



Synergies between local climate mitigation and adaptation

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Cover Image: Jonathan Keenan Photography, adaptation and mitigation measures in Manchester City Centre.

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1 Introduction

The United Kingdom is already seeing the effects of a changing climate. Impacts, including warmer temperatures and more extreme weather, are already apparent today and risks will rise in future. Local authorities can play a key role in addressing climate change, both through actions that reduce emissions (mitigation) and through actions that help prepare for the risks of a changing climate (adaptation). It is important that local authorities consider how local mitigation and adaptation actions interact. When councils design mitigation programmes to be climate-ready, they protect their investment and avoid having to repair, replace or retrofit again after extreme weather. This report explains synergies between local mitigation and adaptation actions and highlights where additional considerations are needed, so councils can act in a joined-up way, achieving multiple outcomes and avoiding unintended consequences.

1.1 What does this report cover?

The Climate Change Committee (CCC) has commissioned a series of reports that explore the role of UK local authorities in responding to climate change.

These comprise:

1. *Duties and Powers for Local Authorities in the UK to Adapt to Climate Change*¹ outlines the legal framework for local climate adaptation across the four UK nations.
2. *The Role of UK Local Authorities in Climate Adaptation*² explores the role of local authorities and the practical actions they can take for each adaptation system. It identifies the key drivers of and barriers to successful local climate adaptation.
3. *Local Authorities and the Seventh Carbon Budget*³ and the abridged summary report⁴ focus on mitigation and outline the role of local authorities in delivering the Seventh Carbon Budget across key emissions sectors in the UK (buildings, transport, electricity supply, agriculture and land use, waste and industry).

This fourth report explains where local mitigation and adaptation actions work well together, and where additional considerations may be required. It aims to enable local authorities to better integrate local climate action on mitigation and adaptation. This supports a UK that reduces emissions, meets its climate commitments, and is well adapted to climate impacts.

Note: This report does not include all the key mitigation and adaptation actions required and should not be used as a checklist for climate actions by local

¹ [Duties and powers of local authorities in the UK to adapt to climate change | CAG Consultants](#)

² [The Role of UK Local Authorities in Climate Adaptation | CAG Consultants](#)

³ [Local Authorities and the Seventh Carbon Budget | CAG Consultants](#)

⁴ [Local authorities and the Seventh Carbon Budget – summary report](#)

authorities. *It should be read alongside the other reports, which contain the main lists of priority actions in reducing emissions and in adapting to climate risks. This report is intended as an accompanying guide to highlight local authority climate actions that deliver mitigation and adaptation synergies and those that require careful consideration around potential trade-offs.*

1.2 The current climate context

1.2.1 Summary of climate impacts

The United Kingdom is already experiencing significant and noticeable changes to its climate. Average temperatures are increasing across the country. The UK will experience warmer and wetter winters and hotter, drier summers. Some extreme weather events will increase in frequency and severity over time. This will increasingly disrupt essential services. Flooding, extreme heat and drought will further impact transport, energy and water systems, and affect buildings and food production. Sea level rise will pose a greater risk to coastal communities and industries. The natural environment will also change, with a risk of widespread ecosystem loss and disruption⁵. The impacts of climate change will not be felt equally across the UK, with different places facing different risks depending on their local environment, the condition of their infrastructure, and the vulnerability of local communities and businesses.

The Climate Change Act 2008 requires the UK government to regularly assess (every five years) the risks that climate change poses. The Act (2008), together with the Climate Change Act (Scotland) 2009, requires the UK and all devolved nations to publish adaptation plans to manage these risks.⁶ The Climate Change Committee (CCC) is the UK's independent advisory body on climate change. Under the Climate Change Act (2008), the CCC must provide advice to the UK government on climate change risks and regularly assess progress on adapting to these risks. This report draws in part on the CCC's Well-Adapted UK report⁷, which was part of the CCC's independent advice for the fourth Climate Change Risk Assessment (CCRA). The Well-Adapted UK report sets out the key risks that climate change poses to the UK, and actions that need to be taken to manage them.

A well-adapted UK is one where climate risk is built into planning, investment and services, so that investments made now remain effective in a warmer climate and minimise climate impacts that cause critical disruption to life in the UK. This means reducing exposure to flooding, overheating, drought and coastal change, and

⁵ [Climate change in the UK - Met Office](#)

⁶ [Duties and Powers for Local Authorities in the UK to Adapt to Climate Change](#)

⁷ [A Well-Adapted UK - Climate Change Committee](#)

embedding climate risk into planning, investment and services so resilience improves over time⁸.

1.2.2 Summary of mitigation requirements

The UK is mandated under the Climate Change Act 2008 to achieve Net Zero Greenhouse Gas (GHG) emissions by 2050⁹. This means reducing emissions as far as possible, while balancing any remaining emissions (mainly from aviation, agriculture and certain industrial processes) through nature-based carbon storage or engineered removals.

The UK Government sets carbon budgets for five-year periods to manage the step-down in emissions to 2050. The Climate Change Committee (CCC) is responsible for advising the UK Government, the Northern Ireland Executive, the Scottish Government, and the Welsh Government on carbon budgets under the Climate Change Act 2008, and equivalent legislation in each of the devolved administrations¹⁰. The CCC's 'recommended level for the Seventh Carbon Budget, a limit on the UK's greenhouse gas emissions over the five-year period 2038 to 2042, is 535 MtCO₂e'¹¹ (which represents an 87% reduction in emissions compared to 1990 levels). UK Parliament passed this recommended level into law in June 2026¹². In June 2025, the Scottish Government laid regulations accepting the CCC's advice on carbon budget levels¹³. In October 2025, the Welsh Government laid regulations to set carbon budget levels in line with CCC advice¹⁴. In 2025, the Northern Ireland Executive consulted on the CCC's recommended carbon budget level, with legislation expected to follow¹⁵.

The CCC's advice on the level of the Seventh Carbon Budget is based on its Balanced Pathway. The Balanced Pathway sets out a credible, cost-effective emissions reduction pathway from 2025 to net zero emissions by 2050, so that the Government and Parliament can be assured that the recommended level is feasible and deliverable. Government is responsible for proposing a level for the Seventh Carbon Budget to Parliament and bringing forward policies to enable the carbon budget to be met.

