrogen.





Market and supply chain

- Due to fragmented demand, the overall market for retrofit products and services is smaller in rural areas than in urban areas, as works are often private household led.
- There is a lack of local skilled workforces to carry out retrofit works. To retrofit traditionally constructed buildings in England alone, an additional 86,500 workers will need to be recruited, trained and sustained until the year 2050.⁴⁴ Without upskilling and market development, rural communities risk being served only by larger companies operating out of urban centres.

Finance

- Rural areas lack economies of scale for retrofit and building integrated renewables projects.
- Accessing funding for hard to heat homes can be difficult.
- Government funding support programmes can be short-term.

Knowledge and awareness gap

- Research has shown that there is a retrofit skills gap in local authority planning departments. The Historic England Local Authority Staffing Survey (2022) found that only 16% of staff who responded felt very confident in making decisions about energy-efficient retrofit proposals.⁴⁵
- There is a lack of understanding of the breadth of retrofit options and technologies available and where their suitable applications are, especially when considering listed buildings.
- Difficulty accessing trusted, verified advice and information.
- Households are unaware of available retrofit options and associated benefits.
- Households are unaware of the grant funding programmes for which they can apply.



Planning

- Different incentives for changing heating systems, changing feed in tariffs, and diverse planning regulations in different areas have all led to confusion about which technology to choose.
- There are additional planning regulations to adhere to when retrofitting heritage buildings and those located in conservation areas.
- Research has shown that EPCs can underestimate the thermal performance of traditionally constructed buildings, leading to lower ratings and recommendations that could compromise their character.⁴⁶



Perceived risk

- Risk of using new technologies which have not been widely deployed.
- Accessing information on trusted suppliers.



Part 3:



Innovations in Rural Retrofit in the UK

Retrofitting rural areas in the UK involves a range of technological and non- technological innovations that can significantly enhance the effectiveness of these efforts, leading to more sustainable, energy-efficient, and equitable outcomes for rural communities.

Addressing the critical need for decarbonised heat, the Innovate UK Net Zero Heat Programme has worked collaboratively with key partners to overcome barriers hindering progress. Through both competitions and grant funding, they have supported a wide array of businesses and organisations working across three core themes:



Data innovation

A data-driven approach to national retrofit activities for greater certainty of outcome and market demand.



Technology innovation

Faster routes for innovative solutions to be proven, accepted and scaled out.



Process innovation

Faster routes for innovative solutions to be proven, accepted and scaled out.

The following section sets out case studies from programme participants and showcases the outcomes of applying new technologies and strategies to retrofit buildings.



Data innovation

ALCHEMAI – Advanced Low Carbon Heat and Energy Modelling Accelerating Investment

Property Overview

Tenure: Municipal Buildings

ALCHEMAI's digital enabled building performance software helps non-domestic building owners who want to decarbonise their estates by reducing uncertainty, optimising their investments across the entire portfolio and providing a better built environment for all their users.

Working in collaboration, 7 different organisations have come together to test scalable and accessible retrofit approaches in 14 commercial and municipal building test beds across the UK, including, museums, leisure centres, town halls and offices.

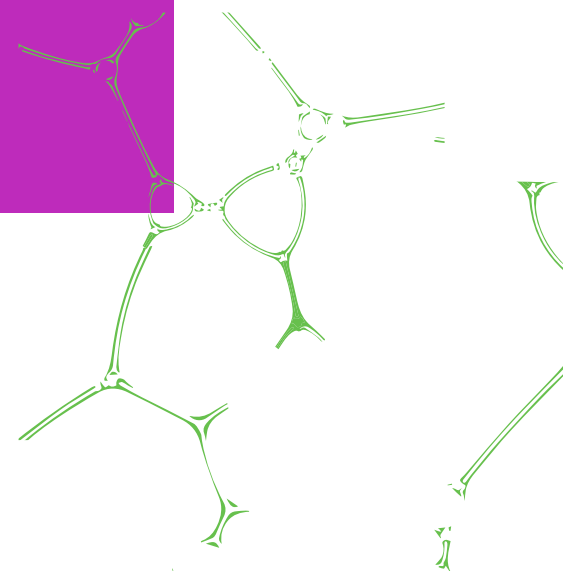
The project is doing this through:

- **Site Data Gathering:** Installing sensors for detailed building performance data collection.
- **Data Analysis:** Conducting energy and environmental monitoring audits and optimising digital twins.
- **User Interface Design:** Creating data visualisations and interaction interfaces in 2D and 3D.

- **Retrofit Option Appraisal:** Analysing buildings to present potential retrofit solutions, impacts, and costs.
- **User Engagement:** Making recommendations that consider the needs of building users.

The project is actively demonstrating how cutting-edge solutions can deliver value. By leveraging high-granularity live data, building performance is monitored in response to varying occupancy patterns and usage scenarios. This data-rich environment enables the development and deployment of Digital Twins, which serve as powerful tools for simulating and testing retrofit scenarios before capital investment decisions are made.

[Click here for more information.](#)





Technology innovation

Chimella – Energy saving in eight homes with chimneys

Property Overview

Tenure: Owner-occupied Freehold

Built form: Detached, Semi-detached, Mid-terrace, End-terrace; Two properties were listed and over 450 years old

The Chimella chimney Umbrella was designed to solve issues with chimney drafts and damp.

Data from the ECO3 programme showed the Chimella improves the thermal performance of homes with chimneys. Following this, Chimella was tested on 8 old, leaky properties across the south of England using airtightness results.

The change to the air tightness of the houses was instant and within a few seconds of installation the cold drafts from the chimney were stopped. Installation is quick, and the chimney umbrella can fit all shapes and sizes chimney. Having a quick installation means that the cost to install and the time on site is quicker than any other measures.

