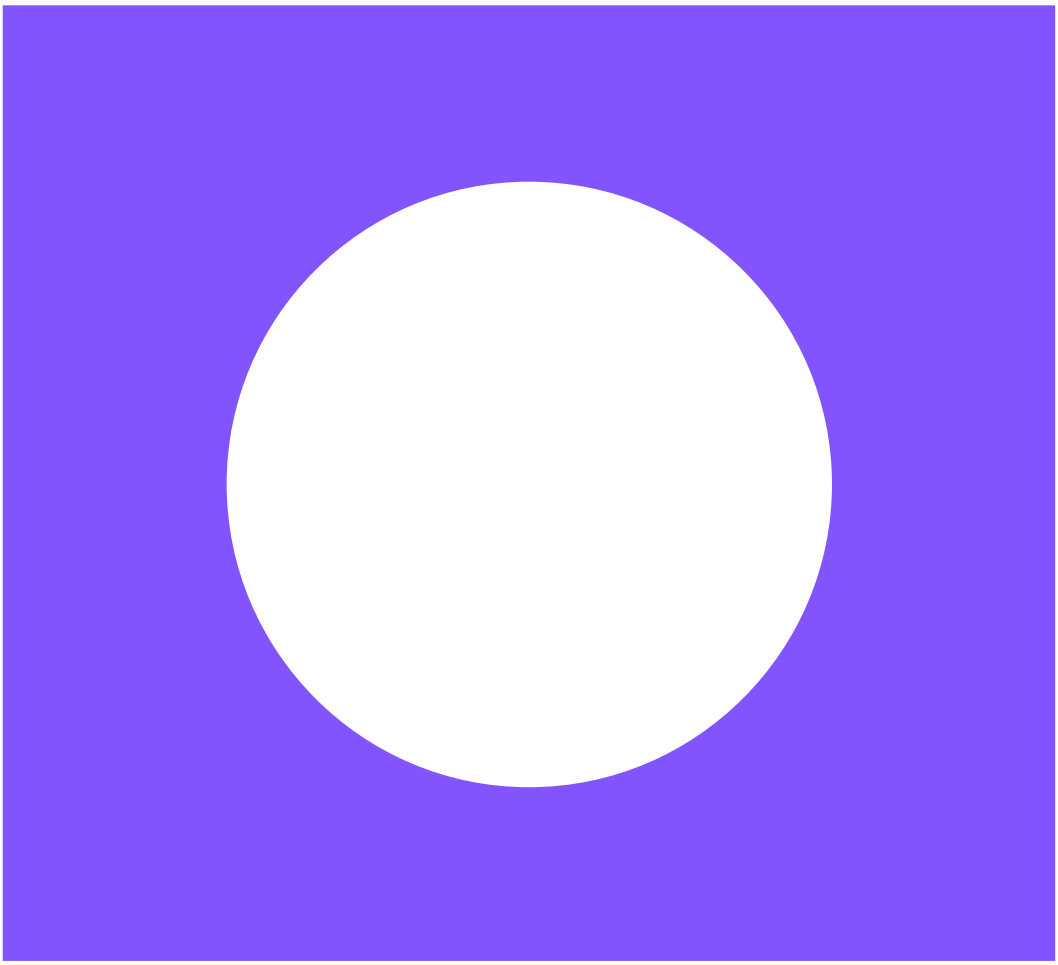
MOTT MACDONALD



Chesterfield, North East Derbyshire, and Bolsover LAEP

EMCCA LAEP 1G - Final

July 2026

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Mott MacDonald
1st Floor
10 George Street
Edinburgh EH2 2PF
United Kingdom

T +44 (0)131 221 2300
mottmac.com

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EMCCA LAEP 1G - Final

July 2026

Mott MacDonald Limited. Registered in England and Wales no. 1243967.
Registered office: 10 Fleet Place, London EC4M 7RB, United Kingdom

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Executive summary

Introduction

The Chesterfield, North East Derbyshire & Bolsover Local Area Energy Plan (LAEP) provides a comprehensive, data-driven roadmap for achieving a just, resilient, and affordable transition to Net Zero. Commissioned by the East Midlands Combined County Authority (EMCCA) and prepared by Mott MacDonald in partnership with IES, the plan integrates technical modelling, spatial analysis, economic appraisal, and stakeholder engagement to identify how Chesterfield, North East Derbyshire & Bolsover can most effectively decarbonise the local energy system while delivering wider social and economic benefits. The LAEP contributes to a joined-up regional approach that aligns local action with national policy objectives and the EMCCA's 2050 net zero ambition.

Purpose and Context

The UK has set a legally binding target to reach net zero greenhouse gas emissions by 2050. The Climate Change Committee's Seventh Carbon Budget (2025) further reinforces the urgency of local delivery by estimating that approximately 82% of the UK's emissions are within the sphere of local authority influence. Chesterfield Borough Council and North East Derbyshire District Council both declared climate emergencies in 2019 and have set targets to achieve carbon neutrality ahead of 2050. Bolsover District Council declared a climate emergency in 2023 and has since established a Carbon Reduction Plan outlining a long-term programme to reduce operational emissions across council buildings, housing, fleet, and services.

The plan responds directly to the local challenges of high fuel poverty in some areas, dependence on fossil gas for heating, grid capacity constraints, and the need for economic regeneration that aligns with environmental sustainability.

Approach and Methodology

The LAEP was developed using the Energy Systems Catapult (ESC) methodology for place-based energy planning. It draws on a combination of:

- Digital Twin Modelling: IES's dynamic 3D model simulating energy demand, generation, and carbon emissions across Chesterfield, North East Derbyshire & Bolsover's building stock at the Middle Super Output Area (MSOA) level.
- Scenario Modelling: Quantitative comparison of three distinct decarbonisation pathways — Counterfactual (Do Nothing), Net Zero by 2050, and Accelerated Net Zero by 2040 — using logistic (S-curve) uptake functions for key technologies.
- Techno-Economic Analysis: Appraisal of capital investment, operating costs, system benefits, and bill savings under each pathway.
- Spatial Prioritisation: GIS-based identification of Focus Zones for targeted interventions where energy, social, and grid considerations converge.
- Stakeholder Collaboration: Engagement with local organisations and stakeholders including Chesterfield, North East Derbyshire & Bolsover Councils, utilities, large industries, housing providers, and community groups.

This approach ensures that the LAEP is evidence-based, spatially specific, and co-created with those who will be instrumental in its delivery.

The UK government is currently undertaking a reorganisation of England's local government with the intention to establish new single-tier unitary councils in areas where two-tier systems exist, such as across Derbyshire. If implemented, this would see "unitary authorities" assume

full legal powers in April 2028. It is acknowledged that this local government reorganisation (LGR) has the potential to impact how and/or who delivers the recommendations outlined in this report. However, the analysis which underpins this LAEP report was intentionally undertaken on an MSOA level such that following a potential local government reorganisation, the data can be re-shaped at the MSOA level to continue to provide an evidence-based decarbonisation pathway for Local Authorities. Whilst the UK LGR may require reallocation of roles and responsibilities to deliver the projects specified in this LAEP report, the restructure is intended to deliver long-term simplification, stronger strategic leadership, and more effective cross-area collaboration, ultimately with the intention to quicker, more efficient delivery of projects.

Scope

The LAEP focuses on the parts of the energy system where a local authority and its partners can exert meaningful influence. This includes homes and non-domestic buildings, personal road transport and charging infrastructure, locally influenced generation such as rooftop solar, and the decarbonisation choices facing local industry that connect into local networks. Nationally controlled systems that are better addressed through central government or national operators, for example strategic rail, aviation and utility-scale electricity generation, sit outside the scope for emissions accounting and intervention planning. Maintaining this focus helps Chesterfield, North East Derbyshire & Bolsover concentrate resources on deliverable local actions.

Pathways to Net Zero

The LAEP models three scenarios, with the preferred scenario for Chesterfield, North East Derbyshire & Bolsover being 2050 Net Zero.

DO NOTHING

Only decarbonisation activities between now and 2050 that are already legislated to happen

2050 NET ZERO

In line with national targets and guidelines including 6th Carbon Budget to 2035 and Distributed Future Energy Scenarios

2040 NET ZERO

Bespoke for D2N2 programme, set by EMCCA. Based on stakeholder preference and suitability of solutions.

Current Energy and Emissions Baseline

In 2023, Chesterfield, North East Derbyshire & Bolsover's total territorial emissions were approximately 2,053 $ktCO_2e$. The area's emissions profile is dominated by three key sectors: transport (33%), industry (27%), and domestic energy use (17%).

Total energy consumption in buildings stood at 2,999 GWh, dominated by space heating (57%), followed by lighting (17%), equipment (13%) and domestic hot water (11%) and natural gas remains the dominant fuel, accounting for the majority of emissions from heating.

Stakeholder Engagement Insights

Stakeholder engagement was central to the plan's development, involving a structured mapping and engagement programme with local authorities, network operators, industry, housing providers, and community groups. Key themes included the importance of fabric-first retrofit and addressing fuel poverty, the need for grid capacity reinforcement and energy flexibility, and alignment around skills development, local supply chains, and co-benefits.

Energy efficiency and Buildings Retrofit

Across Chesterfield, North East Derbyshire & Bolsover, approximately 94,400 domestic buildings require some level of retrofit to achieve the net zero scenarios. Modelling shows around 52,108 homes (40% of the housing stock) require light retrofit, while around 62,896 homes (48%) need deep retrofit.

Light retrofit typically offers shorter payback periods and is well-suited for rapid scaling, particularly in owner-occupied homes. In contrast, deep retrofit is essential for older, solid-wall properties to enable efficient heat pump operation and address fuel poverty hotspots. The recommended approach is to concentrate deep retrofit in a first wave of priority MSOAs where solid wall prevalence, fuel poverty and low energy performance certificate (EPC) ratings coincide.

Low-carbon heat

Heat decarbonisation in existing homes relies primarily on air source heat pumps (ASHPs) installed alongside targeted fabric upgrades and appropriate hot water storage. Of the identified 125,817 suitable properties, early installations should be focussed in areas where electricity network capacity coincides with existing funding eligibility. In parallel, heat network zoning should be pursued in the identified areas and leveraging the central government zoning programme.