The CCC's advice is clear that electrification and low-carbon electricity supply make up the largest share of emissions reductions in the Balanced Pathway, 60% by 2040. This means switching from fossil fuels to electrified heat, transport and industry. This will require a substantial increase in low-carbon electricity supply, achieved through an

⁸ [Progress in adapting to climate change – 2025 report to Parliament](#)

⁹ [Climate Change Act 2008](#)

¹⁰ Climate Change Act (Northern Ireland) 2022, Climate Change (Scotland) Act 2009, Environment (Wales) Act 2016.

¹¹ [The Seventh Carbon Budget](#)

¹² [Response to Parliament passing the Seventh Carbon Budget into law - Climate Change Committee](#)

¹³ [Carbon budgets | Scottish Parliament Website](#)

¹⁴ [The Climate Change \(Carbon Budget\) \(Wales\) Regulations 2025](#)

¹⁵ [The path to a Net Zero Northern Ireland | Department of Agriculture, Environment and Rural Affairs](#)

increase in offshore wind, onshore wind and solar supply. This increase in supply needs to be accompanied by a fast-expanding transmission and distribution infrastructure. Household choices in the CCC's Balanced Pathway account for 37% of the required emissions reductions, particularly through switching to electric vehicles and low-carbon heating. There is scope for local government to influence emissions from areas such as buildings, surface transport, and waste, which account for around half of the emissions reduction needed to meet the Seventh Carbon Budget.

2 Enabling and cross-cutting themes

This section sets out the shared enablers that help councils link climate mitigation and climate adaptation. It also highlights common issues that cut across sectors and services.

2.1 Planning policy and place-shaping

Using local plans to join up mitigation and adaptation: Local plans and masterplans shape where development goes and what it includes. They are one of the strongest tools councils have to both help reduce emissions and reduce climate risks at the same time¹⁶. Ways in which local plans can facilitate both mitigation and adaptation are:

1) Putting development in the right places

- Siting new homes, schools, care settings and key services away from current and future flood or coastal erosion risk where possible.
- Siting new developments in areas where water supplies are more resilient and avoiding areas where water resources are already under stress.
- Where high density developments are being proposed, these should minimise/ not add to the urban heat island effect (e.g. using green spaces, reflective surfaces and reducing heat from exhausts), and reduce the need to travel, supporting walking, cycling and public transport.

Textbox 1: Flood risk, planning and future insurability

Flood risk, planning and future insurability

Planning policy uses a sequential, risk-based approach to steer development away from areas at highest flood risk, but pressure to deliver housing can still lead to building in riskier locations¹⁷. Aviva (a major British multinational insurance company) estimates that 11% of new homes built in England between 2022 and 2024 were in medium or high flood risk areas¹⁸, and that by 2050 flood risk will increase further. Flood Re (a government-backed reinsurance scheme) currently helps many households at risk of flooding obtain affordable insurance, but it is planned to end in

¹⁶ [The Climate Crisis – A Guide for Local Authorities on Planning for Climate Change](#)

¹⁷ [Flood risk and coastal change - GOV.UK](#)

¹⁸ [Proportion of new homes built in flood areas rises to one in nine](#)

2039¹⁹ and doesn't include new builds. If more homes continue to be built in areas at higher flood risk, homeowners may find it harder or more expensive to get insurance in the future.

2) Setting and enforcing “low-carbon and climate ready” rules for all new buildings and major retrofits in the housing and non-residential sectors. Planning policies can:

- Support new homes being built with low-carbon heating and supporting technologies such as solar photovoltaic (PV).
- Require new development schemes to assess and reduce overheating risk through site-wide design (for example, shading, layout, ventilation strategy, green infrastructure and active cooling that may be needed in some cases), to complement individual building requirements in Building Regulations.
- Require new development schemes to include Sustainable Drainage Systems (SuDS), which reduce run-off and therefore local flood risk and secure robust maintenance arrangements for these SuDS.
- Require new development schemes to improve habitats and provide biodiversity enhancements.

Ensuring new Net Zero infrastructure and developments are “climate ready”. Local authorities will be involved in or lead on many developments to support emissions reductions through their own investment, as part of partnerships, as planning authorities or consultees. This will include retrofitting council homes, the building of renewable energy production (such as solar and wind), electricity transmission infrastructure²⁰, heat networks or active travel infrastructure. It is important that these new developments are planned, designed and delivered to withstand a warming climate. New infrastructure should be built to standards which ensure service delivery under future climate conditions. While setting requirements/standards for infrastructure sits with other organisations, local authorities can play a role in supporting “climate ready” developments and ensuring that relevant adaptation measures are added at the same time.

Leveraging Nationally Significant Infrastructure Projects (NSIPs): Many important large-scale developments (such as wind and solar farms, electricity transmission infrastructure and storage) fall under the NSIP regime. This means they require national-level, rather than local, planning consent, and local authorities function as statutory

¹⁹ [Our Future - Flood Re](#)

²⁰ Most small and medium scale renewable energy generation and transmission infrastructure requires planning permission from local planning authorities. Larger energy infrastructure projects may be consented through the Nationally Significant Infrastructure Projects regime, in which case the relevant local planning authority is a statutory consultee but is not the decision maker (see below).

consultees, rather than consenting authorities. Local authorities can use their role²¹ in NSIP processes to ensure the siting and design of these developments also consider climate risks and support emissions reduction. This includes:

- Setting out local evidence on flooding, overheating, drought, wildfire and coastal risk.
- Seeking designs that remain safe and operable in future climate conditions.
- Seeking clear requirements for resilience, maintenance and emergency access.
- Providing evidence on nature and environment impacts and mitigations to safeguard nature and biodiversity.
- Providing evidence on carbon stores such as peatlands and woodlands, how they may be impacted by developments and mitigations to safeguard existing carbon stores.

2.2 Governance and leadership

Breaking down institutional silos: In many councils, the responsibility for reducing emissions and the responsibility for risk management and for preparing for climate impacts sit in separate parts of the organisation. This separation happens at both operational and leadership levels. For example, the team working on Net Zero may not work closely with the team responsible for risk management and emergency planning. This makes it harder to plan climate action in a joined-up way. Shared governance structures can help bring these responsibilities together. These can include Climate Commissions, a Councillor holding the portfolio for climate change overall, or Overview and Scrutiny Committees with a standing question on long-term mitigation and adaptation.