Key benefits achieved were:

1. Protection or enhancement of architectural heritage as Chimella does not need any permissions which can prevent homeowners from retrofitting.
2. Occupants reported instant thermal comfort benefits.

[Click here for more information.](#)





Norfolk Homeowners Choose Tepeo's ZEB

Property Overview

Tenure: Owner-occupied Freehold

Built form: Semi-detached, three-bedroom house with a utility room and a garden office

Occupants: Damian, Rachel, and Murphy (their cat)

Damian and Rachel live in a typical semi-detached house, managing their existing fossil fuel heating system while striving to reduce their environmental footprint. Like many homeowners, they faced challenges with an ageing oil boiler and sought a sustainable solution to future-proof their heating needs.

When Damian and Rachel moved into their home, it came with an outdated oil boiler. Over the years, the boiler became increasingly unreliable, failing on multiple occasions. Beyond functionality, the oil boiler posed safety and compliance concerns. The tank's location no longer met building regulations and moving it to comply would have been impractical due to space constraints in their garden.

They began exploring renewable technologies. Heat pumps initially caught their attention, thanks to government subsidies that made installation costs

comparable to a gas boiler. However, due to the proximity of their property to their neighbour's, planning permission was required. Waiting 16 weeks for approval was not feasible heading into winter.

While researching alternatives, Damian came across Tepeo's ZEB through Octopus Energy's website. The ZEB stood out as a direct replacement for traditional boilers, offering a simple, low-carbon solution without the complexities of heat pumps.

The ZEB installation was completed in just two days. The process involved removing the old oil boiler and integrating the ZEB into their existing central heating system.

The ZEB replaced the need for the oil tank, freeing up valuable outdoor space and eliminating the residual smell of oil. It also significantly reduced the noise associated with the old system.

[Click here for more information.](#)

Part 4:

How Local Authorities Can Address and Enable Innovation in Rural Retrofit

Addressing climate change necessitates a collaborative approach involving input from individuals, the public and private sectors, and all levels of government. While the specific roles and responsibilities vary across these different actors, local authorities hold a crucial position, particularly in regard to local net-zero progress. Local authorities contribute between 2 and 5% of their local

area emissions. However, their place-shaping powers and actions potentially influence around a third of UK emissions, primarily in the buildings, transport, waste and land-use sectors.⁴⁷ The table below highlights (in bold) the key responsibilities which are specifically linked to retrofit for the different tiers of local government across the UK.



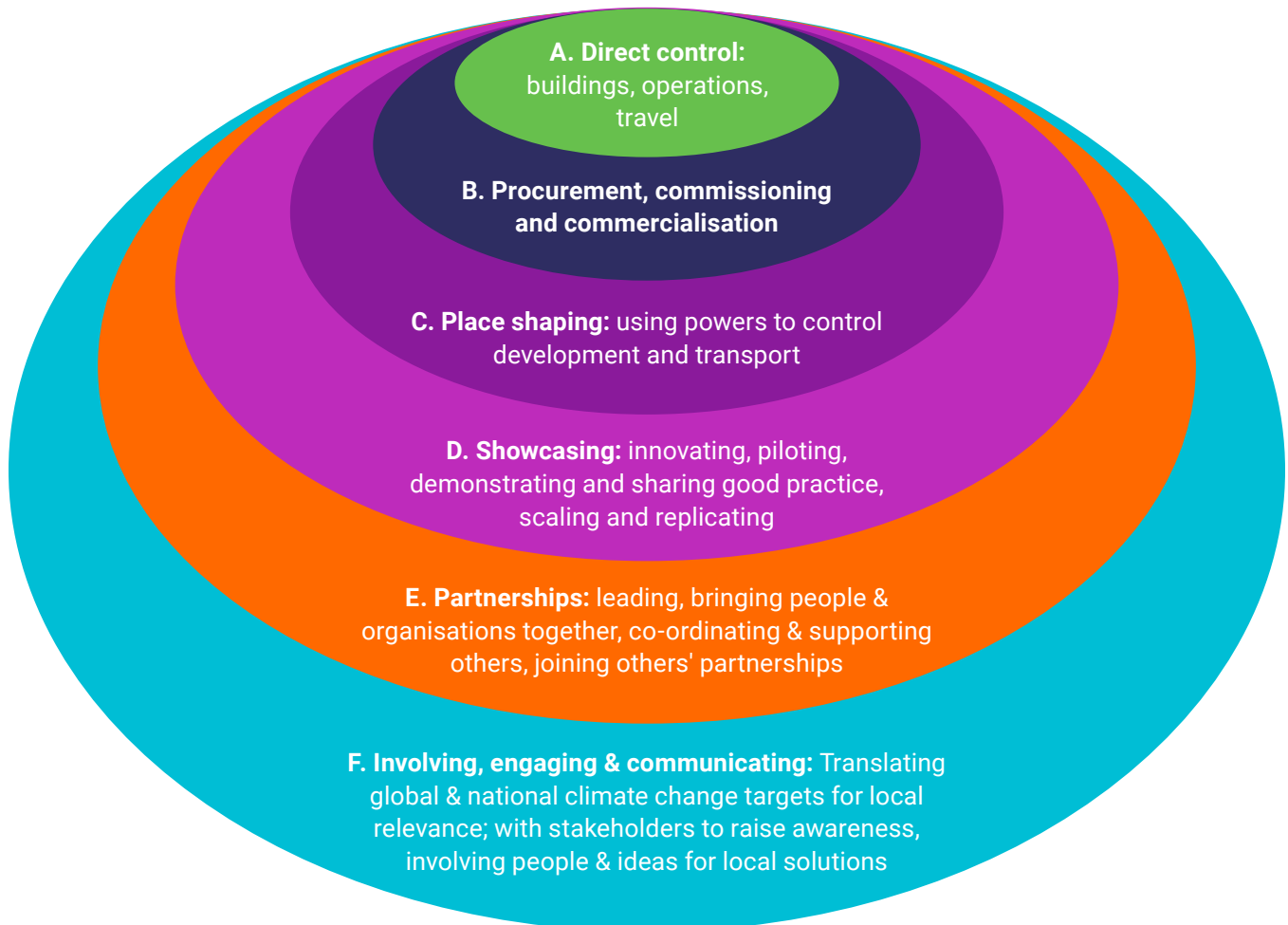
	Local authorities in the UK	Responsibility
Councils in England	District Council	Building Regulations , Council tax and business rates, Planning, Housing , Parking, Waste collection, Environmental Health, Economic Development , Sports centres, parks and playing fields
	County Council	Highways, street lighting, traffic management, Passenger transport and transport planning, Strategic Planning , Waste disposal, Parking, Emergency Planning, Trading Standards (including Energy Performance Certificates) , Education , Economic development , Public Health , Social Services
	Unitary & Metropolitan	All of the above
	London Boroughs & City	All of the above
	Scottish Councils	All of the above
	Welsh Councils	All of the above
	Northern Ireland	Housing, Planning , Improving and maintaining regional and local roads, Libraries, Environmental Protection , Waste collection
	Combined Authorities	Varies due to devolution deals but can include: Transport, Spatial Planning, Environment Strategy , Employment and business development, Mayoral Development Corporations, Further Education & Skills