Transport Electrification

The modelling shows the number of electric vehicle (EV) cars rising to about 147,000 vehicles by 2050, with a planning assumption of one public charger for roughly 20 EVs and the remainder of charging met by private and workplace provision. Siting of public chargers should begin with public car parks and areas that lack off-street parking, then expand to workplace and destination hubs that can host rapid and ultra-rapid chargers.

Local generation and flexibility

Expanding local renewable energy generation is key to enhancing energy resilience and managing grid load. The analysis identifies significant potential for rooftop solar PV, with the capacity to generate over 284 GWh annually across domestic and non-domestic buildings. When paired with battery storage and Demand Side Response (DSR) measures, this local generation can reduce peak demand, provide flexibility to the grid, and lower consumer bills.

Industrial decarbonisation

The plan prioritises the electrification of low-temperature industrial processes first, while high-temperature processes prepare for a potential transition to low-carbon hydrogen, contingent on the development of a credible supply chain and supporting infrastructure.

Analysis suggests that industrial gas use for process heating can be substantially reduced by 2050, with associated emissions falling by around 91% under the assumed fuel-switch scenarios. To make this achievable, large industrial sites should be encouraged to develop time-phased decarbonisation plans detailing what changes will occur, when they will occur, and what new energy vectors and network capacities will be needed.

Networks, storage and headroom

The plan highlights that several primary substations and MSOAs have limited spare capacity, making timely reinforcement, connection planning, and flexibility critical to keeping electrification on track. There is a strong case for proactive investment in distribution network upgrades, as any net zero-compliant scenario is projected to add approximately 1,135 MW of After Diversity Maximum Demand (ADMD), which would exceed the capacity of the current infrastructure.

Close collaboration with the local distribution network operator (National Grid Electricity Distribution and Northern PowerGrid) will be necessary to appropriately phase the scale roll-out of PV, ASHP and EVs.

Economics and value for money

The additional undiscounted capital expenditure for the 2040 and 2050 scenarios is estimated at £4.9 billion in today's prices. Although the required investment is substantial and the pace of transition will depend on sustained policy and grant support, it is expected to generate benefits through lower energy bills, carbon reduction, improved air quality, and employment stimulation in the local economy.

Prioritisation and focus zones

Spatial mapping identified Focus Zones where targeted interventions deliver maximum benefit. These include areas with high fuel poverty risk, poor EPC ratings, and good grid headroom availability. In addition, the following "Quick Win Projects" are identified:

- Deep retrofit of social housing and public estates.
- Deployment of rooftop solar on public sector buildings and schools.
- Rollout of public EV charging in high-demand residential zones.
- Pilot district heating networks in high heat-density clusters.

Next Steps

To ensure the timely and effective delivery of the LAEP, three actions are recommended:

1. Establish a Chesterfield, North East Derbyshire & Bolsover LAEP Delivery Partnership led by the councils and supported by EMCCA, the Distribution Network Operators, local businesses, and other stakeholders to coordinate the programme and identify funding;
2. Launch a public engagement initiative, with an online 'hub' to build confidence and promote low-carbon technologies and behaviours, prioritising pilot projects that demonstrate best practice;
3. Develop a comprehensive delivery roadmap and investment plan that prioritises short-, medium-, and long-term interventions as outlined in the report

1 Introduction

Mott MacDonald, in partnership with IES, has been appointed by the East Midlands Combined County Authority (EMCCA) and its local authority partners to lead the development of the Local Area Energy Plan (LAEP) for Chesterfield, North East Derbyshire & Bolsover, supporting the area's journey toward achieving net zero carbon emissions. In response to escalating impacts of climate change and the global push towards sustainable energy solutions, the development of a LAEP has been identified as a crucial step in supporting climate ambitions across Derbyshire and Nottinghamshire.

This LAEP forms part of a wider regional local area energy plan commissioned by EMCCA. The East Midlands regional plan comprises of eight local area plans, of which Chesterfield, North East Derbyshire & Bolsover is one. This LAEP has therefore been prepared to be comparable to the other local plans, and to contribute to the wider regional plan. This report presents the outcomes of the Chesterfield, North East Derbyshire & Bolsover LAEP, following a comprehensive process of data acquisition, scenario modelling, stakeholder collaboration, and spatial analysis.

1.1 Purpose of the LAEP

A LAEP is a long-term, evidence-based plan that sets out the most effective and efficient pathway for an area to transition to a low-carbon, smart, and flexible energy system. It provides a strategic framework to coordinate investment in energy infrastructure, shape local policies, and guide decision-making across stakeholders. By aligning spatial, technical, and socio-economic considerations, LAEPs ensure that local authorities, businesses, network operators, and communities can collectively plan for a cost-effective and just transition to Net Zero.

Local authorities have a pivotal role to play in enabling the UK's net zero transition. An estimated 82% of the UK's carbon emissions fall within local authorities' scope of influence[1]. There is a growing need for place-based energy strategies that align national goals with local opportunities, priorities, and constraints.

A LAEP is a bottom-up, data-driven, whole-system approach that integrates technical evidence, stakeholder engagement, and non-technical factors to create an energy system decarbonisation plan tailored to Chesterfield, North East Derbyshire & Bolsover's unique characteristics.

The LAEP considers energy supply and demand, private transport, buildings, local industry, and the environment. It looks at current energy use and future decarbonisation opportunities for electricity, heat, and gas networks, the built environment (industrial, domestic, and commercial), and the potential for hydrogen and other low-carbon fuels. The plan has been developed in collaboration with various stakeholders to support a realistic, data-driven action plan.

The primary goal of Chesterfield, North East Derbyshire & Bolsover's LAEP is to identify the most cost-effective ways to decarbonise the area's energy system, aligning local plans and priorities with broader national policies and strategies. It provides a roadmap for each local authority to achieve net zero emissions at the local level. Additionally, the LAEP is being coordinated alongside other areas within the wider EMCCA region to ensure a consistent and joined-up approach between Derby City, Derbyshire, Nottingham, and Nottinghamshire (D2N2).

[1] HM Government. Net Zero Strategy: Build Back Greener. Department for Business, Energy & Industrial Strategy, October 2021. Available at GOV.UK

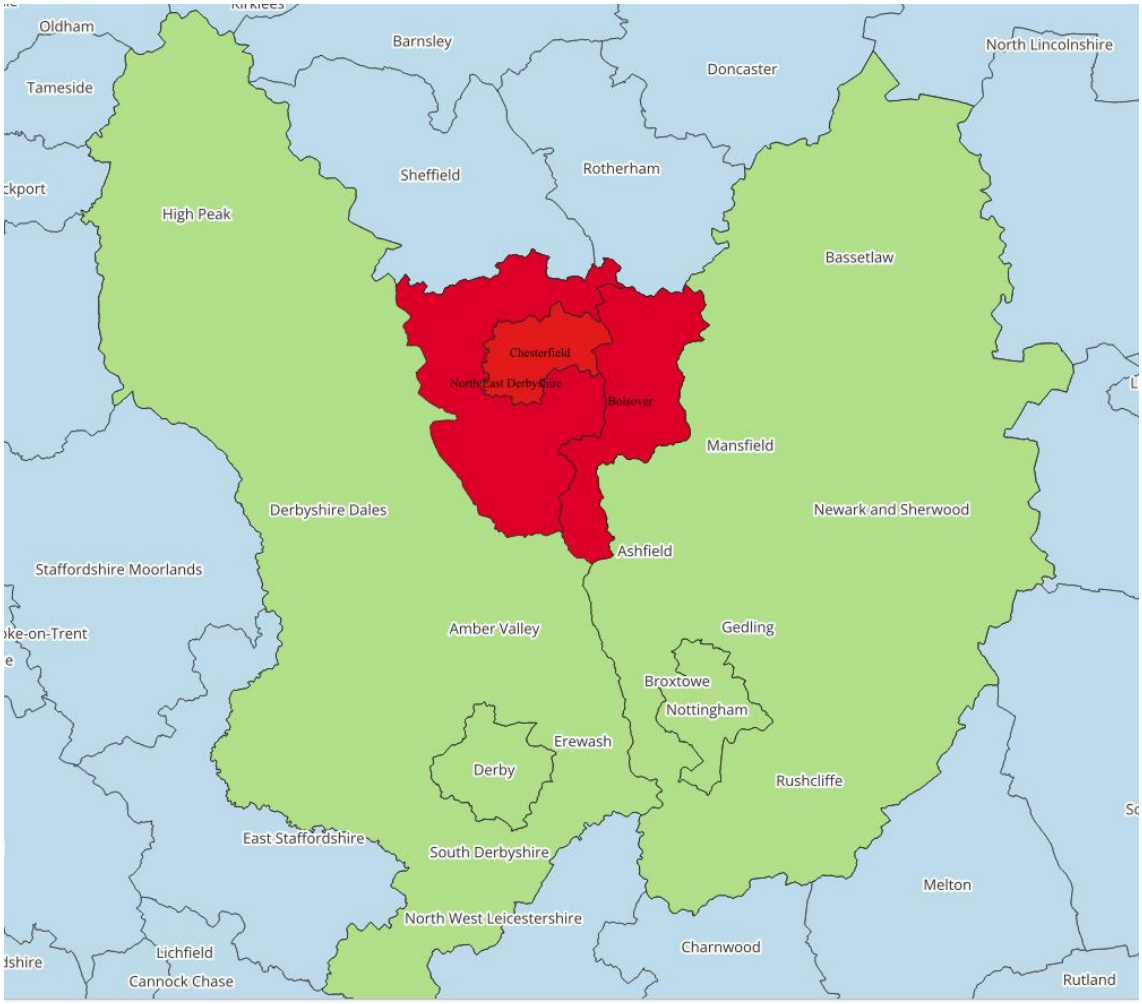
Our standardised approach delivers alignment in outputs, which will significantly increase the ability for projects across areas to scale up through similar enabling mechanisms such as training programmes, funding allocations and aligned priorities.