Using local forums: Some local forums already bring together councils and partner organisations to plan for climate risks. These forums can help bridge adaptation and mitigation by sharing risk information that also informs infrastructure investment decisions. For example, Local Resilience Forums (LRFs) are multi-agency partnerships that bring together emergency services, local authorities, the NHS and other organisations to plan for and respond to major emergencies and local risks, including climate risks. These forums may have data on climate shocks that could help councils identify mitigation projects, such as strengthening local energy systems, which also improve emergency resilience.

²¹ [NSIPs Reference Guide for Local Authorities](#)

Textbox 2: Examples of joined-up governance in practice

Examples of joined-up governance in practice

- The Leeds Climate Commission brings together public, private and third sector partners. Its aims include both Net Zero and climate resilience and adaptation²².
- Climate Ready Clyde²³ is a cross-sector partnership, supported by the Scottish Government, that brings together the eight councils and key partners to deliver a shared climate adaptation strategy and action plan for the region.
- Swansea's council set up a multi-partner "Climate Signatories Group"²⁴ to coordinate a Climate Change Adaptation and Mitigation Strategy and Action Plan for the county, linking adaptation needs with decarbonisation work.

2.3 Data

Bringing together data for resilience and decarbonisation: If they have access, councils can layer datasets mapping energy networks (electricity, heat and gas), transport networks, communications infrastructure, water and drainage, and the location of critical sites such as care homes, schools, prisons, hospitals and emergency facilities with climate hazard information (for example, flood, overheating, drought and storm risk) and with energy demand and vulnerability data. This can help identify where climate impacts could disrupt essential services and where decarbonisation will increase pressure on local systems. However, local authorities will need support to access shared, consistent datasets. Councils can also agree on data sharing arrangements with infrastructure owners and use common map layers so that investment plans for Net Zero also improve resilience to climate risks.

2.4 Budget and finance

Aligning spending around mitigation and adaptation: Councils can design programmes and procurement to deliver both adaptation and mitigation outcomes. This includes writing retrofit and heat specifications that include relevant resilience measures where needed, using clauses that require climate-ready design, and aligning capital works so partners "dig once"²⁵. Councils can also pool budgets and governance across housing, public health, flood risk and estates to agree priorities and target investment where risk and vulnerability overlap. For example, a council can run a single 'healthy, resilient retrofit' programme in high-risk neighbourhoods, with a joint board and pooled budgets across housing, public health, flood risk and estates, so one project delivers emissions reductions and resilience improvements together. While

²² [Leeds Climate Commission](#)

²³ [Climate Ready Clyde](#)

²⁴ [Resilient Swansea - Swansea](#)

²⁵ [London Infrastructure Framework](#)

resource constraints can limit the potential to add adaptation measures to mitigation programmes, taking this integrated approach can help partially address this.

2.5 Capacity and skills

Integrating mitigation and adaptation into everyday roles: Integrating climate change mitigation and adaptation is relevant across the range of local authority functions, from estates, housing and planning to transport, public health, procurement and emergency planning. Many councils are already investing in training programmes, including carbon literacy training for Members and officers, and are increasingly expanding this to incorporate adaptation and climate risk. Building this shared baseline of knowledge across mitigation and adaptation helps staff identify ‘multi-solving’ opportunities, embed climate considerations into routine decisions, and reduce reliance on a small number of specialist officers.

2.6 Communication and engagement

Communicating mitigation and adaptation together: Local authorities can use communication and engagement activities to link emissions reductions with resilience to climate impacts. They can explain that many actions do both, alongside improving neighbourhoods overall. When communicating with residents, communities and businesses, councils can, for example, consider the following narratives:

- Using one joined-up story to talk about cleaner, safer and more affordable places, then explain carbon savings and resilience benefits as part of that story.
- Linking messages to real local issues. For example, when talking about floods, heatwaves, poor housing, or air quality, set out what the council is doing on both mitigation and adaptation.
- When choices add cost or change how places look (for example, shading, trees, rain gardens), explaining why they reduce future risk and avoid rework later.

Whenever local authorities create opportunities for two-way engagement, whether on a mitigation initiative or any other climate-related project, they can also use these opportunities to listen for insights relevant to adaptation and vice versa. Residents rarely separate mitigation and adaptation in their own thinking, so engagement on one topic naturally raises concerns, ideas and local knowledge about the other. By remaining open to this broader feedback, councils can build a more complete understanding of community priorities and design climate actions that better reflect local realities.

Using engagement moments as joint touchpoints: Councils can use existing “points of contact” with individuals, communities, businesses, farmers and landowners to cover both mitigation and adaptation, rather than running separate initiatives. Examples of joined-up engagements could include:

- When residents are engaged on retrofitting, heat pumps, or insulation, councils can also provide advice on overheating and flood resilience, where relevant.
- When consulting on planning applications, councils can communicate clear expectations for buildings that are low-carbon and resilient.
- When engaging on major infrastructure (for example, flood defences, heat networks, street works), councils can explain the combined package of emissions reduction, resilience, and wider place benefits.
- When running business forums or rural engagements, councils can link low-carbon investment and practices with practical resilience steps (for example, water, heat and flood risks).
- When interacting with households around fuel poverty, debt support and priority energy customers, local authorities can also explore climate vulnerabilities (e.g. overheating, flooding, power outage dependencies and housing quality), as these often affect the same households.

2.7 Community resilience

Building community resilience through local groups. Local community groups can play an important role in the transition to Net Zero. For example, they are involved in community energy projects, repair cafes, tree planting and advice on reducing energy consumption, all contributing to emissions reductions. Active community groups and networks that are well-established and well-trusted can also contribute to local community resilience, reducing reliance on councils during a crisis. For example, during Storm Arwen in 2021, when prolonged power outages cut off communities, existing local community groups provided essential support. This has been recognised in Electricity North West’s resilience fund, which acknowledged the roles of community organisations and subsequently provided support to formalise their future role and resources²⁶. Such groups can sit alongside formal Flood Action Groups, and may include some of the same volunteers.

