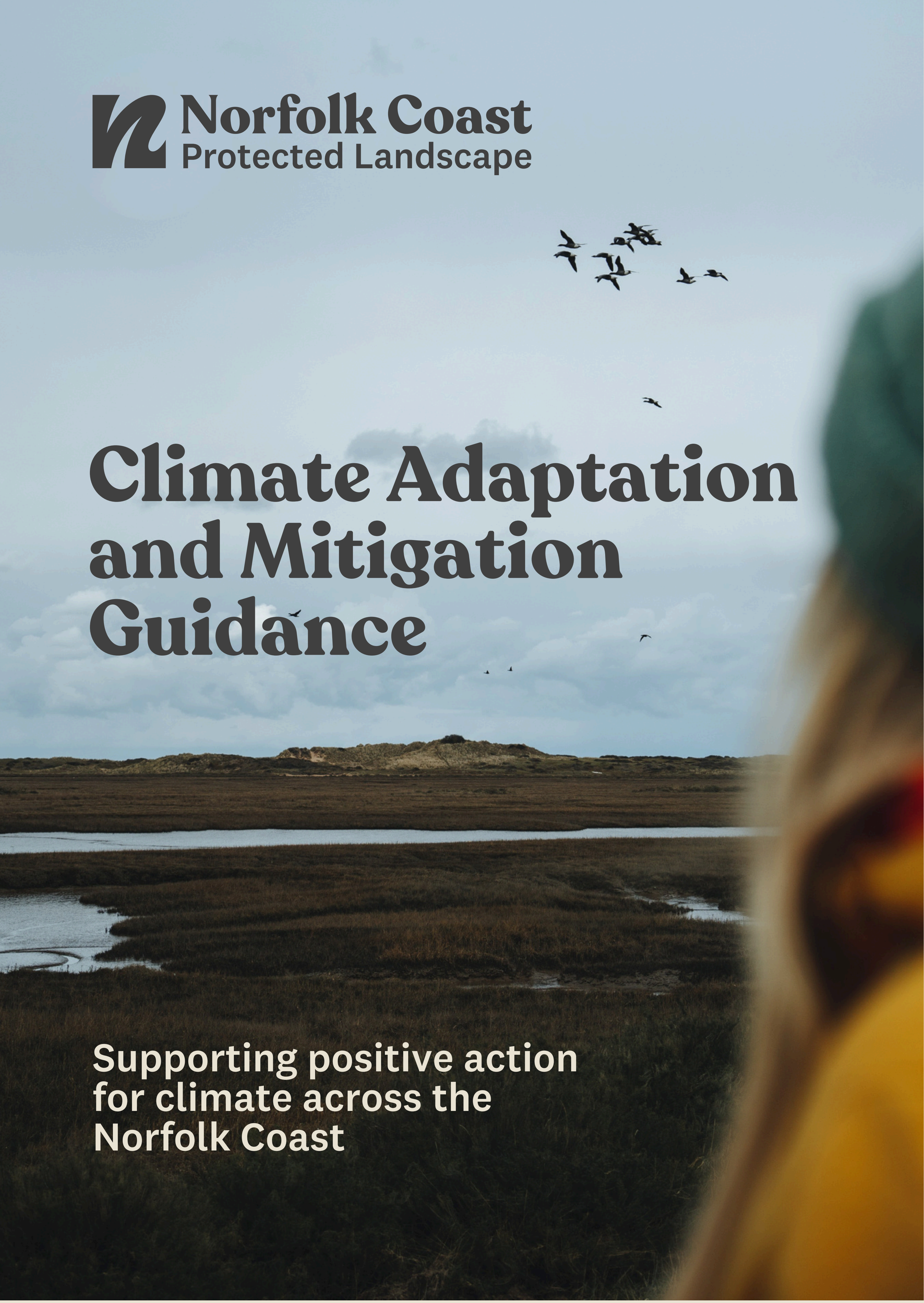

Norfolk Coast
Protected Landscape

Climate Adaptation and Mitigation Guidance

Supporting positive action for climate across the Norfolk Coast

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1. Introduction

This guidance supports the Norfolk Coast National Landscape (NCNL) Management Plan 2025-30. It is designed to help everyone living or working in and around this protected landscape to adapt to climate change and reduce its impacts. This guidance explains why action is essential and highlights the resources available to support these efforts.