1.2 Geographical Boundary of the LAEP

The LAEP covers the administrative areas of Chesterfield Borough Council, Bolsover District Council and North East Derbyshire District Council, located within Derbyshire in the East Midlands of England. Together, the three local authorities encompass a diverse mix of urban centres, market towns, former industrial areas and rural communities, with differing patterns of energy demand, building stock, transport use and socioeconomic conditions.

The geographical boundary of the LAEP is illustrated in Figure 1.1.

Figure 1.1: LAEP Geographical Boundaries in relation to the wider D2N2



1.2.1 Chesterfield

Chesterfield is a borough within Derbyshire County in the East Midlands region of England. The borough has a population of around 104,000 people and covers an area of approximately 79 km², making it one of the most urban districts in the county. It is located to the north-east of Derby, sits on the edge of the Peak District, and is strategically positioned between Derby and Sheffield.

Historically, developed as a market and industrial town, with strong roots in coal mining, engineering and manufacturing, Chesterfield is supported by canal and rail connections that enabled the movement of coal and goods. While deep coal mining has ceased, the borough has successfully transitioned towards a diversified economy, with key sectors now including advanced manufacturing, construction, health, professional services, retail and logistics, alongside a growing role as a regional employment and service centre.

1.2.2 Bolsover

Bolsover is a non-metropolitan district in Derbyshire County, with a population of around 83,000 people and an area of approximately 160 km². The district is largely rural in character, containing the market towns of Bolsover, Shirebrook and Clowne, alongside former mining villages and open countryside. It borders Chesterfield to the west and North East Derbyshire to the south, with strong connections into neighbouring Nottinghamshire and South Yorkshire.

The district's historic development was shaped by coal mining and associated heavy industry, which dominated employment through the 19th and 20th centuries. Following industrial decline, Bolsover has undergone economic restructuring, with its economy now characterised by manufacturing, logistics, public services, retail and construction, as well as increasing levels of commuting to nearby employment centres. Regeneration initiatives have focused on improving skills, employment opportunities and town centre vitality.

1.2.3 North East Derbyshire

North East Derbyshire is a predominantly rural district within Derbyshire County, located in the East Midlands, with a population of around 106,000 people and covering approximately 276 km². The district almost encircles the Borough of Chesterfield and includes market towns such as Dronfield and Clay Cross, as well as numerous villages and dispersed rural communities.

Historically influenced by coal mining, quarrying and manufacturing, many parts of North East Derbyshire expanded to serve surrounding industrial areas. While extractive industries have declined, the district maintains a mixed economic profile, with employment now concentrated in manufacturing, construction, logistics, health, education and small businesses, alongside a significant commuter population working in Chesterfield, Sheffield and wider city regions. The district plays an important role in balancing rural communities with access to nearby urban economic centres.

1.3 LAEP Scope

The LAEP considers energy supply and demand, transport, buildings, local industry, and the environment. It examines current energy use and future decarbonisation opportunities for electricity, heat, and gas networks, the built environment (industrial, domestic, and commercial), and the potential for hydrogen and other low-carbon fuels. The plan involves collaboration with various stakeholders to develop a realistic, data-driven action plan.

Table 1.1: LAEP Scope

Energy Source	Description
Buildings	Identifying priority areas for retrofitting of domestic homes and public buildings to improve energy efficiency Identifying priority areas for heat pump installation or other low-carbon heating. Identifying opportunities for the installation of rooftop solar panels and low-carbon, flexible energy technologies, such as batteries, to reduce demand at peak times
Transport	Identifying priority locations for the installation of electric vehicle (EV) charge points based on projected EV use, particularly around dwellings without off-street parking.
Energy Generation	Reflecting local identification of sites for large-scale, low-carbon energy developments such as utility-scale solar, and district heat networks. Providing information for electricity distribution network operators (DNOs) to ensure the electricity network can handle expected extra capacity and grid connections.
Local industry	Understanding energy requirements and decarbonisation options for local industry.

1.4 Emission Boundary

The LAEP is focused on areas where local authorities can exert meaningful influence, including buildings, private transport, local energy generation and industrial emissions within the distribution network footprint.

While the Chesterfield, North East Derbyshire & Bolsover LAEP provides a strategic framework for guiding the area's transition to net zero, it is essential to define the boundaries of its scope. In line with the Energy Systems Catapult LAEP methodology and the practical remit of local authorities, the areas set out in Table 1.2 are considered out of scope for emissions accounting and intervention planning.

Table 1.2: Emissions scope exclusions

Emission Source	Justification
National and Strategic Transport Infrastructure	Emissions from vehicles transiting through Chesterfield, North East Derbyshire & Bolsover on national motorways are excluded as these journeys are not locally generated and fall outside the remit of local transport planning.
Rail electrification	Emissions from diesel-powered rail services and the potential electrification of rail infrastructure are excluded, as these are governed by national transport policy and infrastructure investment decisions.
Aviation	Emissions from domestic and international aviation are excluded, as flight operations and airport infrastructure are governed by national and international regulatory frameworks beyond local authority control.
Large-scale energy generation	Emissions from large-scale distributed generation, where output is exported to the national grid rather than consumed locally, have been excluded from this analysis, as these assets contribute to national energy supply and their associated emissions are already captured within the carbon intensity factors used for electricity consumption. The LAEP focuses on distribution-connected and locally influenced generation, such as rooftop solar and community-scale renewables.
Land use change and peatland emissions	Although significant in the regional carbon balance, emissions from land use change and peatland degradation are excluded. These are typically addressed through broader land management and agricultural strategies.

Agricultural emissions	Emissions from agricultural activities, including methane and nitrous oxide from livestock and fertiliser use, are excluded due to limited local authority control and the need for sector-specific national strategies.
Embodied emissions from construction	Embodied emissions (sometimes referred to as capital carbon) includes the emissions emitted in fabricating goods (construction or consumer goods), transporting them to their point of use, and in the case of construction the emissions emitted during construction. These emissions, and any interventions to reduce them, are excluded from the LAEP.

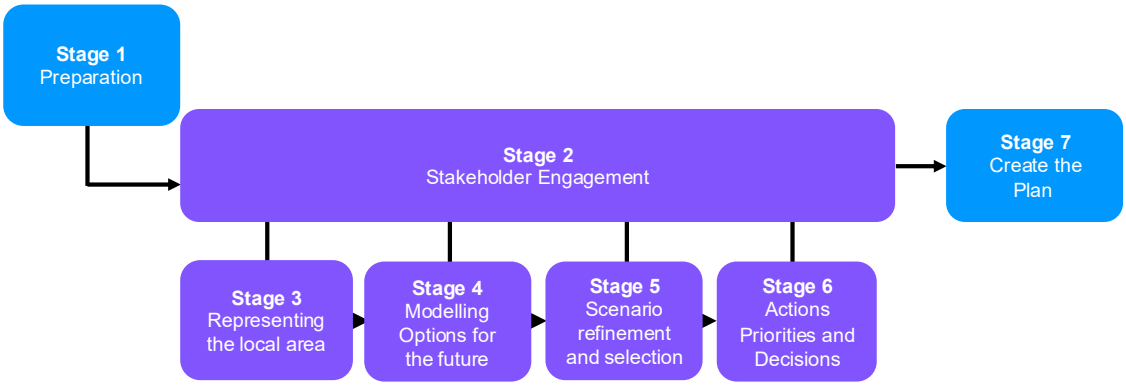
Note: other exclusions may exist, which will be presented in the technology intervention areas, and associated appendices.

These exclusions reflect the standard practice in LAEP development, which typically omits non-energy sources of greenhouse gas emissions and aspects of the energy system expected to be overseen by central government. This approach supports targeted, actionable planning while maintaining alignment with national decarbonisation strategies.

1.5 LAEP Structure

This plan is structured into themed chapters that enable stakeholders to quickly locate and engage with the information most relevant to their interests and responsibilities. It is designed to be both comprehensive and accessible, supporting a wide range of users in understanding and applying the evidence-based roadmap for Chesterfield, North East Derbyshire & Bolsover's targets to reach net zero. This LAEP models net zero by 2040 and 2050 scenarios in order to align with the broader D2N2 regional LAEP, but the preferred scenario drawn out in this report is to achieve Net Zero by 2050 across all three local authorities.

Figure 1.2: Summary approach of the LAEP, structured by Energy Systems Catapult guidance



2 Policy Context

This section presents an overview of key national, regional and local policies influencing Chesterfield, North East Derbyshire & Bolsover's emissions levels and resulting net zero progress. This has enabled a context-driven approach, as far as possible, for quantification of positive and negative influences on future pathways to net zero specific to Chesterfield, North East Derbyshire & Bolsover.

2.1 National Policies

2.1.1 Overview of National Climate Targets and Strategic Direction

The UK's climate policy is anchored in the UK Climate Change Act 2008[2], as amended in 2019 to set a legally binding target of net zero greenhouse gas emissions by 2050. Interim targets include a 68% reduction by 2030 and 78% by 2035, compared to 1990 levels. These targets are territorial, excluding emissions embedded in imports. The Net Zero Strategy: Build Back Greener outlines sector-wide decarbonisation, with a key emphasis on clean electricity by 2035 and recognition that 82% of emissions fall within local authority influence, making LAEPs a critical delivery mechanism.

In 2024, the Climate Change Committee (CCC) updated its recommendations to accelerate progress toward the 2030 target[3]. These include tripling offshore wind, doubling onshore wind, and increasing solar capacity fivefold. The CCC also called for 10% of UK homes to be heated by heat pumps and for nearly all new cars sold to be electric by 2030. These recommendations are reinforced by the Seventh Carbon Budget (2025), which proposes a cap of 535 $MtCO_2e$ for 2038–2042 and an 87% emissions reduction by 2040. Sector-specific targets include an 86% reduction in surface transport emissions and major contributions from electrification and land use change.