3 Local adaptation considerations for priority mitigation actions

This section of the report summarises how priority outcomes from the CCC’s Balanced Pathway¹¹ interact with local adaptation needs. It considers where actions to reduce emissions also support adaptation, and where potential trade-offs and additional consideration are needed.

²⁶ [ENWL Storm Arwen Community Resilience Fund Report](#)

3.1 Buildings

What mitigation outcomes are needed for existing residential buildings?

In the CCC's Balanced Pathway:

- Around half of homes will be heated by heat pumps by 2040, up from 1% in 2023.
- Communal heat pumps will provide 3% of the low-carbon heating systems and heat networks will provide 9% of the low-carbon heating systems by 2040.
- Cost-effective insulation will be installed (loft, cavity and floor) in all suitable homes.

Rooftop solar and home batteries can support heat decarbonisation by reducing heat pump running costs, lowering energy bills, and providing flexibility to help manage growing electricity demand.

What mitigation outcomes are needed for new homes?

In the CCC's Balanced Pathway:

- All new homes will be highly energy efficient and have low-carbon heating.

What mitigation outcomes are needed for existing non-residential buildings?

In the CCC's Balanced Pathway:

- By 2040, 88% of non-residential heating will be delivered by low-carbon sources compared to 24% in 2025.
- Heat pumps can be used for most non-residential buildings, deployed individually or at a larger scale through a district heat network.
- Buildings will have significantly greater savings from energy efficiency. This will be delivered by energy management and building instrumentation and control measures (building management systems, zone and timing controls and management practices) and insulation, heating and hot water measures.
- Catering will move rapidly from gas and oil to electric. Fossil fuels used in hospitals and leisure facilities will be fully electrified by 2045.

3.1.1 Synergies

Taking a whole-home approach: To decarbonise the UK housing stock, existing homes will need to be retrofitted with energy efficiency measures and low-carbon heating systems. Local authorities will need to retrofit their own council housing stock and may be needed to help deliver government retrofit programmes for low-income households and area-based schemes. Local authorities can take an integrated "whole-house" approach that brings mitigation and adaptation together at the property level. This could include upgrading their own council homes and other eligible properties with energy efficiency measures and low-carbon heating systems, as well as, where needed, installing cooling measures (e.g. shutters, shading or active cooling) or property-level flood prevention, such as flood doors. This helps deliver the outcomes sought by local authority housing, environmental health and public health service areas. This delivers

efficiency through upgrading houses once, and can mean that mitigation measures do not have to be replaced again in future due to, for example, flood damage.

Improving thermal comfort and health: Decarbonising council homes and supporting low-income households often involve better insulation. Well-insulated and properly ventilated homes require less energy, but also stay warmer in winter and cooler in summer when designed correctly²⁷. This protects at-risk residents from extreme temperatures, reducing the risk of cold-related illnesses and heat stress. Local authorities can integrate assessments of overheating²⁸ and residents' exposure and vulnerability into retrofit schemes. Additionally, every plan to improve energy efficiency needs to take into account ventilation to prevent overheating and mould. The same principles apply to business premises and new homes.

Integrating enforcement of regulations: Local authorities already have powers and duties under the Housing Act 2004 to inspect properties using the Housing Health and Safety Rating System (HHSRS), which includes excess heat as a recognised hazard²⁹. Where serious hazards are identified, authorities must or may take enforcement action depending on the hazard category. Local authorities are also responsible for enforcing Minimum Energy Efficiency Standards (MEES) in the private rented sector and can sanction landlords for non-compliance. As both roles involve property inspections, housing data and engagement with landlords, local authorities could coordinate these activities to identify and address overheating risks alongside wider housing quality and energy efficiency issues.

Integrating adaptation measures when installing low-carbon heat networks: Local authorities, as planners, commissioners or procurers of heat networks, can adopt a 'dig once' approach by including measures such as green (e.g. trees) and blue infrastructure, biodiversity, and stormwater management measures in the specification and design of the network, so they are installed at the same time as heat network infrastructure.

Using low-carbon heating to provide cooling during extreme heat: Local authorities will be involved in the transition from fossil fuel to low-carbon heating systems as landlords in their own housing stock, through delivering retrofit schemes for low-income households, area-based retrofit schemes and through retrofit advice to households. The transition to low-carbon heating systems also presents an opportunity to address cooling needs. With appropriate design, all types of heat pumps can provide both heating and cooling, and consideration of future cooling requirements should therefore form part of transitioning to low-carbon heating.

²⁷ [Dwelling and household characteristics' influence on reported and measured summertime overheating: A glimpse of a mild climate in the 2050's - ScienceDirect](#)

²⁸ [Overheating In Retrofit And Existing Homes](#)

²⁹ [Tenant guide to the Housing Health and Safety Rating System \(HHSRS\) - GOV.UK](#)

Providing cooling through district heating networks: Some low-carbon heating will be delivered through district heating networks and local authorities will be involved in the development or consenting of heat networks. District heating networks can also provide cooling, and several are in operation in the UK, including across London and in Birmingham³⁰. These are designed for tri-generation, providing power, heating and cooling. They tend to be located in dense city-centre developments where air conditioning may otherwise be required. Natural water sources, such as rivers, can also be used at network or energy-centre scale, for example through water-source heat pumps, to provide heating and, where the system is designed for it, cooling. UK government funding and Ofgem regulations for heat networks now include the supply and metering of cooling³¹. Fifth-generation heat networks using ambient loops can also supply cooling.

Developing an integrated supply chain: The CCC's Balanced Pathway places emphasis on public sector buildings decarbonising at a faster rate than privately owned ones. In light of this, the public sector can develop new norms across the building sector supply chain. These norms can create a stronger local supply chain for commercial building retrofits that integrates the design and installation of low-carbon technologies, energy efficiency and adaptation measures together. If contractors can be trained to deliver integrated solutions for whole buildings, this will support well-adapted building decarbonisation across the wider built environment. This principle can apply in the housing retrofit sector as well, integrating low-carbon technologies and fabric improvements with adaptation measures.