The purpose of this guidance is to:

- **Provide simple, clear advice** on climate mitigation and adaptation across The Wash and Norfolk Coast
- **Empower people and organisations** to take meaningful action
- **Protect and enhance the special qualities** of the NCNL (as outlined in the Management Plan) in the face of the pressures of a changing climate.

This guidance is aimed at:

- Developers
- Planners
- Decision makers
- General public

Please note: climate change affects both people and the natural environment. Guidance on how nature can adapt is provided separately in our Nature Recovery Guidance.

2. Climate change in Norfolk

Climate change refers to long-term shifts in climate patterns caused directly or indirectly by human activity, which alters the composition of the global atmosphere and exceeds natural climate variability.

These changes are driving increases in temperature, shifts in rainfall patterns, rising sea levels, and more frequent extreme weather events such as heatwaves, flooding, droughts, wildfires and storms. Responding effectively requires action on two fronts:

- **Mitigation:** reducing or preventing greenhouse gas (GHG) emissions to limit the extent of climate change.
- **Adaptation:** preparing for and managing the impacts of a changing climate.

We recognise both the seriousness of these impacts and the urgency of taking action. Situated within the Eastern England climate region, the Norfolk coast experiences:

- Average maximum summer temperatures of 20–22°C
- Average maximum winter temperatures of 7–8°C
- Annual rainfall generally below 700mm, spread fairly evenly throughout the year
- Generally low average wind speeds, but the highest frequency of tornadoes in the UK

However, the Norfolk Coast's climate is already shifting. Figure 1 illustrates changes in annual mean temperature and rainfall from 1991–2020, compared with the 1961–1990 baseline. Recent climate-related impacts include:

- Flooding, such as the 2023 Potter Heigham event
- Coastal erosion, notably at Happisburgh
- Intense rainfall, including the heavy downpours during Storm Conall in 2024
- Landslides, such as the 2024 cliff collapse north of Trimingham
- Wildfires, including the 2022 incident that damaged homes and important habitats
- Heatwaves, such as those affecting Norfolk in July 2024
- Drought, including 2023 conditions in North Norfolk that impacted farming

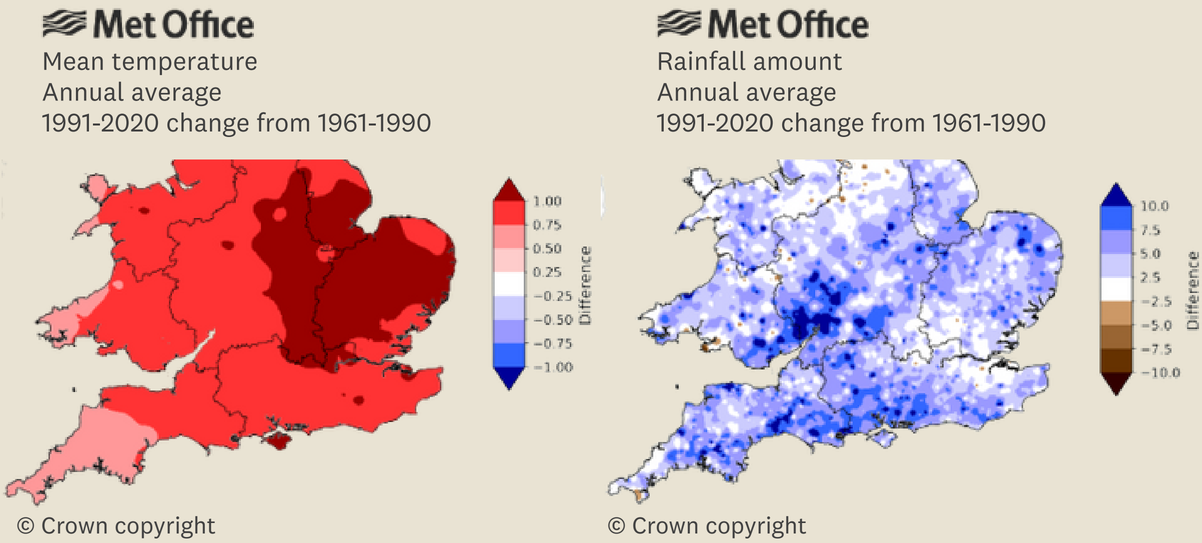

Figure 1: Observed climate changes in Norfolk. Data sourced from UKCP18 via the UK Climate Projections User Interface (adapted from Met Office Local Authority Climate Service).