2.1.2 Energy Infrastructure, Market Reform and Planning Policies

The UK Government has introduced several legislative and strategic reforms to modernise energy infrastructure and accelerate clean power deployment. The Great British Energy Act (2025)[4], establishes Great British Energy (GBE), a publicly owned company tasked with investing in and operating low-carbon energy infrastructure. Backed by £8.3 billion in public capital, GBE will co-invest with the private sector, support community energy schemes, and help deliver the government's target of a fully clean electricity system by 2030.

The proposed Energy Independence Act aims to phase out new oil and gas exploration licences, improve home energy efficiency, and expand support for insulation and low-carbon heating. Ofgem has approved a £24 billion investment programme to upgrade electricity and gas networks, expand grid capacity to connect 126 GW of clean power by 2030, and deploy flexible technologies such as storage and smart grids. The Clean Power Action Plan (2024) sets regional caps for solar and battery storage to 2030, including 2.1 GW of transmission-connected solar PV and 500 MW of battery storage in Central England, guiding local connection priorities.

[2] The Climate Change Act 2008 (2050 Target Amendment) Order 2019

[3] Progress in reducing emissions 2024 Report to Parliament - Climate Change Committee

[4] Great British Energy Bill 2024-25

To support delivery, the Planning and Infrastructure Act (2025)[5] proposes reforms to streamline consenting for critical infrastructure, introduce strategic nature recovery mechanisms, and enable cross-boundary spatial planning. Ofgem's Connections Reform replaces the "first come, first served" grid queue with a strategic prioritisation process, favouring projects with planning progress and alignment to national decarbonisation pathways. This may affect the sequencing and viability of local solar and storage projects.

Furthermore, Great British Energy's Local Power Plan[6], announced in February 2026, sets out a vision for transforming the UK's local and community energy sector so that, by 2030, every community has the opportunity to benefit from and own a local energy project. Through up to £1bn investment in a combination of grants, loans, advice, expert help and more, this plan will support more than 1,000 projects, increase shared ownership, and catalyse the development of scalable, self-sustaining business models for community energy organisations. GBE already have a formalised agreement with the East Midlands Combined County Authority to support the region to access the benefits of local and community energy.

2.1.3 Buildings, Heat and Local Delivery Mechanisms Policies

Buildings account for around 25% of UK emissions, making them a key focus of decarbonisation efforts. The Heat and Buildings Strategy (2021)[7], sets out plans to phase out new gas boilers by 2035, scale heat pump installations to 600,000 per year by 2028, and ensure all new buildings are net zero-ready. The Future Homes and Buildings Standard (FHBS, 2025)[8] will require all new homes and non-domestic buildings to be built to high energy efficiency standards, with low-carbon heating systems and improved ventilation, from 2027 onwards. Homes built under the new standard are expected to produce 75–80% fewer emissions than those built under current regulations.

The Warm Homes Plan (2025)[9] complements these efforts by targeting fuel poverty, aiming to lift over one million households out of fuel poverty by 2030 while accelerating the shift to clean, homegrown energy. Together, these policies provide a robust framework for local authorities to deliver decarbonisation through LAEPs, with clear national targets, funding mechanisms, infrastructure upgrades, and building standards to support local action.

2.1.4 Transport and Industrial Strategy Policies

The upcoming Integrated National Transport Strategy (INTS, 2024)[10], is developing a unified vision for England's transport system, aiming to improve integration across modes, support decarbonisation, and enhance accessibility. It promotes the use of data and technology to improve journey planning and system efficiency and will guide transport policy and investment decisions over the next decade.

Until the INTS is released, the pre-existing UK Transport Decarbonisation Plan (2021)[11] outlines measures to achieve net zero transport emissions by 2050. Key actions include ending the sale of new petrol and diesel cars by 2030, requiring all new cars and vans to be zero-emission by 2035, and investing in public transport, walking, cycling, and sustainable aviation and maritime fuels. Supporting infrastructure includes EV charging points and hydrogen

[5] Guide to the Planning and Infrastructure Bill - GOV.UK

[6] Local Power Plan | Great British Energy

[7] Heat and buildings strategy

[8] Future Homes and Buildings Standard

[9] Warm Homes Plan

[10] Integrated National Transport Strategy for England

[11] Transport decarbonisation plan

refuelling stations. Recent updates include the Zero Emission Vehicle mandate and Sustainable Aviation Fuel mandate from 2025.

The UK's Modern Industrial Strategy (2025)[12] provides long-term policy certainty for high-growth sectors, including clean energy industries. It supports investment in regional clusters, supply chain development, and skills for the energy transition. The Clean Energy Industries Sector Plan, part of the strategy, is particularly relevant to LAEPs, focusing on enabling local delivery of low-carbon infrastructure and workforce development.

2.2 Regional Policies

2.2.1 East Midlands Combined County Authority Ambition for Greener Environment

The East Midlands Combined County Authority (EMCCA) has set ambitious goals to create a greener, more sustainable environment. In alignment with national targets, EMCCA aims to be carbon neutral by 2050. To realise this ambition, some opportunities have been identified which include building new low-carbon homes, retrofitting existing homes in line with the 2025 EMCCA Retrofit Strategy, promoting renewable energy, protecting and enhancing green spaces, exploring the establishment of heat network zoning to decarbonise heating and hot water, and potentially increasing the region's electricity network capacity.

2.2.2 D2N2 LEP Energy Strategy 2019-2030

The D2N2 Local Enterprise Partnership (covering Derby, Derbyshire, Nottingham, and Nottinghamshire) set out a regional energy strategy[13] for 2019-2030 to support economic growth while reducing carbon emissions. It targets a 60% reduction in emissions from 1990 levels by 2030, with ambitions for 100% low-carbon energy supply, of which 60% should come from renewables. The strategy also promotes smart transport, aiming for 70% of vehicle miles to be ultra-low emissions by 2030, and supports community energy generation with a goal of 15 MW installed capacity. It encourages upgrading buildings to EPC C or above, expanding electricity storage by 180 MW, and investing in energy efficiency to reduce regional energy bills by over £1 billion annually.

2.2.3 Derbyshire Spatial Energy Study

This spatial energy study[14] covers all of Derbyshire to provide an understanding of the current situation and future of Derbyshire's energy system. Derbyshire consumes 4,547 GWh of electricity and 10,046 GWh of heat energy annually. The electricity demand is primarily met by the national electricity grid, while heat demand is mostly supplied by the national gas grid, with 6% of properties being off-gas-grid. Most of the energy consumed in Derbyshire is sourced from outside the region, with local generation in 2021 totalling approximately 404 GWh, mainly from renewable sources such as solar PV (~50%), onshore wind (~15%), and energy from waste (~15%). Future energy scenarios predict an increase in energy demand due to a 9% rise in population and an 11% increase in housing between 2022 and 2040, along with associated commercial and industrial development. The study identifies key areas of focus for the short term, including demand reduction through energy efficiency improvements and the decarbonisation of heat demand.

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[12] The UK's Modern Industrial Strategy 2025 - GOV.UK

[13] Energy Strategy 2019-2030

[14] Derbyshire Spatial Energy Study https://www.derbyshire.gov.uk/site-elements/documents/pdf/environment/planning/derbyshire-spatial-energy-study.pdf

2.2.4 Low Emission Vehicle Infrastructure (LEVI) Strategy

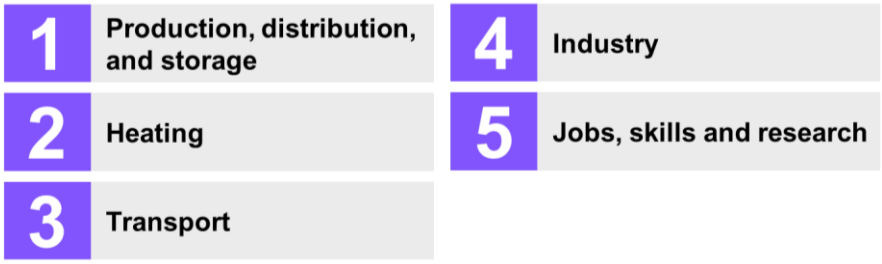
The Derbyshire LEVI Strategy sets out a clear vision for transitioning to low emission vehicles by developing comprehensive, accessible, and future-ready charging infrastructure across the county. It supports Derbyshire's broader climate goals by aiming to reduce transport-related emissions and improve air quality. The strategy focuses on equitable access, ensuring that both urban and rural communities, especially those without off-street parking—can benefit from the shift to electric vehicles. It also emphasises collaboration with local authorities and private partners to deliver infrastructure that meets current and future demand.

2.2.5 East Midlands Local Retrofit Strategy

The East Midlands Local Retrofit Strategy (2025–2028)[15] sets out a coordinated regional plan to accelerate domestic energy-efficiency upgrades and low-carbon home improvements. Improving the energy efficiency of homes, reducing fuel poverty, and cutting carbon emissions by accelerating high quality retrofit delivery across the region. Developed with contributions from more than fifty organisations, it promotes a whole system model that brings together communities, skills, supply chains, finance, and governance to create warmer and healthier homes while supporting local jobs and economic growth. The strategy positions retrofit as both a climate priority and a significant social and economic opportunity for the East Midlands.

2.2.6 Hydrogen Road Map

In 2021, Derby City Council released the Regional Hydrogen Roadmap[16] outlining the city's ambition to become the UK's leading hub for future fuel technologies. The roadmap highlighted five key areas for hydrogen investment in the D2N2 region:



The roadmap projects that by 2050 the wider D2N2 region could consume 8.5 TWh of hydrogen, primarily in industry and transportation. By 2030, local demand is expected to surpass local production capacity. Additionally, the report sets out that the region has at least 16 sites with significant potential for hydrogen production and/or end-use.

2.2.7 EMCCA Corporate Plan 2025-26

With EMCCA in its early years of operation, significant long-term policy is still in development. However, EMCCA have produced a Corporate Plan for 2025-26, which sets out several commitments on the net zero transition and climate resilience. These include developing a strategic vision and investment plan for clean energy across the EMCCA region, supporting investment in green industry, energy efficiency and low-carbon energy generation, leveraging the region's leading position in fusion, advanced nuclear and hydrogen industries, and establishing a nature and biodiversity taskforce.