3.1.1.1 Synergies for existing non-residential buildings specifically

Incorporating operational resilience in public buildings: Decarbonising council-owned buildings may involve installing solar panels and battery storage, alongside low-carbon heating technologies. These systems can also play a resilience function by replacing emergency diesel generators during a power cut, where they have been installed with a backup interface. This helps essential services, such as emergency centres, call centres or depots, continue to function if the main power grid fails. Local authorities should consider specifying the ability of low-carbon technologies, including batteries, to operate during power cuts, as well as to provide flexibility and storage for a resilient grid. Installers indicate this is becoming more common, and such backup systems are offered when providing quotes, but are not always accepted. Ensuring the budget is available for this could build in resilience and avoid later costs.

³⁰ [Heat Network Zoning Opportunity Report: Birmingham](#)

³¹ [Regulations: heat networks \(metering and billing\) - GOV.UK](#)

3.1.1.2 Synergies for new homes specifically

In England, Building Regulations are tightening and come into force in March 2027, building on existing rules on energy efficiency, overheating and water efficiency³².

Masterplanning for integrated mitigation and adaptation: Local planning authorities can consider how best to integrate mitigation and adaptation for individual and wider areas of new homes, as mentioned in the cross-cutting themes section. Masterplans can be used to set out a high-level vision, layout and phased development of an area or project and can include specifications on high-level design, transport, amenities, public realm and utilities of an area or project. Local authorities can use these master plans to integrate mitigation and adaptation into new homes. To achieve this, they must bring together several policy levers, such as building standards, National Planning Policy and local evidence, to encourage developers to think about developing “low-carbon and climate-ready” residential areas and homes. This can include integrating green and blue infrastructure to reduce flooding and heat islands in residential areas and provide insulation that keeps homes warm in winter and cool in summer.

3.1.2 All Buildings: Additional considerations

Balancing insulation with ventilation: As detailed above, insulation can be a way to improve both energy efficiency and keep homes warm in the winter, as well as keep homes cool in the summer. However, for this to be an effective dual strategy, certain homes (e.g. homes with high solar gain) must be sufficiently ventilated when insulation is put in place, and this should be considered as part of home insulation.

Designing heat networks for long-term climate resilience: Heat networks are an important mitigation tool for dense urban areas. However, these networks involve extensive underground pipes and central energy centres. This infrastructure can be vulnerable to climate impacts such as flooding or ground movement caused by drought and rainfall. Heat network developments must include a well-thought-out assessment of future flood and subsidence risks to avoid long-term failure. These are included in the proposed heat network technical standards³³.

Heat networks and tree planting: Heat networks can cause tensions with planting of more street trees, which contribute to urban cooling and better air quality, as the pipework can dry out the ground, and tree roots can damage pipework insulation³⁴. This can be overcome through design methods, setback distances, geotextiles, vented trenches, and the choice of suitable trees like Ginkgo Bilboa or Oak over trees like Willows.

³² [The Future Homes and Buildings Standards: 2023 consultation](#)

³³ [Heat Network Technical Assurance Scheme \(HNTAS\) - GOV.UK](#)

³⁴ [Street-Works-UK-Publications-Volume-4-Issue-3-2026.pdf](#)

3.2 Electric vehicle uptake

What mitigation outcomes are needed?

In the CCC's Balanced Pathway:

- Three quarters of cars and vans on the road will be electric by 2040.
- Two thirds of HGVs will be electric by 2040.
- The number of public charge points will grow from 54,000 charge points in 2023 to around 300,000 by 2030 and over 550,000 by 2040.

3.2.1 Synergies

Improving air quality during heatwaves: Local authorities have a mandated role in managing local air quality³⁵. By enabling the uptake of electric vehicles and heat pumps, which do not produce exhaust nitrogen oxides from burning fossil fuels, local authorities will see an improvement in local air quality. During heatwaves, poor air quality (due to NOx reacting and making ozone) makes respiratory and heart conditions worse. By reducing pollution, the shift to zero-emissions EVs and heat pumps helps vulnerable people stay healthier during extreme heat events. Electric vehicles may also reduce local waste heat compared with conventional petrol and diesel vehicles. However, the effect on urban temperatures is likely to be modest compared with factors such as building design, green space and traffic levels.

Multi-purpose infrastructure: Local authorities can build solar-powered charging hubs on council land. These hubs use renewable energy to charge vehicles. The physical structures also provide shade for cars and people during hot weather. This reduces the risk of vehicles overheating and provides a cooler environment in urban areas.

Delivering emergency power through EV batteries: Electric vehicle batteries can store energy, which helps with grid balancing through flexibility and emergency resilience. Through rapidly evolving "Vehicle-to-Grid" (V2G), "Vehicle-to-home" (V2H), "Vehicle-to-buildings" (V2B) technologies and markets, EV batteries can send power back into buildings or the grid³⁶. If a storm or flood causes a power cut, EV fleets could potentially provide emergency electricity to keep essential services running. This requires V2G-compatible vehicles and specifications for the grid connection so it can be disconnected from the main grid and can operate as an 'islanded' micro-grid. It also requires the use of bi-directional chargers and smart energy management systems³⁷. Although this is not a priority action, local authorities could consider supporting trialling this new technology, and some early innovation trials for rural resilience are underway³⁸.

³⁵ [Unlocking local action on clean air | IPPR](#)

³⁶ [Future Energy Scenarios 2025: Pathways to Net Zero](#)

³⁷ [Everything You Need to Know About Vehicle-to-Grid \(V2G\) in the UK](#)

³⁸ [Electric Vehicle Chargepoint Installation - Cybermoor](#)

3.2.2 Additional considerations

Managing vulnerability to flooding: Charging points are electronic devices. They may be installed on streets or in car parks that may be at risk of flooding now or in the future. Local authorities should avoid placing charging hubs in areas with a high risk of flooding, or should specify chargers with IP67³⁹ ratings which can withstand temporary submersion.

Making best use of street space: On-street charging points and cables take up space on pavements and roads. Space for both mitigation and adaptation needs to be carefully considered. For example, a local authority might need on-street space to plant trees for shade and flood risk reduction, as well as room to install SuDS to manage floodwater. Councils should therefore develop integrated kerbside strategies. The Manual for Streets⁴⁰ is expected to be updated to outline setback distances for EV infrastructure to avoid damage to tree roots and to integrate permeable surfaces around Electric Vehicle Charge Points (EVCPs). EVCPs can also be clustered, allowing more space for rain gardens, for example.