The Met Office's UK Climate Projections 2018 (UKCP18) provide the most up-to-date information on how the UK's climate is expected to change. These projections indicate that the country is likely to experience warmer, wetter winters and hotter, drier summers in the decades ahead.

Although national trends are clear, the specific impacts of climate change will vary from place to place. The scale of these changes depends on global GHG emissions, but some level of climate change is now unavoidable due to emissions already released into the atmosphere. To support local planning, the Local Authority Climate Service offers non-technical climate summaries for UK Local Authorities under different global warming scenarios (1.5°C, 2°C, and 4°C) relative to the pre-industrial baseline (1850–1900).

The table below outlines the projected climate changes for North Norfolk under two warming scenarios: 2°C and 4°C. These figures illustrate how the local climate may change if global average temperatures rise by either 2°C or 4°C above pre-industrial levels. Notably, global temperatures have already increased by approximately 1.2°C.

Climate variable	2°C increase (in global temperature)	4°C increase (in global temperature)
Average summer temperature	+2°C	+3.9°C
Average winter temperature	+1.3°C	+2.7°C
Summer precipitation rate	+1%	-21%
Winter precipitation rate	+1%	+10%

Table 1: Local climate projections for North Norfolk. Data sourced from UKCP18 via the UK Climate Projections User Interface (adapted from Met Office Local Authority Climate Service).

UKCP18 also provides projections for future sea level rise. Around the Norfolk Coast, sea levels are expected to rise throughout the 21st century — up to around 30cm by the 2050s and approximately 49cm by the 2080s — with the possibility of even greater increases. Rising sea levels will heighten the risk of coastal erosion and flooding.

A full summary of climate projections for North Norfolk is available via the Local Authority Climate Service.

Key anticipated impacts of future climate change on the Norfolk Coast include:

- An increase in summer days above 25°C and very hot days above 30°C
- Longer growing seasons due to more days with average temperatures above 5.5°C

- Reduced demand for heating (due to fewer days below 15.5°C) but higher demand for cooling (with more days above 22°C)
- Fewer frost days, meaning less disruption from temperatures falling below 0°C

The UK Climate Change Risk Assessment also indicates that extreme temperature and rainfall events will become more frequent and severe, depending on future global emissions. For the Norfolk Coast, the expected consequences include:

- Increased flooding from heavy rainfall and rising sea levels, threatening homes, businesses, infrastructure (including energy and transport) and essential services
- Greater pressure on water supplies for homes, agriculture and businesses due to water scarcity and drought
- Saltwater intrusion into aquifers and agricultural land, driven by sea level rise, storm surges and high tides, increasing salinity and reducing the viability of farmland and freshwater sources

These projected impacts underline the urgent need for climate action — both to reduce greenhouse gas emissions and to adapt to the changes already underway. Councils across Norfolk recognise these challenges and the region's important role in supporting national mitigation and adaptation efforts.

Strategies in action
A range of projects and initiatives are already underway to reduce emissions and respond to the impacts of climate change across the Norfolk Coast.

Borough Council of King's Lynn & West Norfolk has:

- Implemented retrofit projects under the Re:fit framework, installing solar panels, heat pumps, LED lighting, insulation upgrades, and Combined Heat and Power units to enhance energy efficiency in buildings.

North Norfolk District Council has:

- Committed to a net zero target by 2030
- Adopted an Environmental Charter
- Initiated an ambitious tree planting programme
- Supported renewable energy projects, including a 150kW solar panel installation at its Cromer headquarters, reducing emissions by up to 23.2 tonnes of CO_2e* annually
- Expanded electric vehicle infrastructure, funding over 30 charging points at council sites
- Supported building retrofits to improve energy efficiency, particularly for low-income households

Great Yarmouth Borough Council has:

- Developed the Coastal Adaptation Supplementary Planning Document to address the impacts of coastal erosion

Norfolk County Council has:

- Committed to a net zero target by 2030
- Launched a Climate Strategy
- Secured £4.45 million from Active Travel England to improve active travel infrastructure
- Planted 600,000 trees as part of the 1 Million Trees for Norfolk project

Collaboration and engagement
All four Councils actively engage with residents and stakeholders on climate action through initiatives such as the Norfolk Climate Change Partnership and Net Zero East.