[15] East-Midlands-Local-Retrofit-Strategy-summary.pdf

[16] Establishing a Regional Hydrogen Roadmap in Derby and the Wider Region (2021)

2.3 Local Policies

2.3.1 Chesterfield Borough Council Climate Change Strategy 2023–2030

Chesterfield Borough Council's Climate Change Strategy 2023–2030[17] sets out a clear commitment to achieving net zero carbon council operations by 2030 and to supporting the wider borough's transition to net zero by 2050, building on the council's climate emergency declaration and the significant emissions reductions already achieved since 2019. The strategy prioritises action in key areas where the council has the greatest influence, most notably buildings and energy use, alongside travel, land use, green space, and engagement, and establishes a strong policy framework for local decarbonisation.

2.3.2 North East Derbyshire District Council Climate Change Action Plan 2024–2030

North East Derbyshire District Council's Climate Change Action Plan 2024–2030[18] sets out a detailed programme of actions to deliver the council's longer-term climate objectives following the declaration of a climate emergency in 2019. The Action Plan focuses on reducing the council's own emissions by 80 percent from a 2014 baseline by 2030 and supporting a transition to net zero across the district by 2050, with structured actions across ten thematic areas including operational practices, sustainable buildings, low-carbon transport, renewable energy, planning, housing, and community collaboration.

2.3.3 Bolsover District Council's Carbon Reduction Plan 2019–2030

Bolsover District Council's Carbon Reduction Plan 2019–2030[19] sets out a long-term, council-led programme to reduce operational carbon emissions while balancing economic growth, service delivery, and community wellbeing. The plan establishes a clear commitment to sustained emissions reduction through an annual improvement approach, underpinned by eight thematic areas covering sustainable buildings and workplaces, renewable energy, low-carbon fleet, transport, planning, community collaboration, biodiversity, and procurement. Its primary focus is on reducing emissions from council buildings, housing stock, fleet operations, and energy use, supported by detailed, action-level measures, performance targets, and strong internal governance arrangements.

[17] Climate Change Strategy 2023 to 2030

[18] Climate Change Action Plan 2024 to 2030 - updated July 2024

[19] Bolsover Climate Reduction Plan 2019-2023

3 Current Emissions and Energy Use

This section presents an overview of the current greenhouse gas emissions and energy system in Chesterfield, North East Derbyshire & Bolsover. This is intended to establish the starting point for the change required to achieve net zero.

3.1 The energy baseline definition

The LAEP energy baseline for Chesterfield, Bolsover and North East Derbyshire is a simulation of energy supply and demand across all buildings within each council's boundaries for the year 2022. It includes both domestic and non-domestic buildings, although confidence in the input data for non-domestic buildings is lower, and emissions from industrial activities beyond gas consumption are not available at this stage.

The baseline covers 48,842, 49,131 and 38,549 buildings for Chesterfield, North East Derbyshire & Bolsover respectively, each with a rich set of attributes. Simulated energy consumption and associated carbon emissions are available at annual and monthly granularity, and can be broken down by heating, domestic hot water (DHW), and electrical loads (including lighting, auxiliary loads and equipment). These results can be aggregated at Middle Super Output Area (MSOA) and local authority levels and are accessible via the IES 3D digital map, which visualises all buildings and energy assets across the district councils.

3.2 Creation of the energy baseline

Each local authority's baseline was developed using IES' Digital Twin software, which integrates geographic information system (GIS) and building data to simulate energy use and carbon emissions across the building stock. The key datasets utilised are set out below.

- **The Ordnance Survey National Geographic Database** (OS NGD) Buildings dataset was used to generate 2D building geometries.
- **Energy Saving Trust's Home Analytics** datasets for domestic and non-domestic buildings provided information on building characteristics such as fabric, heating systems, and fuel types.

These datasets include energy performance certificate (EPC) data and predictive modelling for homes without EPCs. For non-domestic buildings, data availability is more limited, restricting the scope of analysis for interventions such as fabric improvements. Where data gaps exist, assumptions are made to enable all buildings to be included in the analysis. A list of attributes available from Energy Savings Trust data for domestic and non-domestic buildings is included in Annex **0**.

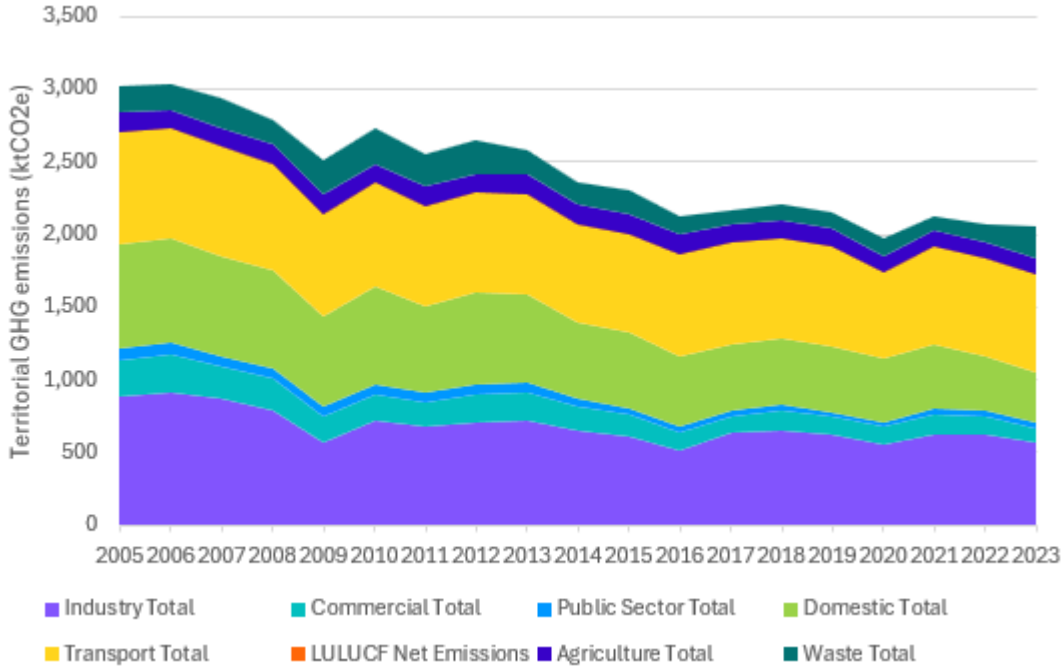
A baseline energy profile is created using IES' technology, resulting in a dynamic 3D digital map of the area, as well as industrial process load data from Gas Distribution Network (GND). The modelling is organised by MSOAs, with each MSOA containing around 5,000 buildings. These zones represent the smallest geographical units with sufficient government energy data (electricity and gas) for comparison, and each has its own masterplan-scale energy model.

3.3 Current Emissions and Energy Use

The total amount of emissions attributed to Chesterfield, North East Derbyshire & Bolsover is 2,053 ktCO2e, based on UK Government data for 2023[20]. Figure 3.1 illustrates the historical emissions of Chesterfield, North East Derbyshire & Bolsover from 2005 to 2023 split by sector. Over this period, the area has experienced a gradual reduction in carbon emissions across industry, transport, domestic and commercial properties, and waste. This reduction in emissions is largely driven by the decarbonisation of the national electricity grid.

Transport remains the largest emissions contributor, accounting for 33% of total emissions, followed by the industry (27%), domestic buildings (17%), and waste (10%). There are negative emissions associated with Land Use, Land-Use Change and Forestry (LULUCF), predominantly in North East Derbyshire, however this is equivalent to less than 1% of total emissions so has minimal impact. The LAEP scope includes emissions from industry, commerce, public, domestic and transport sectors, targeting 85% of Chesterfield, North East Derbyshire & Bolsover's total carbon emissions. This targeted scope ensures that the LAEP addresses the most significant sources of local emissions and supports the development of effective, place-based decarbonisation strategies.

Figure 3.1: Chesterfield, North East Derbyshire & Bolsover Historic Emissions (ktCO2e)



Source: https://www.gov.uk/government/statistics/uk-local-authority-and-regional-greenhouse-gas-emissions-statistics-2005-to-2023

[20] https://www.gov.uk/government/statistics/uk-local-authority-and-regional-greenhouse-gas-emissions-statistics-2005-to-2023

3.4 Energy use breakdown for domestic and non-domestic buildings

Figure 3.2: Chesterfield, North East Derbyshire & Bolsover 2023 Carbon Emissions Breakdown by Sector

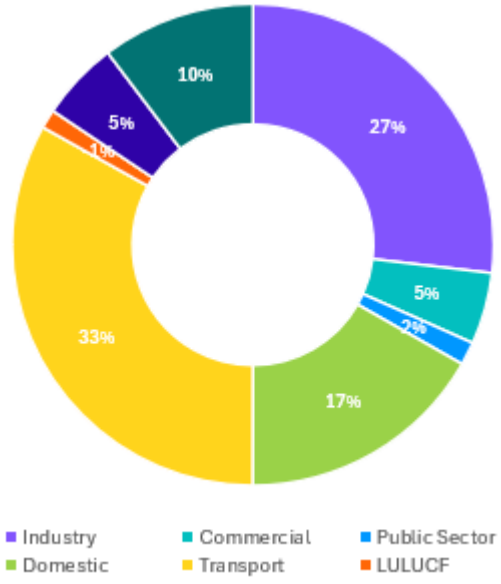
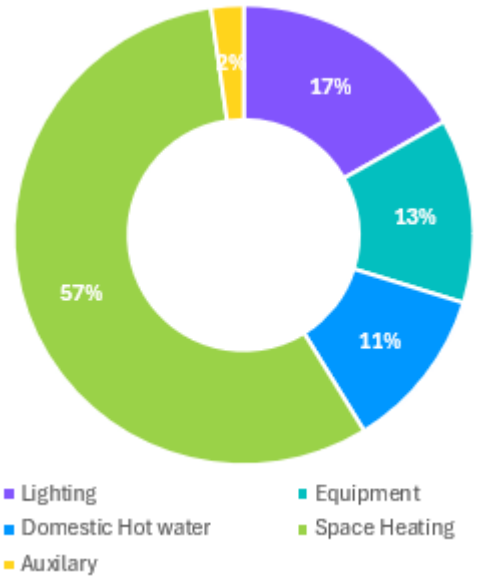


Figure 3.3: Chesterfield, North East Derbyshire & Bolsover Building Energy Use Breakdown (GWh)



Source: https://www.gov.uk/government/statistics/uk-local-authority-and-regional-greenhouse-gas-emissions-statistics-2005-to-2023

Total building energy demand in Chesterfield, North East Derbyshire & Bolsover totalled 2186 GWh in 2023, with approximately even energy demand in each local authority. Space heating was the dominant energy use at 57%, followed by lighting (17%), equipment (13%), domestic hot water (11%) and then auxiliary systems (2%). The split between end uses is very similar in both local authorities. These figures highlight the significant role of heating and equipment in overall energy consumption, pointing to key opportunities for targeted efficiency and decarbonisation interventions.