Adapted from: <https://www.theccc.org.uk/wp-content/uploads/2020/12/Local-Authorities-and-the-Sixth-Carbon-Budget.pdf>

The Climate Change Committee, an independent advisor to the UK Government, acknowledges that while local authorities

may not have direct control over all aspects of decarbonisation, their sphere of influence is substantial, as illustrated in figure 1 below.

Figure 1: How local authorities control and influence emissions



Source: <https://www.theccc.org.uk/wp-content/uploads/2020/12/Local-Authorities-and-the-Sixth-Carbon-Budget.pdf>

Further to this, research has shown that local government have higher levels of public trust in comparison to national government.⁴⁸ Depending on their policy choices, priorities and resources, local authorities can significantly accelerate or impede the transition to net zero.

Local authorities in both rural and urban areas play a crucial role in ensuring a just transition to net zero for their communities. By leveraging their areas of direct control (their statutory duties) and exerting their

influence they can accelerate this transition whilst ensuring it benefits all residents.

Although not directly responsible for managing retrofit in privately owned or rented rural residential and heritage buildings, local authorities can significantly influence the process by sharing information and signposting to resources. Local authorities can however directly control the buildings they own and manage, especially social housing and the public estate located in rural areas.

Local Authority “Spheres of Control and Influence” Adapted to Rural Retrofit

Local authorities can play a key role in driving retrofit adoption in both rural and heritage building contexts. Using the spheres of control and influence framework, this section examines these potential roles, drawing examples from both rural and urban contexts to highlight cross-applicable learnings.

While the included examples illustrate specific roles, it is important to note that they are, in some cases, applicable to more than one role.

These roles are categorised as follows:

A. Direct control

B. Procurement, commissioning and commercialisation

C. Place shaping

D. Showcasing

E. Partnerships

F. Involving, engaging and communicating



A. Direct control

Retrofit the public estate to stimulate the local supply chain.

- i. Assessing the public property portfolio to determine the priority order for retrofit interventions.
- ii. Retrofit public sector buildings through government akin to funding such as the Public Sector Decarbonisation Scheme.⁴⁹
- iii. Retrofit council-owned social housing through government funding such as the Warm Homes: Social Housing Fund.⁵⁰

Retrofit of council-owned properties, North East Derbyshire District Council

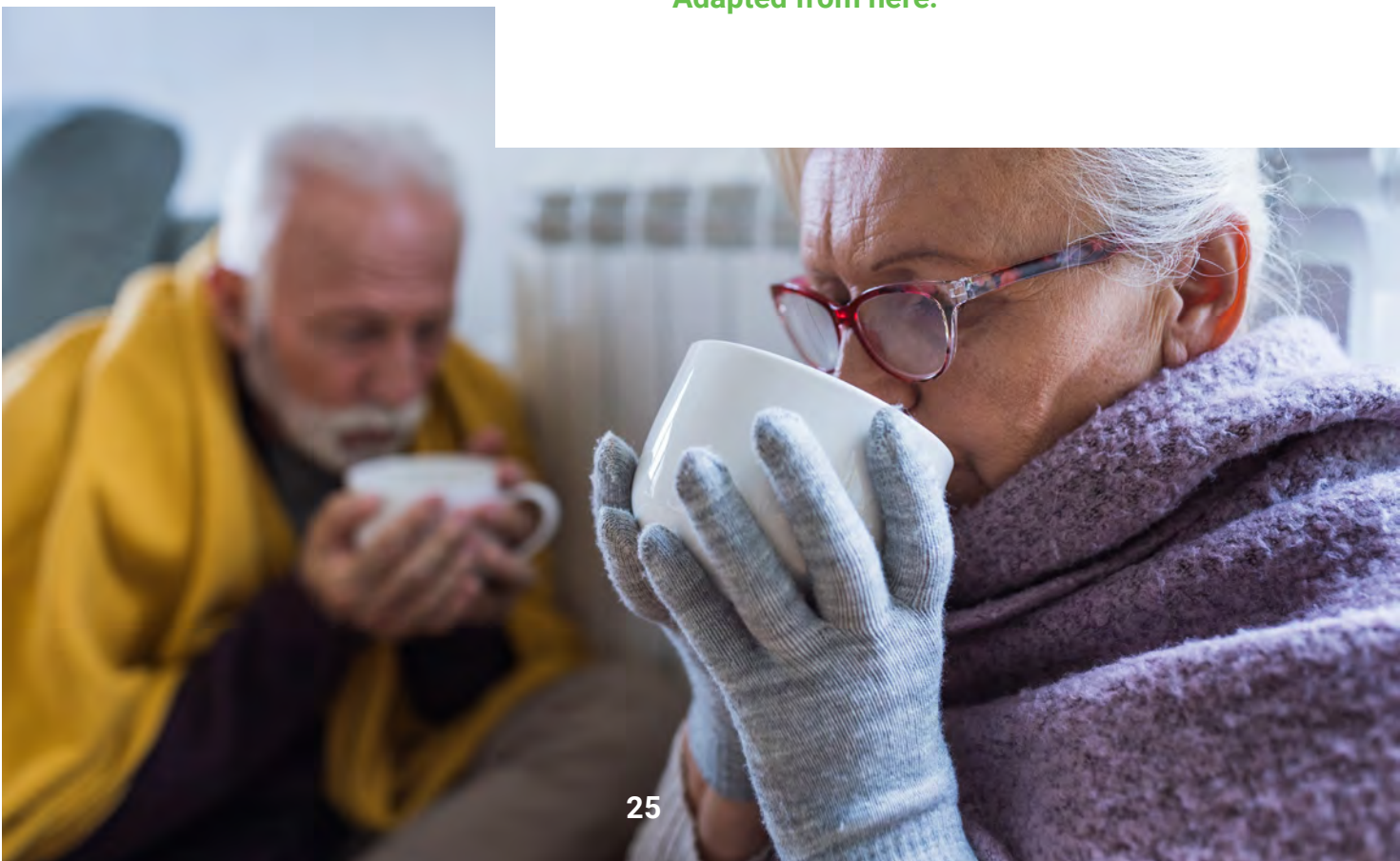
North East Derbyshire District Council worked with expert partners to install external wall insulation at 427 council-owned homes in ex-mining communities, such as the Morton estate, and the British steel framed properties located on the Mickley Estate in Alfreton. The work was funded by the government's Green Homes Grant Local Authority Delivery Scheme.