*Carbon Dioxide Equivalent (CO_2e or CO_2-eq) is a metric used to compare the impact of different greenhouse gases. It expresses the amount of any greenhouse gas in terms of the equivalent amount of carbon dioxide that would have the same global warming effect.

3. Climate mitigation strategies

Climate mitigation refers to efforts to reduce or prevent the emission of GHGs. This includes transitioning to renewable energy sources, promoting sustainable transport, improving energy efficiency, and enhancing carbon sinks such as forests.

This section provides guidance on mitigation actions focused on reducing emissions from buildings and new developments, including architectural design, renewable energy installations and electric vehicle infrastructure.

Reducing greenhouse gas emissions from buildings
The UK built environment is responsible for approximately 25% of total UK GHG emissions (UK Green Building Council). Addressing emissions from buildings — both existing and new — is therefore essential to reducing overall emissions across the Norfolk Coast.

Existing buildings and developments
Existing homes account for around 18% of annual national CO_2e emissions and are projected to represent 80% of homes in 2050 (Low Energy Transformation Initiative, LETI).

Energy efficiency is measured using Energy Performance Certificates (EPCs), which assess features such as building materials, heating systems, and insulation. Median EPC scores up to the financial year ending 2025 were:

- King's Lynn and West Norfolk: 66
- North Norfolk: 65
- Great Yarmouth: 68

EPC scores range from 1 (least efficient) to 92+ (most efficient). While new dwellings generally score 83–84, existing homes score 62–66, highlighting that a substantial portion of the existing building stock is relatively inefficient and requires upgrading.

Strategies for reducing emissions from existing buildings
The main opportunities for mitigation in existing buildings include retrofitting measures to improve energy and water efficiency. These interventions:

- Reduce operational GHG emissions
- Extend the life of existing buildings, avoiding emissions associated with demolition and new construction
- Support the continued use of buildings while lowering overall carbon impacts

Prioritising maintenance and refurbishment of existing buildings is therefore critical to achieving climate mitigation goals while preserving the character of the local built environment.

A summary of key measures that can be adopted to improve the energy efficiency and water efficiency of existing buildings is presented in the table below.

Building element	Retrofit action
Walls	Add external and/or internal insulation
Roofs	Insulate roof spaces
Floors	Insulate between joists and/or excavate and insulate below floors
Windows and doors	Replace with better insulated, air-tight units
General building envelope	Mitigate any breaks in insulation (thermal bridging) where possible, and implement draught proofing, sealing of chimneys and vents to make air-tight
Heating systems	Adopt fossil fuel-free building systems e.g. ground source heat pumps
Hot water	Increase insulation or replace hot water tanks, insulate all pipe work, install low-flow fittings and consider solar water heating
Renewables	Adopt rooftop solar panels

Table 2: Summary of typical retrofit measures. Adapted from LETI's Climate Emergency Retrofit Guide.

The type and extent of retrofitting should be tailored to the property, taking into account factors such as building type, heritage status and visual appearance.

Helpful guidance for retrofitting both dwellings and non-domestic buildings (including historic properties) includes:

- LETI's Climate Emergency Retrofit Guide
- Passivhaus and EnerPHit Retrofit Guide
- Energy Saving Trust resources on energy efficiency, renewable energy, and heating systems
- Historic England technical advice guides on retrofitting historic buildings
- UK Green Building Council (UKGBC) guidance to support retrofits in commercial buildings

Emissions from new developments

GHG emissions from new developments make a significant contribution to the local carbon footprint. These emissions arise from:

- Construction processes, including the extraction, processing and transport of materials
- Operational energy use, such as heating, hot water, lighting and electrical appliances

The UK Building Regulations set minimum energy performance standards for buildings in England. They primarily address emissions from controlled fixed services (heating, cooling, ventilation, and lighting). However, embodied carbon in materials, transport emissions and operational emissions from appliances are not covered, despite often being substantial.