3.5 Energy Baseline Validation

To assess the accuracy of the digital twin modelling outputs, simulated electricity and gas consumption results were validated against UK Government metered energy consumption data. As the government dataset includes only electricity and natural gas, fuels such as oil, LPG and biomass were excluded from the simulation results to enable a like-for-like comparison.

This limitation means that results may be less representative in rural areas where off-gas-grid fuels are more prevalent. However, this effect is not expected to be material for Chesterfield, Bolsover and North East Derbyshire. Below are the energy simulation results for electricity and gas consumption compared to government data at MSOA level for Chesterfield, North East Derbyshire & Bolsover's domestic buildings.

Table 3.1: Validation for Chesterfield, North East Derbyshire & Bolsover

	Simulated Energy (GWh)	Govt, Meter Energy (GWh)	% Difference
Chesterfield	**670**	**648**	**3%**
North East Derbyshire	**696**	**674**	**3%**
Bolsover	**495**	**501**	**-1%**
Total	**1,861**	**1,823**	**2%**

For both domestic and non-domestic buildings, a floor area correction was applied. This adjustment accounts for the simulation software's assumption that the entire building footprint is thermally conditioned, including spaces such as cupboards, internal voids, and wall thickness. Where high-confidence conditioned floor area values were available from the Energy Saving Trust, these were compared to modelled areas to derive scaling factors used across the building stock.

To enable a like-for-like comparison, oil, LPG, and biomass consumption were removed from the simulation results, aligning with the scope of the government dataset. Given the limitations of the available data, the results are considered acceptable. A tolerance range of ±20% was set, and all MSOA results fall within this range.

4 Stakeholder Engagement Approach

Stakeholder engagement has been the foundation for the overall progress of the project, with frequent interaction with stakeholders undertaken at every stage. A diverse set of stakeholders have been engaged, from commercial and community backgrounds, which enabled efficient review and feedback at different points of the project.

4.1 Engagement Objectives

Stakeholder engagement provided the project team with feedback which informed the preferred pathway chosen for this LAEP. Stakeholders assisted in developing a sequenced plan of proposed actions for achieving Chesterfield, North East Derbyshire & Bolsover's net zero goals.

The original stakeholder engagement aims tied into the wider LAEP programme are:

- Identify the critical stakeholders needed to deliver the priority projects.
- Increase stakeholders' understanding of energy systems and the LAEP process.
- Develop stakeholder trust and buy-in to the proposals of the LAEP.
- Encourage a wide range of views and insights to refine the LAEP, identifying opportunities and constraints that will improve the deliverability.
- Increase stakeholders' understanding and the LAEP process and how it feeds into the Net Zero goals of Chesterfield, North East Derbyshire & Bolsover District Councils.
- Establish a sound foundation for effective and sustained local action to reduce carbon emissions in line with the councils' Net Zero goals.

4.2 Stakeholder Mapping

A desk-based stakeholder mapping exercise was undertaken, to produce a register of names and contact details for each area. These included Group 1, Primary and Secondary stakeholders. This created the stakeholder register, with contact details and a tracker for all touchpoint contacts held in a secure SharePoint site. Further stakeholders were added to the register as relevant throughout the course of the project.

4.3 Stakeholder Management

The interest and position of stakeholders relevant to the project was considered throughout and informed the appropriate methods of communication with each stakeholder group, whether through group stakeholder engagement sessions or organising 1:1 calls or discussions where appropriate. The grouping of stakeholders into the following categories ensured that each stakeholder group received tailored engagement and information regarding the scheme and its proposals. Definitions of each of the stakeholder groups is provided below.

Table 4.1: Stakeholder Prioritisation

Category	Influence	Interest	Ranking
Steering Group	High	High	High
Primary Stakeholders	High	Medium	High
Secondary Stakeholder	Medium	Medium	Medium

Steering Group (SG)

A small group of individuals who represent the local authorities, working closely with the project team to advise on engagement, decision making and assist with further stakeholder mapping, along with EMCCA, Mott MacDonald and IES.

Group 1 Stakeholders (PS)

These stakeholders were categorised due to their influence over all LAEP's included in the D2N2 programme, primarily network operations and the universities. These stakeholders were engaged separately at programme level. Meetings consisted of one-to-one sessions which were held with the Gas Distribution Network, Northen Powergrid and National Grid Electricity Distribution on what data could feed into the digital twin, and energy modelling analysis

Group 2: Primary Stakeholders (PS)

Primary stakeholders were directly involved in the LAEP process and had significant influence over its outcomes. They provided local insights, priorities, and data inputs, shaping the content and direction of the LAEP, including modelled scenarios and optimised pathways. These stakeholders included key primarily network operations, the universities council representatives, and relevant community groups.

Group 2: Secondary Stakeholders (SS)

Secondary stakeholders were not directly involved in the LAEP's core activities. They provided local insights, priorities, and data inputs. These stakeholders included large industry and/or commercial organisations such as the NHS, utility providers, and residents' groups.

Primary and secondary stakeholders were invited to workshops at key stages of the development process. Insights gathered at stakeholder meetings were fed to the project team and IES to influence the modelling. Table 4.2 summarises the stakeholders engaged throughout the LAEP development process.

Table 4.2: Summary Stakeholder Register

Stakeholder Category	Organisations Engaged
Steering Group	Chesterfield, North East Derbyshire & Bolsover District Councils, D2N2/EMCCA representatives, Mott MacDonald, IES
Primary Stakeholders	National Grid, Northern PowerGrid, Cadent Gas, Local NHS boards, Derbyshire County Councils
Primary and Secondary Stakeholders	• Employees from other teams within Chesterfield, North East Derbyshire & Bolsover councils • Local residents and resident groups • Local government organisations • Large industry commercial organisations • Community energy organisations • Net-zero hub/local enterprise partnership (LEP) • Social housing providers and local council housing teams • Local organisations with energy/decarbonisation expertise • Utility Providers (Severn Trent) • Local planners and developers • Public sector estates organisation

4.4 Stakeholder Engagements

The engagement process was designed to be iterative and two-way. Insights gathered during stakeholder meetings were fed back into the project team, and any resulting changes or refinements to the LAEP were communicated transparently to contributors. This feedback loop fostered trust, built consensus, and encouraged stakeholders to become advocates for the plan.

The Steering Group met fortnightly throughout the project, to steer the day-to-day work of the delivery team and shape other stakeholder engagements.

Group 1 stakeholder engagement consisted of one-to-one sessions which were held with Cadent Gas, National Grid and UK Power Network on what data is available that could feed into the digital twin, and energy modelling analysis.

Group 2 stakeholders were invited to workshops and stakeholder engagement sessions, taking place aligned with the relevant LAEP Stage. Group 2 stakeholders were further categorised into priority and non-priority groups as identified by the steering group, in order to target their engagement in all future sessions and workshops, to streamline the outputs received and appropriately manage our time spent with the most relevant Group 2 stakeholders.

Insights gathered at stakeholder meetings were shared and discussed amongst the wider EMCCA LAEP delivery team and agreed inputs were reflected into the energy modelling or intervention modelling, with changes then made as a result.

This commits Mott MacDonald and IES to meaningful, genuine stakeholder engagement, ensuring our stakeholders are heard and will likely continue to be engaged beyond the publication of this LAEP. Additional engagement was sought from using MS forms to expand on discussions taking place during the stakeholder engagement sessions and allowed participants to re-summarise their points in writing, or the opportunity to offer more detailed and written answers to specific topics discussed such as intervention proposals and scenarios.

Table 4.3: Key Stakeholder Engagements

Communication channel	Frequency	Description
Workshops	Work with primary and secondary stakeholders to gather insights on the LAEP and help refine future plans.	Virtual and/or in person. Comprised of a presentation of data or information, followed by specific questions to stakeholders to inform the next phase of work. Stakeholders were given the opportunity to ask questions with regards to the information presented. Other tools, such as MS Form surveys or polls, were used for additional input where relevant.
Email	Weekly. Briefing information ahead of workshops. Allowing for two-way engagement if any questions arise	Use of emails prepares stakeholders for the workshops by providing aims and objectives of the session, as well as key themes to encourage streamlined sessions. Email communication allowed people to contact Mott MacDonald and the Steering Group with any ad-hoc requirements or feedback.

4.5 Key Stakeholder Insights

Table 4.4: Key Stakeholder Insights for Chesterfield, North East Derbyshire & Bolsover

Stakeholder	Insight
Community energy groups	Technical knowledge on the feasibility of interventions has proved useful to determine uptake rates. Firsthand experience of working with communities has also offered up new opportunities and actions included in the phased pathway. Additionally, the groups were able to offer considerable local knowledge and examples of best practice, to further inform several areas of the plan.
Utility providers	Provided context for how the LAEP needs work alongside utility systems, influencing the phased pathway. Shared knowledge and expectations on the forward development of both electricity and gas networks, including the future potential of hydrogen in the local area. Queried and added depth to the consideration of infrastructure impacts of scale roll-out of interventions.
Education & Skills Providers (Chesterfield College)	Confirmed availability of renewable energy, building services, and net-zero skills training; offered facilities and collaboration on workforce upskilling to meet retrofit, heat pump, and solar deployment scaling requirements. Reinforced that achieving LAEP pathways will require a 4× growth in retrofit workforce in some districts.
Industrial Energy Users	Clarified constraints such as lack of gas access and offered further data to refine modelling of industrial decarbonisation pathways. Highlighted the need to consider biomass, hydrogen and process-specific constraints in future scenarios
Local authorities	Current data available to the local authorities has been inputted into the modelling. An overview of the priorities of the region and local knowledge is also used to help develop the prioritisation section as well as expand the modelling (e.g. floating solar, mine water heat, water source heat pumps, food waste generation).
Local residents	Highlighted individual opportunities and concerns regarding interventions, including the need for equity, fuel poverty reduction, and ensuring interventions don't disproportionately burden disadvantaged groups. Also highlighted localised retrofit and EV-uptake barriers.