By prioritising hard to heat homes, the council aimed to reduce carbon and costs, while protecting people's health and wellbeing and reducing the potential burden on local NHS services.

The project also developed the green skills base in the area. Sustainable Building Services UK Ltd, the contractor that carried out the work, commissioned Think Construction to conduct on-site training, helping 10 workers gain NVQ Level 2 qualifications in external wall insulation and a site manager gain NVQ Management of external wall insulation.

A key enabling factor in this project was the partnership between the council and Rykneld Homes. Rykneld Homes is a council-owned social housing provider that has managed, maintained and improved about 8,000 properties on behalf of the authority.

[Adapted from here.](#)



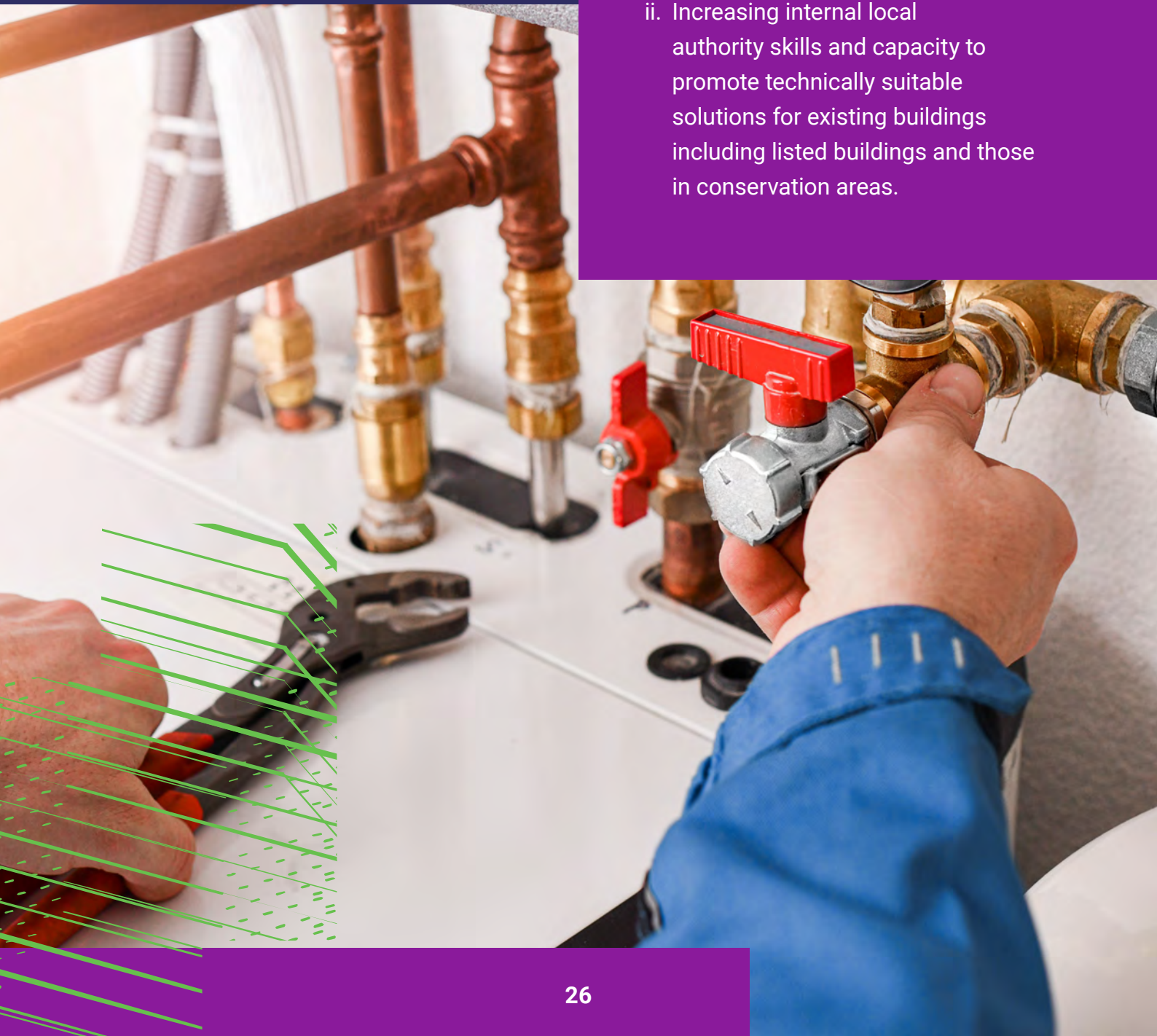
B. Procurement, commissioning and commercialisation.