Reducing GHG emissions in new buildings requires going beyond regulatory minimums. Low-carbon and net-zero developments should aim for:

- Low embodied carbon in construction materials
- Low or zero operational emissions
- Integration with sustainable transport infrastructure, including public transport, safe cycle routes and electric vehicle charging

Key measures for low-carbon new buildings

- Fossil fuel-free heating and hot water: e.g., heat pumps, solar thermal systems, biomass boilers or district heating
- Effective ventilation: e.g., Mechanical Ventilation with Heat Recovery (MVHR) or natural ventilation
- On-site renewable energy: including battery storage to maximise self-generated energy
- Low-carbon and sustainable materials: choosing alternatives to high-carbon materials like steel
- Reuse and circular design: reusing materials from demolished buildings and designing for disassembly to facilitate future reuse

For more detailed guidance, see the UK Green Building Council (UKGBC) guidance on applying circular economy principles to construction projects.

Taking the 'Fabric First' approach

The 'Fabric First' approach prioritises the performance of a building's components and materials — the building fabric — before relying on mechanical or electrical systems. By focusing on insulation, air-tightness, and overall design, this approach can:

- Reduce capital and operational costs
- Improve energy efficiency

- Lower carbon emissions
- Reduce ongoing maintenance costs

All of these benefits contribute to reducing emissions from new developments.

Key 'Fabric First' measures

- High levels of insulation and airtightness to minimise heat loss and reduce heating demand
- Optimising building form: more compact and simple forms have smaller surface areas, leading to lower heat loss. The building's form factor is commonly used as a measure of efficiency (see Figure 2)
- Building orientation: positioning buildings to maximise solar gains, reduce heating demand, and prevent winter overshadowing is essential. Combined with the glazing ratio, orientation is a key factor in energy efficiency (see Figure 3)
- In the UK, north-facing windows generally lead to net heat loss, while south-facing windows can be designed for net heat gain
- South-facing glazing should be optimised to avoid summer overheating

					
Building type	**Bungalow**	**Detached**	**Semi-detached**	**Mid-terrace**	**Mid-floor apartment**
Form factor	3.0	2.5	2.1	1.7	0.8
Efficiency	Least efficient	→			Most efficient

Figure 2: Types of homes and their form factors. Adapted from LETI's Climate Emergency Design Guide, 2021.

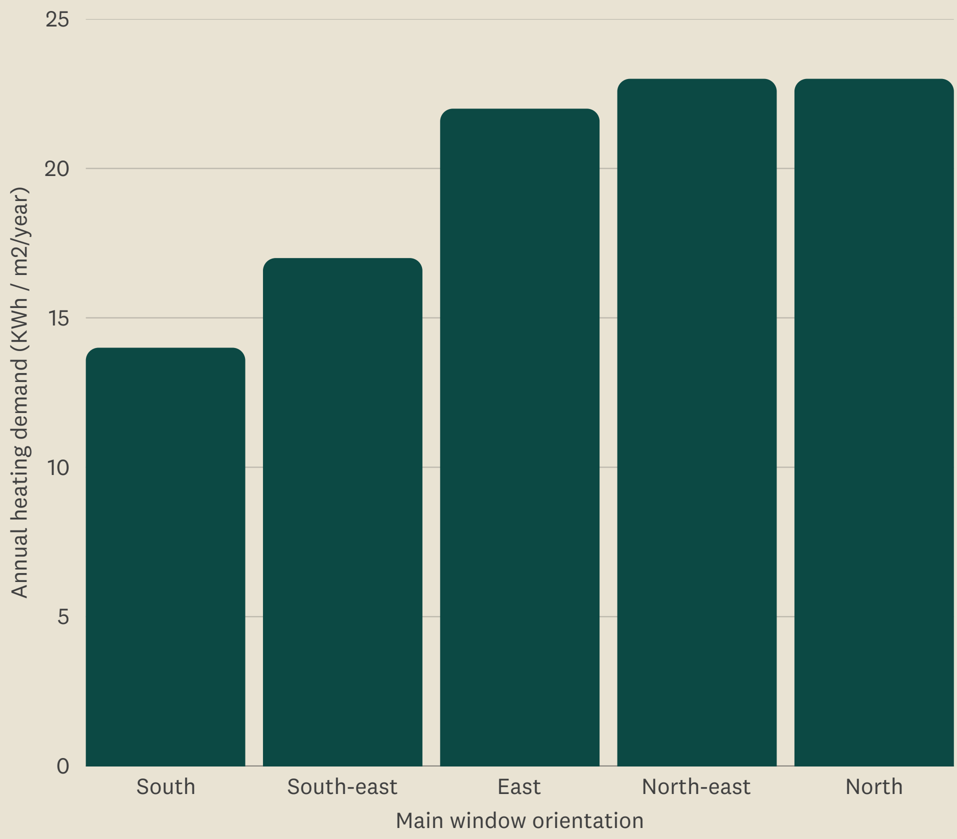

Figure 3: Impact of orientation on heating demand. Adapted from LETI's Climate Emergency Design Guide, 2021.