5 Assessing Options for the Future

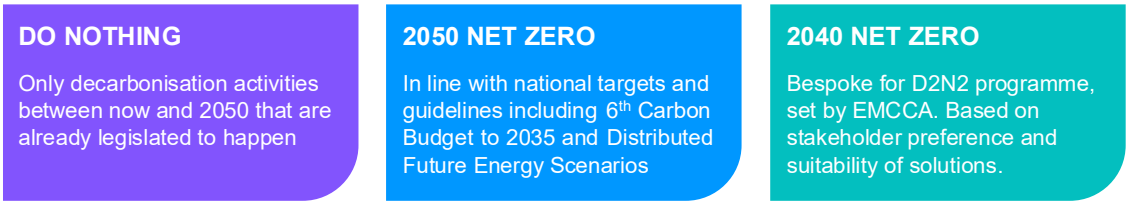
This section sets out the scenario constraints which frame the LAEP, and the approach to deciding which interventions underpin the fundamentals of the transition to net zero for Chesterfield, North East Derbyshire & Bolsover.

5.1 Overview of Scenarios

Scenarios are a powerful tool in energy planning, letting us explore different futures, understand the impacts of our choices, and prepare for uncertainties. Three scenarios were used as part of this LAEP to explore potential decarbonisation pathways for Chesterfield, North East Derbyshire & Bolsover.

These scenarios reflect varying levels of ambition and policy contexts, from minimal intervention to accelerated decarbonisation aligned with regional targets. To ensure comparability, key economic parameters such as intervention costs, energy prices, and discount rates were held constant across all scenarios. This supports sensitivity analysis and isolates the effects of policy ambition and technology uptake.

Figure 5.1: Scenarios for the LAEP modelling



5.1.1 Do Nothing

This ‘Do Nothing’ scenario represents what will happen without additional policy (beyond what is already legislated) or without additional infrastructure investment identified in this LAEP. In this way, the ‘Do Nothing’ scenario represents the most probable outcome, if nothing additional was done beyond what is already committed to. The ‘Do Nothing’ acts as the baseline, from which carbon reductions and the cost of the LAEP can be calculated.

This could be characterised as a small amount of consumer engagement in decarbonisation in addition to slow system changes. In the ‘Do Nothing’ scenario, the energy system emissions are reduced, but the scenario does not result is reaching Net Zero. It aligns with the “Falling Short” pathway from the National Grid/Regen Distributed Future Energy Scenarios (DFES).

Each intervention area in the subsequent sections, provides specific detailed counterfactual assumptions and exclusions relevant to the technological solution. The high-level Do-Nothing assumptions are listed in the following table.

Table 5.1: Do Nothing Modelling Assumptions

Technology Area	Policy landscape and Market Trends
Heating Decarbonisation	As there is currently no legislated mandate for heat pumps, we have assumed no further uptake of low-carbon technologies and a like-for-like replacement of heating systems at the end of their operational life

Building Thermal Energy Efficiency (Fabric Improvements)	We have assumed that all privately rented and social housing currently rated EPC C or below will undergo some form of fabric retrofit in order to meet the MEES target.
Energy Generation	As with air source heat pumps, we have assumed no further uptake of solar PV due to the absence of mandated legislation

5.1.2 2050 Net Zero

Aligned with the UK Government's legally binding target, this scenario reflects a pathway to net zero greenhouse gas emissions by 2050. It is similar to the "Leading the Way" DFES pathway however includes assumptions from the Climate Change Committee (CCC) on retrofit rates and policy impacts. Hydrogen use is considered for industrial clusters, consistent with National Grid's Future Energy Scenarios (FES 2024). This scenario provides a nationally consistent benchmark for evaluating local contributions to UK climate commitments.

5.1.3 2040 Net Zero

This regionally defined scenario targets net zero by 2040, positioned between the national 2050 target and the 7th carbon budget. It allows for bespoke modelling of retrofit rates, hydrogen deployment, and other interventions tailored to local opportunities and constraints. The scenario assesses the feasibility, impacts, and benefits of accelerating the energy transition to meet a 2040 target.

5.2 Scenario Modelling Approach

Scenario modelling for a LAEP can follow two main approaches:

- **Standardised Scenarios aligned with regional planning (Top-Down):** LAEPs can adopt industry-standard scenarios, such as the Distribution Network Operator's Distributed Future Energy Scenarios (DFES), which are derived from the National Energy System Operator's Future Energy Scenarios Pathways (FESP). This approach ensures consistency with regional and national planning frameworks.
- **Bespoke Local Scenarios informed by stakeholder input (Bottom-Up**): Alternatively, scenarios can be developed through engagement with local stakeholders, reflecting local priorities and ambitions. This includes input from local authorities, large energy users, community organisations, and businesses. Such collaboration helps identify unique local drivers and constraints that may not be captured in standardised scenarios.

Following discussions at the programme level, a bottom-up modelling approach was adopted to estimate the uptake of interventions, informed by local stakeholder input and priorities. Input is also taken from the UK Climate Change Committee's (CCC) Seventh Carbon Budget, which targets a 75% reduction in UK territorial emissions by 2040, achieving net zero emissions by 2050. While DFES projections for the East Midlands follow similar trends, the data can rely on LAEPs for their modelling. Therefore, national projections are used as a scalable proxy for local totals.

To model uptake of interventions, a logistic growth (S-curve) function was applied. This reflects slow initial growth due to barriers such as upfront costs, followed by acceleration in the mid-phase driven by policy support, and eventual saturation near 100%. Uptake is normalised to 100% of the total required installations by the target year, assuming a low starting point in 2026.

During modelling, curve midpoints and growth rates were anchored to concrete national and regional policy signals, and adjusted around these in discussion with stakeholders. Peak annual delivery was capped at realistic levels to reflect workforce and supply chain ramp-up

constraints. Annual percentages represent the incremental increase in installations for each year, while cumulative uptake reaches 100% by the target year.

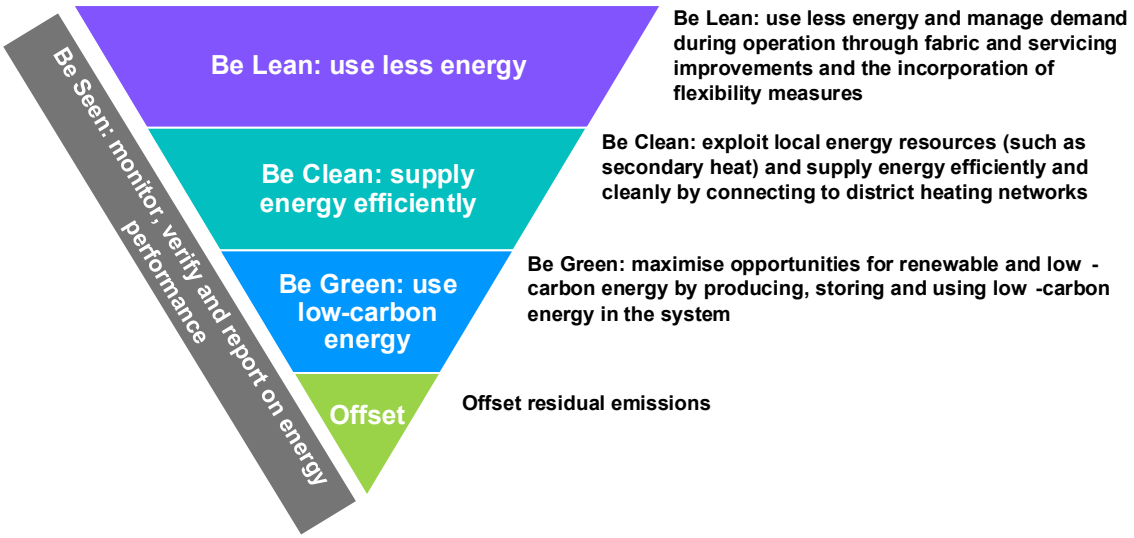
- For the **Net Zero by 2050 scenario**, the uptake curves typically follow the CCC's Balanced Pathway, with local adjustments.
- For the more ambitious **Net Zero by 2040 scenario**, the timeline is compressed by a factor of approximately 1.67 (25 years to 2050 vs. 15 years to 2040). This shifts data points earlier while preserving the S-curve shape.

5.3 Intervention Prioritisation Approach

The idealised approach to achieving net zero emissions is to follow the energy hierarchy as represented in Figure 5.2. It offers a common-sense, cost-effective, sustainable energy policy that aims to reduce energy use before seeking to meet remaining demand by investing in 'be clean' technologies in advance of 'be green' and offset incentives.

The Hierarchy offers an effective framework to guide sustainable energy policy and decision-making. The Interventions identified for Chesterfield, North East Derbyshire & Bolsover therefore follow this hierarchy, starting with energy efficiency measures and then followed by low-carbon heating alternatives, then supplementing this with installation of local renewables and battery storage.

Figure 5.2: The Energy Hierarchy



5.4 Proposed interventions

Table 5.2 outlines the energy interventions considerations applied across the scenarios.