- i. Maximising access to retrofit and low carbon heating funding;
- ii. Engaging with local suppliers and SMEs to overcome barriers to entry for any public sector contracts, helping to ensure that any retrofit programmes benefit the local economy.

C. Place shaping

Using powers to control local development and determining the strategic direction of works.

- i. Developing local retrofit planning guidance which clearly outlines the planning procedures for retrofit works and what works are likely to be permitted within the locality. By leveraging an archetype approach, retrofit planning guidance can be made specific to the prevalent building types within the local area.
- ii. Increasing internal local authority skills and capacity to promote technically suitable solutions for existing buildings including listed buildings and those in conservation areas.



Archetype Approaches

What is a retrofit archetype?

Retrofit archetypes are groups of buildings that share similar features and are likely to require similar interventions to make them low energy, low carbon, climate resilient and healthy. Archetypes can be used to engage with householders on specific retrofit solutions for different property types, to disseminate information and best practice to households, and to promote retrofit works aggregation amongst households of a similar type.

The examples below set out how archetypes have been used to demonstrate the local context, aiming to ensure effective retrofit implementation.

Definition Source: National Retrofit Hub

A Bristolian's Guide to Solid Wall Insulation: Bristol City Council

This retrofit archetype guide, commissioned by Bristol City Council, was designed for Bristol homeowners and professionals working on solid-walled houses. It provides essential information on successful and responsible retrofit works for this specific housing type.

[Click here to access the guide.](#)

Retrofit Procurement Club – Westminster City Council, Net Zero Living Funded Project

Westminster has a diverse stock of buildings ranging from town houses to flats, many of which are located in conservation areas. To enable retrofit in the area, the council has created a set of building archetypes to help to understand the thermal behaviour of the local stock and how best to retrofit them. As part of their work on the Net Zero Living Programme the council are exploring the concept of a Retrofit Procurement Club. The club will allow building owners access to a quality supply chain of services and products to carry out retrofit works, ideally prioritising deep whole-house retrofit.

[Click here for more information.](#)

Heritage Building Retrofit Toolkit: City of London Corporation

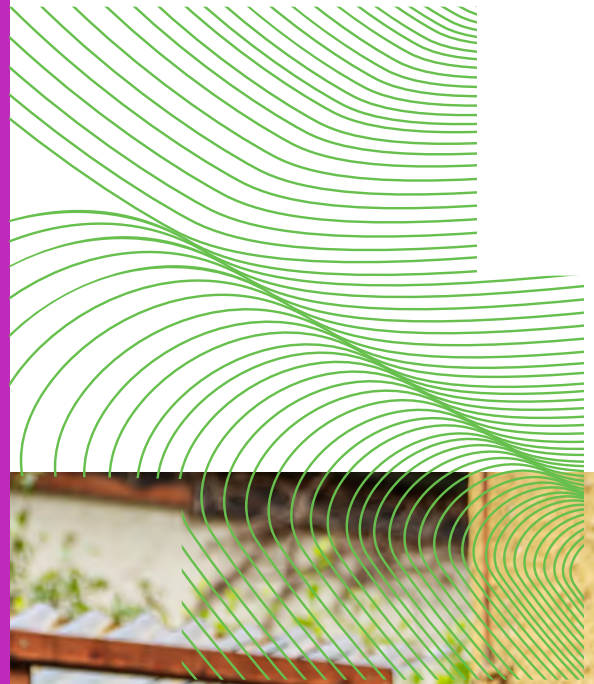
The City of London is rich in the historic built environment and contains more than 600 listed buildings, 27 conservation areas, 48 scheduled ancient monuments and four historic parks and gardens. The City of London Corporation has developed a Heritage Building Retrofit Toolkit to provide guidance for homeowners, planners, local authorities and developers undertaking retrofit projects to ensure the protection of the local heritage assets.

[Click here to access the toolkit.](#)

D. Showcasing

Innovating, piloting, demonstrating and sharing good practice, scaling and replicating.

- i. Piloting retrofit innovations via demonstrator home projects and disseminating lessons learnt and outcomes.
- ii. Sharing information and case studies about domestic rural and listed building retrofit.
- iii. Joining demonstrator projects in rural areas that involve citizens.
- iv. Organising demonstration and showcase sessions of different retrofit technologies for local residents.



Net Zero Terrace Streets – Rossendale Borough Council, Net Zero Living Funded Project

The Rossendale Valley is located in Lancashire, made up of a collection of towns and villages all with their own individual character, known locally as The Valley. It is predominantly a rural area, dotted with traditional terraced housing.

The Local Authority highlighted the need for innovative retrofit approaches for older, mixed tenure housing stock, particularly in deprived areas. They found that residents and owners often cannot afford or are unwilling to engage with existing retrofit solutions. Their motivation for retrofitting terraced streets in Rossendale was to ensure an inclusive and effective net zero transition for communities that are at risk of being left behind, addressing the growing energy inequality where market solutions for those able and willing to pay result in lower bills and access to more flexible tariffs.