Planning for increased road wear: Climate change leads to hotter summers and higher rainfall intensity, which can soften road surfaces and lead to standing water and scour. This can increase damage to road surfaces and therefore require more frequent maintenance by local authorities. Alongside this, there is some emerging evidence on additional road wear from electric vehicles in the heaviest vehicle classes (such as buses and trucks)⁴¹. Local authorities should prioritise more heat-resistant, water-resistant and weight-appropriate surfaces on key freight and bus routes, and improve drainage to reduce standing water.

3.3 Modal shift – reducing car use

What mitigation outcomes are needed?

- In the CCC's Balanced Pathway, 7% of car demand will shift to public transport and active travel by 2035, particularly in towns and cities.

3.3.1 Synergies

Integrating nature and transport corridors: New active travel corridors can act as nature corridors. When councils build new cycle lanes or pedestrian routes, they can include trees, planting and SuDS, provided there is sufficient space available. These green features support wildlife by linking habitats. They also provide shade for people

³⁹ IP = Ingress Protection followed by two numbers, the first indicated resistance to dust ingress, the second to water both 0-9. An IP67 charger can be submerged in 1m of water for 30 minutes.

⁴⁰ [Designing and modifying residential streets: Manual for streets - GOV.UK](#)

⁴¹ [Hidden cost of road maintenance due to the increased weight of battery and hydrogen trucks and buses – a perspective - University of Edinburgh Research Explorer](#)

during heatwaves, and due to this cooling effect and their aesthetics, they make active travel a more attractive option. In addition, the green features help absorb rainwater during heavy storms, which reduces flood risk. Councils can also retain existing trees through careful design and specification for new footpaths, cycle routes and bus lanes.

Improving public health and resilience: Councils have a mandated public health role, which encompasses tackling the root causes of ill health and promoting health and wellbeing. Encouraging active travel, such as walking, wheeling and cycling, improves the general health and wellbeing of the community. Healthier people are often better able to cope with the physical stress caused by extreme heat. By reducing car use, local authorities also improve air quality. This protects people with respiratory conditions who are most at risk during heatwaves.

Creating resilient public transport hubs and routes: Transport strategies should identify "critical routes" that must be kept open and resilient to both flood and heat to support emergency services. Improving bus services often involves upgrading stations and shelters. Local authorities can design these hubs to be "climate-ready." For example, bus shelters can have green roofs for cooling or be designed to provide better protection from extreme heat and heavy rain. This ensures that public transport remains a comfortable and viable option as the climate changes, alongside having alternative routes in contingency plans for extreme weather disruptions.

3.4 Electricity supply

What mitigation outcomes are needed?

In the CCC's Balanced Pathway:

- Annual electricity demand by 2050 will be more than double 2023 levels.
- Electricity will be generated largely by renewables, with around 80% of generation in 2040 from wind and solar.
- The electricity generated by renewables will need to be transported from where it is produced to where it is needed, which requires the construction of new transmission and distribution infrastructure (e.g. new lines, cables and pylons and associated substations).

The energy system transition underpins climate mitigation by providing clean power for a more electrified economy.

3.4.1 Synergies

Coordinating planning: Developing a Local Area Energy Plan (LAEP) and contributing to Regional Energy Systems Planning (RESP, including tRESP) helps councils align local priorities with network and system planning. Most LAEPs focus on energy demand, decarbonisation options and delivery, and they do not routinely assess wider natural hazards such as flood risk. RESP can add this wider perspective by using constraint

mapping (for example, Environment Agency flood risk datasets⁴²) to identify where proposed substations, storage or generation may be more exposed, and to steer investment towards more suitable locations. Councils can, therefore, use LAEP and RESP to:

1. share local growth plans and locations of critical sites (for example, schools, care homes and key council buildings),
2. flag flood, erosion, wildfire, water scarcity and overheating risk early so network partners avoid high-risk sites, and,
3. ask for clear plans to protect and recover existing energy assets in high-risk areas.

Improving energy security through local power: Installing renewable energy and storage, such as solar panels and batteries, on council-owned roofs or land can improve energy security. If a severe storm or flood damages the national grid, local generation combined with battery storage can keep essential services running where a backup interface has been installed. This helps the council with business continuity. This type of backup interface is becoming more common, although it may not have been installed on earlier systems. In a similar way, councils can support community energy projects to consider the inclusion of backup interfaces to make sure that these renewable energy projects also add to resilience during weather related power cuts.

3.4.2 Additional considerations

Reducing physical vulnerability of assets: As highlighted in section 2 *Enabling and cross-cutting themes*, new energy infrastructure can be vulnerable to climate impacts. Solar farms, substations, and battery storage units and auxiliary equipment can be damaged by flooding if they are built in low-lying areas. Local authorities can use their planning role to ensure that all new energy assets, especially substations, are built outside of high-risk flood zones and that existing ones are sufficiently protected for future risks. In addition, when dealing with Nationally Significant Infrastructure Projects, they can use Planning Agreements with developers to secure the funds and expertise needed to assess climate risks and to manage Flood Risk Assessments and mitigations.

3.5 Land use and agriculture

What mitigation outcomes are needed?

In the CCC's Balanced Pathway:

- UK woodland cover will increase from 13% to 16% by 2040.
- Peatland restoration will mean 60% of upland peat and 31% of lowland peat will be in a natural or rewetted condition by 2040.

⁴² [Flood Risk Areas - data.gov.uk](https://data.gov.uk)

- Cattle and sheep numbers will decrease by 27% by 2040.
- Widespread adoption of low-carbon farming practices will help reduce emissions further.

3.5.1 Synergies

Storing carbon in nature while strengthening ecosystem resilience: Emphasis on woodland planting and management and on peat restoration for carbon reasons gives an opportunity to safeguard ecosystems in nature. Local authorities can help deliver this on their own land, through place-shaping policies and by leading and supporting nature recovery and landscape scale projects, and by working with their farming and landowner networks. Resilient woodlands are created through diverse planting of future-proof species able to withstand future climate impacts, pests and diseases. Robust woodlands are less at risk of storms and windthrow that destroy swathes of trees. Healthy wet peatlands lock away carbon and contribute to flood risk reduction, but are also less at risk of destruction from wildfires during drought.