Useful resources for reducing emissions from new developments include:

- LETI's Climate Emergency Design Guide
- Passivhaus Trust's Passivhaus Easi Guide

Case study: Burnham Overy Staithe, North Norfolk
This terrace of three dwellings has been constructed to the internationally recognised Passivhaus standard. Key features include:

- Compact building form with carefully considered north-facing windows
- High-performing insulation and air-tight construction using wet plaster
- Non-fossil fuel heating systems
- Seamless integration with the local context, reflecting the traditional style of Norfolk cottages

This project demonstrates how low-energy, low-carbon design can be achieved without compromising local character or aesthetics.

Emissions from transport

Transport is the largest contributor to UK domestic GHG emissions, accounting for 28% of all emissions in 2022. In North Norfolk, transport emissions make up approximately 27% of total territorial emissions, compared with 20% in King's Lynn and West Norfolk and 32% in Great Yarmouth (National Atmospheric Emissions Inventory). Reducing transport emissions is therefore a critical part of cutting local GHG emissions.

Strategies for reducing transport-related emissions in new developments

1. Development location and supporting travel infrastructure

New developments should be designed and located to encourage sustainable transport such as walking, cycling, and public transport. Measures may include:

- Well-designed, direct cycling routes with secure cycle parking
- Mixed-use developments that combine shops, healthcare, and other essential services, reducing the need for car travel
- Convenient public transport access to connect residents to key destinations