The Authority partnered with Rossendale Valley Energy, a community owned renewable energy group, to create The Net Zero Terrace Streets Project. The solution integrates a digital system that engages and manages the consumer journey with tailored energy efficiency packages, shared community heating from ambient ground loops, EV charging and community energy via a multi-vector smart local energy system.



Phase 1 of the work highlighted at least 29 non-technological barriers and other challenges which the solution overcomes through creating a shared, seamless, well supported customer journey to bring people on board as a community rather than individual households. The shared ownership and peer-to-peer promotion embedded in existing community structures helps to create demand for the Net Zero Terrace Streets Solution which is both replicable and scalable.

[Click here for more information.](#)



Nesta's Visit a Heat Pump Service

Although not a local authority led initiative, Nesta's 'Visit a Heat Pump' service offers a compelling example of innovative retrofit showcasing and demonstration. Nesta, a UK-based innovation agency for social good, launched the programme in 2022. Initially a trial, the programme has since expanded to a national service, connecting homeowners with heat pumps to those considering the technology. Participating households register their property on the platform, allowing potential adopters to book a visit to see

a heat pump in action and speak directly with users about their experiences. A key strength of the service is that it showcases the versatility of heat pump technology across a range of different housing types. To further support informed decision making, Nesta and The MCS Foundation also created the "Get a Heat Pump" website, offering independent guidance on the different heat pump types, selecting the right type, cost estimates and the installation process.

[Click here for more information.](#)



E. Partnerships

Building and leading a coalition of the willing by bringing different organisations together, coordinating and supporting others and joining partnerships.

- i. Working with neighbouring authorities, registered social landlords and housing providers, local businesses, researchers and academics, and training providers to develop and implement a local retrofit plan and programme of works.
- ii. Prioritising the development of a local retrofit skills base within the building trade in partnership with Local Enterprise Partnerships, neighbouring authorities, business organisations, community organisations, colleges and universities, and local trades specialists.

Example: Partnering, showcasing, involving, engaging and communicating roles



Somerset Retrofit Accelerator

The Somerset Retrofit Accelerator Project was a collaborative effort between Frome, Bruton, and Glastonbury Town Councils, the four District Councils in Somerset, Somerset Independence Plus and the Centre for Sustainable Energy. The one-year project was awarded funding through the UK Government's Community Renewal Fund.

The project's core objective was to develop a robust supply chain for whole-house retrofit in Somerset through a multi-pronged approach focusing on skills development, resource creation and showcasing of best practice.

The project carried out the following activities:

- **Home Retrofit Plans:** In partnership with Futureproof, the project subsidised 50 Home Retrofit Plans for Somerset households, enabling residents to understand the potential for energy efficiency improvements in their homes.

- **Skills Development:** 30 local construction professionals benefitted from paid places on the Futureproof Essentials course, equipping them with the skills to deliver high-quality retrofit projects and address the critical bottleneck in the retrofit supply chain.
- **Green Directory for Somerset:** The project developed an online directory to connect homeowners with local retrofit suppliers.
- **Virtual Home Tours:** Virtual online tours of local low carbon homes where households can showcase energy efficiency improvements they have made.

[Click here for more information.](#)

Oban Local Energy plan

In Oban, Argyll and Bute, a remote community where two thirds of properties are owner occupied and a further 24% are owned by housing associations, high rates of fuel poverty (45% average) and low energy efficiency (affecting roughly half the housing stock) highlighted residents' urgent needs.

Oban was not on the UK national gas transmission network (operated by National Grid) nor its associated distribution network (operated in Scotland by SGN). However, it is served by one of four Statutory Independent Networks (SINs) that are supplied by liquefied natural gas (LNG). There are 1,104 customers on the SIN network in Oban.

The community advocated for cheaper energy bills, warmer homes that are better insulated, and increased local energy generation.

Under the Scottish Government's Community and Renewable Energy Scheme (CARES), the community created a Local Energy Plan led by a steering group including the Oban Community Council, Argyll Community Housing Association, West Highland Housing Association, Atlantis Community Leisure, Bid4Oban, Argyll and Bute Council, Local Energy Scotland, Home Energy Scotland and ALLenergy.



The plan was developed in collaboration with the council and other local groups and agreed actions were co-developed and distributed across partners to ensure there was a whole system approach to decarbonisation efforts.

[Click here for more information.](#)

F. Involving, engaging and communicating

Translating global and national climate change targets so that they have local framing and relevance. Engaging and communicating with local stakeholders to raise awareness and involving people in the retrofit planning process to develop ideas for local retrofit solutions.

- i. Promoting retrofit options and decarbonisation co-benefits to private landlords, social housing providers and private homeowners.
- ii. Maintaining a publicly available list of private domestic retrofit grant funding sources for local residents can access.
- iii. Supporting and amplifying community initiatives on home energy efficiency.