Delivering natural flood management: Creating woodlands and hedgerows, and restoring peatlands on council-owned land and more widely, are key mitigation actions that store carbon in nature. These also provide vital adaptation benefits. Healthy peatlands, woodlands and hedgerows act as natural sponges. They slow the flow of water during heavy rain, which reduces local flood risk. They also provide shade and cooling for people and livestock during heatwaves. Local authorities' flood authority role, nature recovery and planning roles, working with landowners and the voluntary sector can help deliver these benefits.

Improving soil health and drought resilience: Supporting low-carbon farming practices often focuses on improving soil health. Healthy soil also has a better ability to absorb and retain water. This makes farmland more resilient to droughts and reduces soil erosion during intense storms. Rural local planning authorities may develop planning policies for soils, and carry out coordination and advice roles with local farm businesses. Through their county farms, they can encourage tenant farmers to lead on improving soil health and share lessons more widely with the sector.

Diversification of farming income: An important mitigation measure is to support farmers in diversifying some of their activities away from livestock production, especially beef and lamb. This reduces emissions directly associated with livestock, and makes land available for alternative uses, including landscape recovery, nature restoration and tree-planting. Some of these uses can directly support adaptation and mitigation. Local authorities can support this diversification by providing business support services, rural programmes and partnerships to connect farming and funding, training and technical guidance and fostering peer-to-peer learning.

3.5.2 Additional considerations

Reducing the risk of maladaptation in tree planting: When undertaking nature recovery activities, local authorities need to balance the importance of planting trees to store carbon and the need to protect existing carbon-rich habitats, especially peatlands. Tree planting schemes should consider whether they can withstand droughts and hotter temperatures, and management plans may be needed to establish trees. This will help avoid maladaptation (for example, planting trees on sensitive peatlands, which can dry out the soil, releasing stored carbon and increasing the risk of wildfires). Species choice for maximum survival is key. Diverse planting is required to reduce vulnerability to new pests and diseases, which are exacerbated by climate change. This will help avoid issues such as planting single tree types, which make woodlands vulnerable to new diseases, as seen with ash die-back. Tree planting must be in line with Local Nature Recovery Strategies and protect nature and biodiversity.

Making best use of land: Careful planning is needed to ensure that land is available both for large-scale woodland creation, solar farms and for food production. Local authorities must balance the need for carbon sinks with the need for productive farmland and renewable energy production through local land-use policies in their planning role, working in partnership with farmers and landowners. Silviculture and Agroforestry are ways to produce food and trees in harmony on the same land, with trees providing shade and shelter for crops and animals. The newly published Land Use Framework for England also sets out how it expects that land used for solar and wind production can be used to deliver other outcomes, such as grazing animals and the restoration of peatland⁴³. It also highlights that, if land is used effectively, there is enough land to deliver all objectives.

3.6 Waste

What mitigation outcomes are needed?

In the CCC's Balanced Pathway:

- Household recycling rates will increase from 45% now to 57% by 2035.
- Non-household recycling rates will increase from 49% to 74% by 2035.
- No more Energy from Waste plants without a viable Carbon Capture and Storage route will be built.
- Waste sent to landfill will be nearly eliminated.
- Food waste per person will reduce by 45% by 2040.

⁴³ [The Land Use Framework for England](#)

3.6.1 Synergies

Modernising infrastructure for continuity: Modernising Household Waste and Recycling Centres (HWRCs) allows for better sorting and reuse (mitigation), helping to achieve much higher levels of recycling. This process also provides a chance to make the sites more resilient (adaptation). For example, local authorities can design centres with better drainage and shaded areas for staff, ensuring that waste services can continue to operate safely during floods or heatwaves.

3.6.2 Additional considerations

Collecting refuse in extreme heat: Collecting a wider range of waste materials requires more manual handling. As the UK faces more frequent heatwaves, waste crews working outdoors face a higher risk of heat exhaustion. Local authorities must balance collection targets with the need to protect staff health. This can be achieved by changing working hours, allowing for more breaks, and adjusting routes for increased shading to avoid midday high temperatures, as seen in Europe. Councils should also consider appropriate equipment, such as air-conditioned or ventilated vehicles and cool clothing.

Reducing public health risks from waste storage: Separate food waste collection, which requires households to store food waste temporarily, is a measure that helps reduce waste emissions. But hotter summers speed up the decomposition of food waste. Regular collections and clear communications by local authorities for correct use can mitigate the risk of issues with pests, flies, and unpleasant odours in residential areas, and make clear that the risk is no greater than if the food waste were in black bin bags. Planning policy should ensure that waste storage in new developments is easy to use, well-ventilated and kept away from direct sunlight to prevent odours and pests. In existing buildings, local authorities should consider how to improve waste collection containers or install underground recycling facilities.

3.7 Industry

What mitigation outcomes are needed?

In the CCC's Balanced Pathway:

- Fossil-fuel heating equipment will be replaced by electric alternatives, such as using electric heat pumps for low-temperature heat, alongside electric boilers and furnaces.
- Carbon Capture and Storage will be targeted at the chemicals, and cement and lime industries to tackle 'process emissions' that cannot be avoided by switching fuels.
- Hydrogen will be used for high-temperature processes where electrification is impractical or not cost-effective.
- Resource efficiency (using high-carbon materials more efficiently) and energy efficiency will also contribute to emission reductions.

The low-carbon transition for industry is highly dependent on electrification, alongside hydrogen production for harder-to-transition industries like chemicals and glass. Additionally, some of the processes needed for industry to manufacture the hydrogen, sustainable aviation fuel and process waste products rely on the availability of feedstocks, including natural resources, waste resources, energy, and critically, water.

Those very resources needed for a low-carbon future are at risk themselves from climate impacts, particularly water and possibly timber and biomass. While hydrogen can be produced using seawater or treated wastewater, many production pathways still depend on reliable water, energy and infrastructure systems that may be affected by climate change.

3.7.1 Synergies

Integrating adaptation in Local Industrial Decarbonisation Plans: Local Industrial Decarbonisation Plans set out a route to decarbonise dispersed industrial clusters. These plans are funded by DESNZ and in some cases plan development is led by local authorities. Where local authorities lead on plan development, they can ensure that adaptation measures (such as cooling buildings) are included.