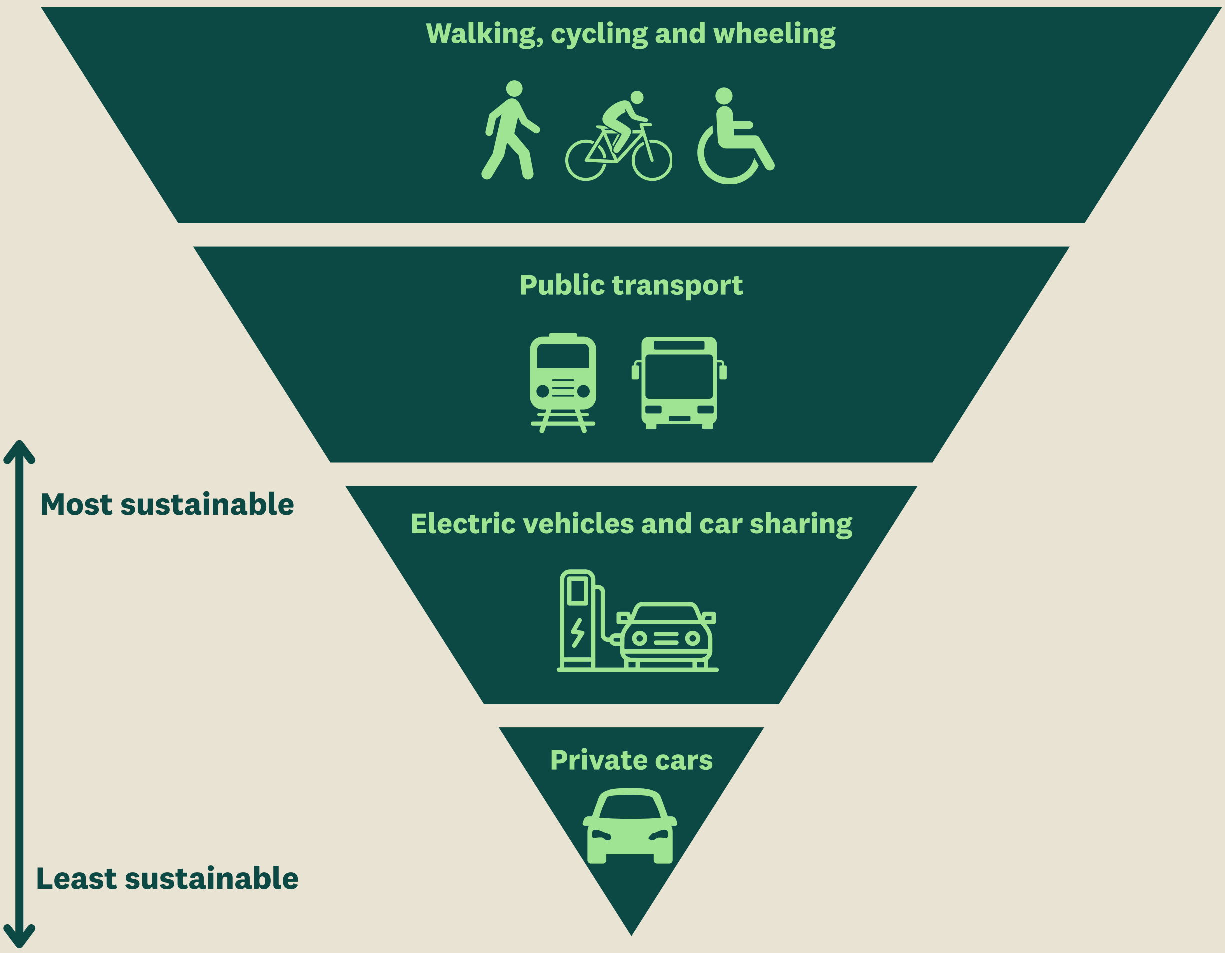

Figure 4: The sustainable transport hierarchy, which ranks the sustainability of travel options from most (top) to least (bottom) sustainable.

2. Electric vehicle infrastructure

Rural areas such as Norfolk rely heavily on private cars. To reduce emissions while meeting residents' travel needs, it is essential to support electric vehicles (EVs). This includes providing EV charging infrastructure both within new developments and at key community locations.

3. Digital connectivity

High-quality broadband and digital connectivity in new developments can help reduce travel-related emissions by enabling:

- Home working, reducing daily commuting
- Access to digital health and other essential services, minimising the need for in-person trips

4. Climate adaptation strategies

Climate adaptation refers to the adjustments required to respond to a changing climate. This includes adapting infrastructure, buildings, water systems and food production to cope with new climate realities.

This section focuses on adaptation actions for water management and reducing the risk of overheating in buildings.

Managing water consumption

England's water system is already under significant pressure. The Anglian Water company area is classified as being under serious water stress (Environment Agency). Future challenges are likely to intensify due to population growth and an increased risk of droughts. Climate adaptation is therefore essential to prepare for more frequent and severe droughts and water scarcity.

Key measures for efficient water use in new buildings

- Water-efficient fixtures: low-flow taps and showers, pressure-reducing valves, and dual-flush toilets reduce water consumption without compromising performance.
- Smart irrigation systems: automated garden watering systems optimise frequency and volume, reducing overall water use.
- Rainwater harvesting: collecting and storing rainwater from rooftops for non-drinking uses, such as gardening or washing vehicles, typically via connected water butts.
- Grey water recycling: treating wastewater from showers, baths, sinks, and washing machines for reuse in non-drinking applications (e.g., toilet flushing). However, this system requires filtration and treatment to remove particles, bacteria and viruses, making it a more complex and costly option.

The water management hierarchy (Figure 5) offers a practical guide to best practice. It prioritises water reduction above all other measures, emphasising efficiency and largely passive approaches, such as installing water-efficient fixtures.

While primarily aimed at new developments, these measures can also be applied to existing buildings, helping to manage water consumption effectively. Efficient water management can also deliver cost savings for residents and building occupants.

For further guidance, the Town and Country Planning Association (TCPA) guide to building climate-resilient communities provides additional context on water efficiency in buildings.