Example: Involving, engaging, communicating, partnering and showcasing roles

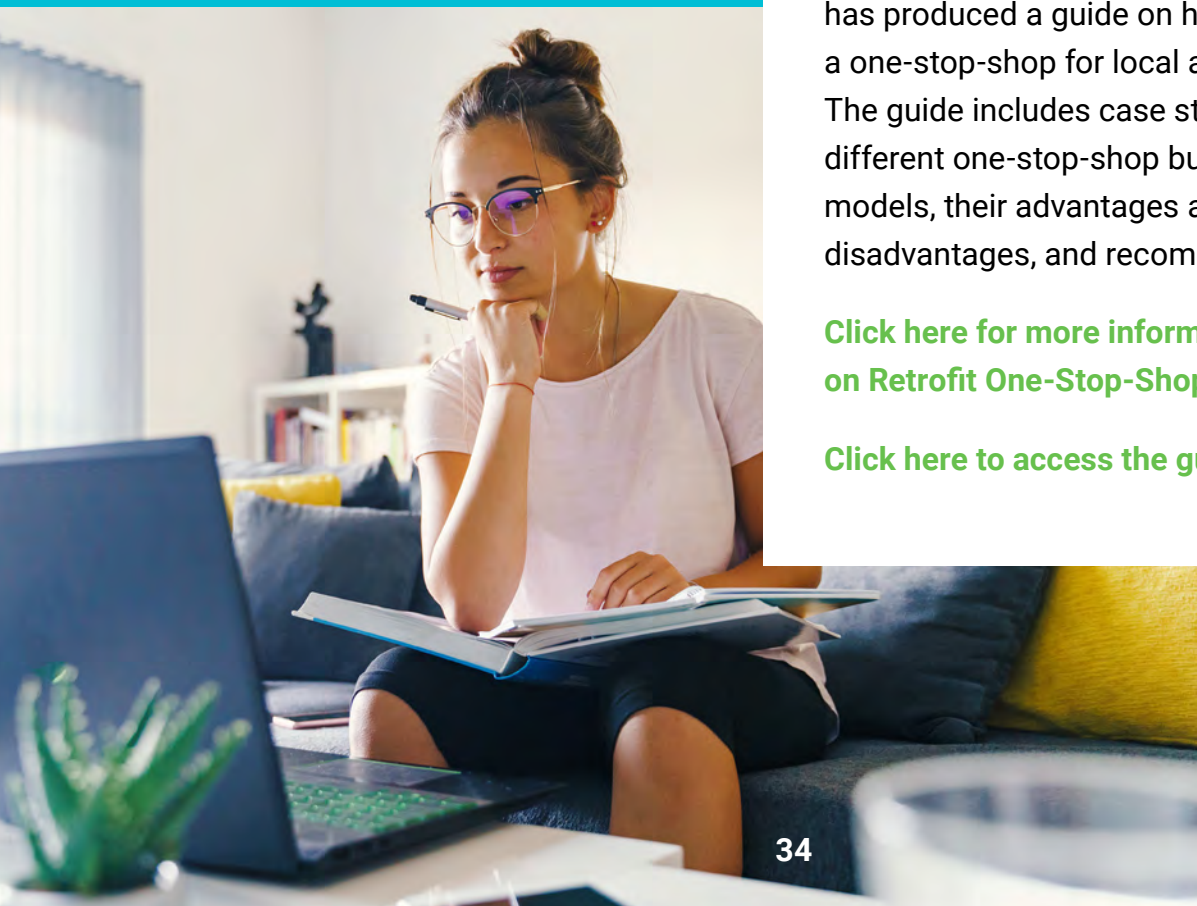
Retrofit One-Stop-Shops

The retrofit solutions market often presents a complex, hard-to-navigate landscape for both homeowners and landlords. Retrofit one-stop-shops seek to address this challenge by centralising information, advice, trusted suppliers and financing options, creating a streamlined customer journey from start to finish.

As part of Innovate UK's Net Zero Living Programme, City of York Council, in collaboration with several partners, is developing a local authority led retrofit one-stop-shop. Further to this, INNOVATE, a European Horizon 2020 funded project, has produced a guide on how to set up a one-stop-shop for local authorities. The guide includes case studies, different one-stop-shop business models, their advantages and disadvantages, and recommendations.

[Click here for more information on Retrofit One-Stop-Shop York.](#)

[Click here to access the guide.](#)



Part 5:

Conclusions

Retrofitting in rural environments presents a complex but critical opportunity for meeting the UK's Net Zero targets while delivering tangible co-benefits to communities. This report has outlined the importance of retrofit, especially within rural housing stock, which tends to be older, less energy efficient, and often off the gas grid. The technological and non-technological challenges are significant, but not insurmountable, and innovation is already taking place across the UK to address these.

This report has explored the different roles a local authority can play in driving rural retrofit, recognising that whilst private housing falls outside their direct control, they can instead leverage their influencing powers. Drawing upon the Climate Change Committee's research on how local authorities control and influence emissions, this report highlights the continued significance of local authority involvement in accelerating rural retrofit. Several examples demonstrate that local authorities often assume multiple roles concurrently; this integrated approach is positive as it allows for greater influence. The adoption of retrofit archetypes, targeted funding mechanisms, and collaborative pilot projects demonstrate what is possible when local leadership is empowered and supported.

Finally, recognising the diverse nature of rural areas across the UK, the adapted spheres of control and influence framework provides a flexible and adaptable tool for local authorities to use when considering and navigating the complexities of rural retrofit. The framework can be used to tailor approaches and strategies to communities' unique needs and circumstances, ultimately helping to maximise the impacts of net zero efforts.

Retrofitting in rural environments is not just an important step towards the UK's Net Zero goals; it is an opportunity to build a fairer, more sustainable future for rural residents across the UK.



Part 6:

Resources and Further Reading

Responsible Retrofit Knowledge Centre, Sustainable Traditional Buildings Alliance:

It presents information to assist decision making and increase learning about the responsible retrofit of traditional buildings. It is intended as a free resource to support a movement for responsible retrofit both at an individual and at a national level.

Retrofit of traditional buildings – what to consider when planning for the future, Department for Communities, Northern Ireland: This guide is for owners of historic buildings who want to reduce the energy use of a traditional building through technical interventions.

Guide to Energy Retrofit of Traditional Buildings, Historic Environment Scotland: This guide describes retrofit measures which can be used to improve the energy efficiency of traditional buildings, whilst preserving as much of their historic fabric and creating healthy indoor environments.

Interactive map of listed buildings in Wales, Welsh Government.

Interactive Map: Data on the Demand for Retrofitting Skills and Economic Growth, Historic England: Data on the estimated need for retrofitting skills to deliver Net Zero for England's historic buildings.

Adapting Historic Buildings for Energy and Carbon Efficiency, Historic England

(2024): This guidance provides advice on the permissions required to decarbonise and improve the energy efficiency of historic buildings, supporting local planning authorities and others in assessing proposals. The guidance also signposts relevant resources for further information.