Using industrial regulation to support decarbonisation and resilience: Local authorities can use environmental permitting and air quality duties to encourage cleaner industrial processes, including electrification, energy efficiency and reduced diesel use. This can also create a touch point to discuss wider site resilience and future investment required to adapt to a changing climate with operators.

3.7.2 Additional considerations

Managing water demand: Some industrial decarbonisation options increase water demand. Hydrogen production needs water, and Carbon Capture and Storage (CCS) can be water-intensive because of cooling and process needs. Local authorities and industrial sites can reduce the impact of operations on water resilience (and the impact of droughts on their operations) by planning for non-potable water sources (for example, treated wastewater) and by building water recycling into CCS projects. Future water availability should also be a factor when considering CCS for Energy from Waste (EfW) facilities.

Ensuring industrial decarbonisation infrastructure is climate-ready: Electrification, hydrogen and CCS can increase reliance on electricity, communications, transport, water and new site infrastructure. Local authorities should treat climate resilience as part of option appraisal, siting, permitting and network planning, to avoid locking into assets that are more exposed to outages, water stress, and costly retrofits later.

Planning for sea-level rise at coastal industrial sites: Most of the UK's main industrial clusters, which are decarbonising and which have the potential to support decarbonised industry, including hydrogen production and CCS, are based on the coast. They may be subject to the impacts of sea level rise, coastal erosion, and storm surges due to a changing climate. Local authorities should work with cluster operators, port authorities and regulators to assess future sea-level rise, coastal erosion and storm surge risk, and use planning and investment decisions to ensure suitable siting of new industrial assets and appropriate adaptation measures for existing assets. Where key sites must stay on the coast, local authorities should set clear requirements for protection, emergency access and recovery plans.

4 Considering mitigation for adaptation-focused interventions

In addition to the mitigation actions above, some adaptation actions can also affect the transition to Net Zero. This section highlights key, but not exhaustive, examples of where key adaptation-focussed interventions can be aligned to support mitigation efforts, and where careful considerations are required.

4.1 Integrating climate adaptation with energy system planning

Some adaptation options require additional energy use when helping communities, buildings and infrastructure cope with climate impacts. This can apply to options such as active cooling (e.g., air-conditioning) in buildings and public transport, extra cooling for digital infrastructure, and water supply measures such as additional pumping, treatment, and desalination. Where these measures require additional electricity, the decarbonisation of the UK electricity supply means this will not result in additional emissions in the long-term.

Planning for peaks: As noted above in the *3.4 Electricity supply* section, local authorities can use LAEP and RESP to work with system operators to understand where potential extra cooling load or energy needs associated with these adaptation measures will fall, and how to meet them. LAEP/RESP can map constraints and climate risks (for example, flood risk) to steer siting and investment decisions for infrastructure that will serve higher cooling loads.

Considering cooling measures in retrofit and new build: Local authorities can consider low-cost shading and ventilation strategies to cool, for example, buildings. They can add efficient active cooling only where needed, starting small and allowing for later expansion if risks increase.

Specifying integrated solutions in public estates: Local authorities can include solar, storage and backup interfaces so essential services can operate during power cuts, and reduce costs by providing flexible services to the grid to generate income to power the extra measures for cooling and heating.

4.2 Embodied carbon in adaptation options

Some adaptation measures include embodied carbon from materials and construction. This is most obvious in hard-engineered measures such as sea walls, embankments, groynes, breakwaters, and some pumping or drainage infrastructure, which often rely on concrete, steel, and heavy construction. As these industries further decarbonise, the embodied carbon of these measures reduces. In England, the Environment Agency often leads and delivers major flood and coastal schemes on main rivers and the coast. Local authorities should work with the Environment Agency and other risk management authorities early, so schemes support local priorities and consider lower-carbon options or a mix of measures where these can effectively manage risk. This may include nature-based measures, green-grey design, or allowing some places to adapt over time through managed retreat, where this is appropriate.

Reducing carbon where construction is needed: Where local authorities commission or deliver construction works directly, they should specify lower-carbon materials and methods, such as low-carbon concrete, and look for ways to reduce emissions from pumps, vehicles and construction activity. They should also ensure that construction activities do not harm green spaces and natural areas. Where they do not commission schemes themselves, councils can still influence outcomes by setting requirements through planning conditions, funding agreements or partnership arrangements. In both cases, setting clear outcomes rather than prescribing solutions can allow bidders to propose innovative low-carbon approaches.

Identifying options that extend asset life and add wider benefits: Where local authorities commission or deliver schemes directly, they should test whether nature-based and green-grey measures can reduce pressure on hard defences and extend their design life, while improving habitats and public space.

4.3 Nature-based solutions and protection of natural habitats

Nature-based solutions can reduce flood and heat risks while also storing carbon. They can sit alongside built infrastructure and improve health, amenity and biodiversity. Local authorities should encourage the use of nature-based solutions where appropriate, protect and enhance natural habitats and avoid actions that damage habitats or reduce their climate benefits.

Embedding nature-based measures in plans and programmes: Local authorities should include natural flood management, SuDS, urban greening and habitat restoration in local plans, regeneration and resilience work. These measures can reduce risk and support carbon storage when designed well. In England, they should align with the Local Nature Recovery Strategy (LNRS).

Using green-grey approaches where needed: Local authorities should design flood and coastal schemes as hybrid projects where this reduces risk. Nature-based features can reduce pressure on hard defences and extend asset life, which can also reduce the need for future high-carbon repairs and rebuilds.

Working with landowners and local partners: Local authorities should work with landowners, community groups and local partners to agree on practical management and long-term maintenance. This helps keep risk reduction and carbon benefits in place.

5 Conclusion

As noted in the *Introduction*, this report should be read alongside the other reports included in this series, which contain the main lists of priority actions in reducing emissions and in adapting to climate risks. This report is intended as an accompanying guide to highlight local authority climate actions that deliver mitigation and adaptation synergies and those that require careful consideration around potential trade-offs.

It shows that in many cases, local climate mitigation and adaptation should be planned together, not treated as separate activities. For local authorities, the main message is to be practical. Good local plans, joined-up governance, shared data, coordinated investment, outcomes-focused procurement, skills development and effective community engagement can leverage adaptation-mitigation synergies and improve value for money. Councils do not need to solve every challenge alone, but they do have a central role in making sure that local climate action is both low-carbon and climate-ready.



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