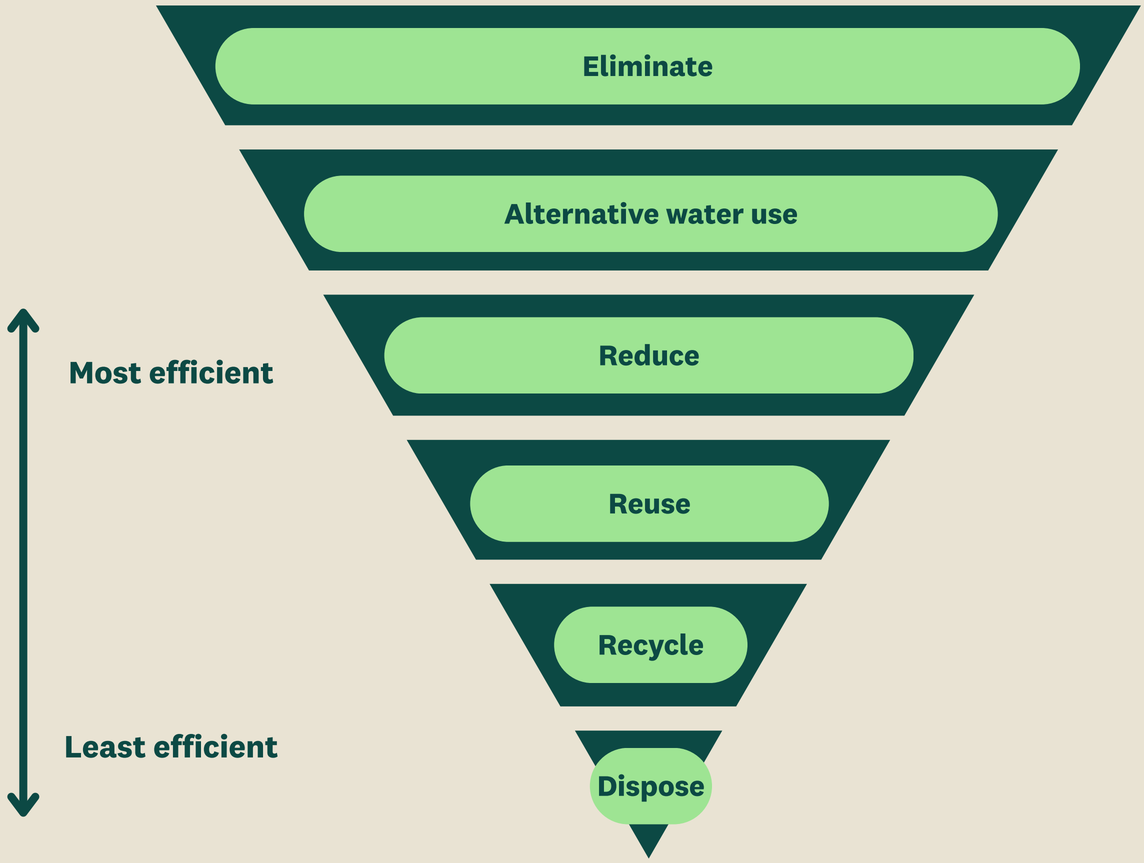

Figure 5: The water management hierarchy, which ranks the efficiency of management measures from most (top) to least (bottom) efficient.

Managing the risk of overheating

Rising summer temperatures and more frequent heatwaves increase the risk of overheating in buildings. Currently, 55% of homes in England overheat even during relatively cool summers (UKGBC). Overheating can affect occupant comfort and health, encourage mould growth and cause material expansion and contraction, leading to cracks or structural damage.

Key measures to reduce overheating

- Reduce solar gains: minimise heat entering buildings through shading, careful window sizing, and strategic building orientation, considering local geography.
- Use trees, vegetation, and soft landscaping: natural shading, thermal insulation, and evapo-transpiration from plants help regulate local temperatures.
- Natural and mechanical ventilation: maximise natural ventilation (e.g., windows or vents) before relying on mechanical systems like air conditioning, which consume energy and produce GHG emissions.
- Adapt building use and occupancy: dynamic management of internal heating loads, considering seasonal climate changes, can help reduce overheating risks.

Further guidance

- Historic England – Technical Guidance for Improving Climate Resilience Through Adaptation
- CIBSE – Preventing Overheating in Homes
- TCPA – Guide to Building Climate-Resilient New Communities

Case study: Carrowbreck Meadow, Greater Norwich

This development of 14 Passivhaus homes has been designed in a contemporary interpretation of the local architectural style. Key features include:

- Optimal positioning and orientation to maximise winter solar gain while minimising summer overheating
- Fresh, filtered air supplied through a heat recovery ventilation system
- Highly efficient building envelope, including thermal bridges and draught-free construction that exceed air-tightness regulations
- Sustainable infrastructure, with electric vehicle charging points, rainwater harvesting butts, and connections for solar power systems

The development delivers comfortable, healthy homes that are affordable to run, helping to eliminate fuel poverty and future-proofing residents against the impacts of climate change.

Find out more

norfolkcoast.org

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