Households off the gas grid and prices for alternative fuels, House of Commons Research Briefing (2024): This briefing note is about households who use fuels other than mains gas and how the prices of these fuels changed in recent years.

Fuel Poverty in the UK, House of Commons Research Briefing (2025): This briefing presents the latest research on fuel poverty across all four nations.

Decarbonising Off Grid Homes: A Rapid Evidence Review, Sheffield Hallam University (2024): This report summarises a project that focused on homes that are 'off grid' (no electricity and / or gas connection) in the North of England. It provides a good overview of the challenges with off-grid homes.

Institute of Historic Building Conservation

Climate Hub and Knowledge base: The knowledge base aims to raise awareness and understanding of how conservation philosophy and practice contributes towards meeting the challenge of climate change, while reducing threats and damage from poor practice. It is an evolving resource which is updated regularly.

Adapting Historic Buildings for Energy and Carbon Efficiency, Historic England (2024):

This advice note considers energy efficiency improvements to traditional homes which are described as heritage assets within the planning system.

Planning Responsible Retrofit of Traditional Buildings, Sustainable Traditional Buildings Alliance (2015):

This guidance is for anyone involved in a project aiming to reduce the energy use of a traditional building through retrofitting.

Setting up a Listed Building Heritage Partnership Agreement, Historic England

(2015): The purpose of this advice note is to provide information to assist local authorities, planning and other consultants, owners, applicants and other interested parties in implementing historic environment policy in the National Planning Policy Framework (NPPF) and the related guidance given in the National Planning Practice Guide (PPG).

Retrofit Information, Support and Expertise

(RISE): RISE is a free support service funded by the Department for Energy Security and Net Zero, which provides training, guidance and support to help social housing providers, local authorities and their supply chains across England plan and deliver successful domestic retrofit programmes.



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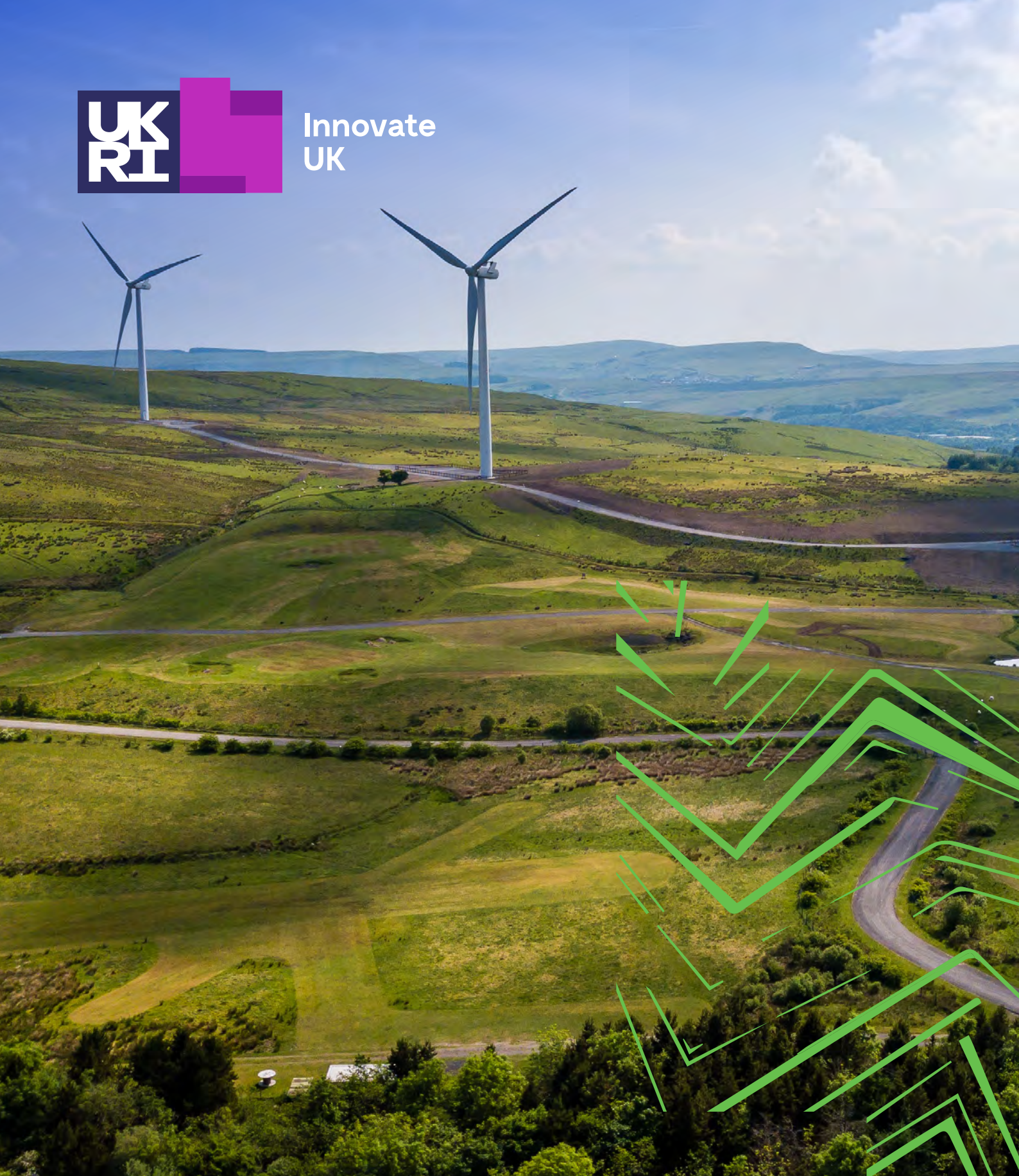
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