Table 5.2: Considered energy interventions

Energy Interventions	Applied to	Filter/constraints applied
Light retrofit	Domestic buildings	Suitable fabric properties; not already retrofitted.
Deep retrofit	Domestic buildings	Suitable fabric properties; not already retrofitted.
Air source heat pump	Domestic and non-domestic buildings	Fossil-fuelled boiler present

Energy Interventions	Applied to	Filter/constraints applied
District heating network & connections	Domestic and non-domestic buildings	High demand areas with strong anchor loads (e.g. hospitals, industrial clusters)
Hydrogen Consumption	Non-domestic buildings (not incl. domestic for hydrogen)	High-temperature industrial processes
Solar PV (on roofs)	Domestic and non-domestic buildings	80% of buildings with SE–SW facing roofs.
Solar PV (on land)	Suitable land	Energy generated supplies local area, not National Grid.
Wind	Suitable land	Local Plan identifies areas for small turbines; energy supplies local area.
EV charging	Private and public chargers	Local and passenger vehicles only.
Substation capacity constraints	Electricity network substations	Where demand increases and modelling shows capacity issues.

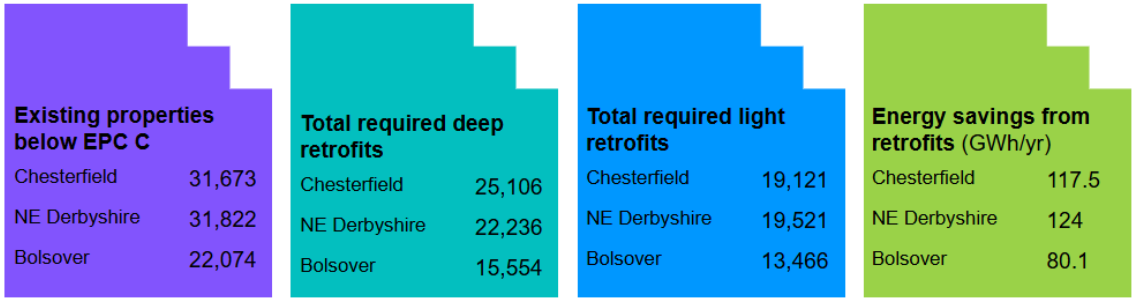
In addition to energy interventions, the modelling process incorporated simulations based on local plan allocations. Employment sites were modelled in accordance with existing development plans and current legislation. This ensured that any planned infrastructure or industrial activity was accurately reflected in the energy system analysis.

Similarly, mixed-use and housing sites allocated in the local plan were considered within the modelling framework. Where plans already exist for these sites, simulations were aligned with those proposals and legislative requirements. However, it is recognised that the Government has adopted a revised standard method for assessing housing need, which has resulted in significantly higher housing targets in many areas, including Chesterfield and North East Derbyshire, compared to those underpinning current local plan allocations. As a result, future iterations of local plans are expected to accommodate increased levels of housing growth.

This is likely to have a material impact on future development patterns across the LAEP study area. While the modelling provides a robust representation of growth based on the best available evidence at the time, there remains inherent uncertainty regarding the scale and distribution of future development. Consequently, ongoing updates to local plans will need to be reflected in future LAEP reviews to ensure that identified energy interventions remain aligned with evolving land use and planning outcomes.

6 Energy Efficiency in Buildings

Buildings account for nearly 40% of energy consumption in the UK across all sectors, and this equates to almost a quarter of total emissions UK wide[21]. This section deals with energy efficiency in buildings associated with the upgrade and retrofit of fabric improvement measures. This spans both domestic and non-domestic properties.



The primary focus of retrofit of building fabric improvements is to bring down the “U-Value”, the thermal transmittance measure, of different components of a building to increase its ability to retain heat and ultimately support environmental sustainability. Increased fabric performance and energy efficiency of a buildings can be linked to many direct benefits such as reduced energy bills, reduced fuel poverty, warmer homes and reduced carbon emissions. There are also many indirect co-benefits that can be realised through energy efficiency or fabric retrofit, the better example being resilience on the energy (gas and electricity) grids through the reduced energy demand from homes and businesses.

Additionally, implementing retrofits will reduce the overall thermal heat demand of properties. This reduction will be pivotal when transitioning to electric heating systems. This is because it will lower the required heating capacity of properties, which in turn will significantly cut the total capital costs associated, as well as reducing operating energy costs. Further details are provided in Section 7.

Building fabric retrofit is crucial to tackling climate change. It also contributes to the growth of local economies through the creation of jobs and is ultimately linked to the increased health and well-being of the population through the reduction of cold and damp related ailments.

6.1 Existing Building Stock

6.1.1 Domestic and Residential Housing Stock

Across Chesterfield, North East Derbyshire and Bolsover, domestic housing accounts for 96% of buildings across social housing, private rented and owner-occupied tenure types. With the right information and insights influencing policy decisions a significant impact on the energy transition and carbon impacts can be made through addressing this sector.

Going forward the majority of these houses will continue to be occupied, highlighting the importance of future proofing these properties. A key aspect of futureproofing is reducing both the thermal and electrical demand. This can be achieved by improving fabric performance and implementing other energy efficiency measures, which in turn lowers energy consumption and reduces associated carbon emissions.

[21] The CCC Sixth Carbon Budget

Energy efficiency and energy retrofit in buildings is a fundamental for achieving net zero. Through following the first step of the Energy Hierarchy, “Be Lean”, it is possible to bring wider benefits such as creating warmer homes, improving internal air quality and thermal comfort, reducing energy use, all giving occupants more certainty over their energy bills, and a reduction in the risk of fuel poverty.

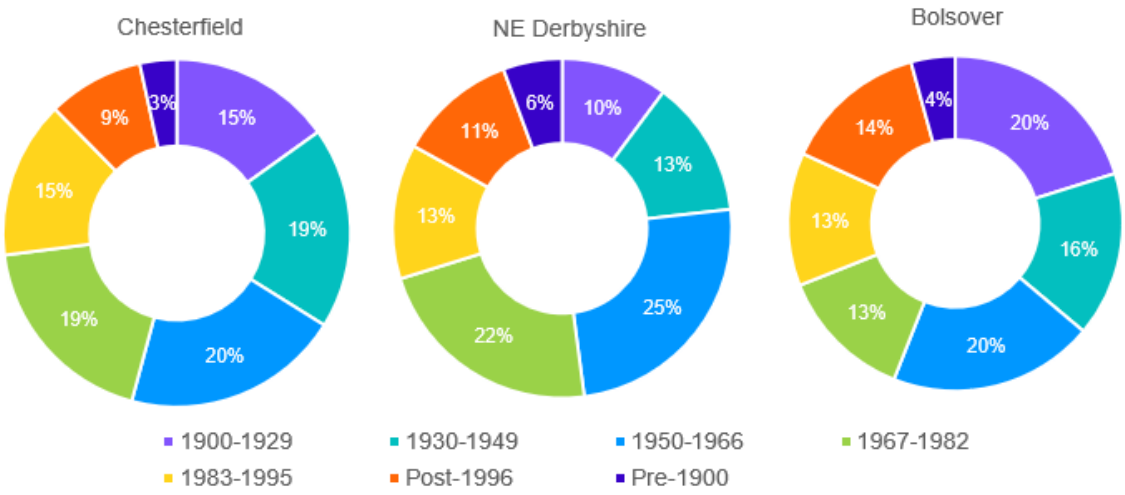
In the context of this Local Area Energy Plan, energy efficiency will play a critical role in demand reduction and heat decarbonisation. The Derbyshire Spatial Energy Study[22] projects that committing to bringing all properties up to an Energy Performance Certificate (EPC) rating of 69 or above (C) would lead to an annual heat energy demand reduction of around 743 GWh and aggregate energy bill reduction of over £58m per annum across 292,574 properties.

The UK’s EPC data provides insight into the thermal efficiency of dwellings across the country. EPC ratings are the most widely used indicator of a building’s energy efficiency level and are based on data points collects across building fabrics (insulation, windows, construction type, age), heating and hot water system and electrical demand (lighting, electric heating and appliances).

To address the energy transition needs of the local area it is pertinent first to understand the emissions context of the area and the “tools” that the local authority might have at their disposal by way of energy interventions. Emissions associated with domestic sector has decreased in line with Chesterfield, North East Derbyshire & Bolsover’s historic emissions and this is mainly due to grid decarbonisation.

The characteristics of all local authority’s housing stock remains a critical factor in determining future energy demand and retrofit potential. Figure 6.1 shows the varying construction dates of Chesterfield, North East Derbyshire and Bolsover’s domestic properties respectively, which helps indicate the level of pre-existing energy efficiency measures the home may already be equipped with, and lead to an understanding of the scale of retrofit needed.

Figure 6.1: Split of domestic buildings by age band across Chesterfield, North East Derbyshire and Bolsover



Chesterfield, North East Derbyshire and Bolsover housing stock presents a significant challenge for energy efficiency, with 76%, 76% and 73% of homes built before 1983 respectively. These properties were constructed under standards far below today’s requirements, resulting in high

[22] Derbyshire spatial energy study

heat loss and poor baseline performance. Bolsover has the highest number of properties constructed after 1996 under modern regulations at 14% compared to 11% and 9% for North East Derbyshire and Chesterfield respectively.

The largest share of properties across Chesterfield, North East Derbyshire & Bolsover, 22%, consists of homes built between 1950 and 1966 followed by those built between 1967 and 1982 (18%) and 1900-1929 (15%).

The oldest homes, Pre-1900 and 1900–1929 (19%), typically feature solid brick or stone walls with lime mortar and no cavity, giving estimated U-values above 2.1 W/m²K, roughly eight times worse than current standards[23]. However, their usual wet plaster finish does offer some airtightness. Although these buildings can be durable and architecturally significant, they normally require more complex retrofit solutions, which is likely dependent on factors such as statutory planning protection (e.g., listings, conservation areas). The technological challenge of applying external or internal wall insulation is a significant technical barrier, while cost and affordability present financial barriers. The disruption of the work is also likely to be a major consideration, particularly for internal wall insulation.[24]

The 1930–1949 band (16%) marks the architectural transition to cavity wall construction. While these walls offer slightly better conductive performance (typically around 1.5 W/m²K) because of the air gap, they introduced new vulnerabilities. These early cavities were built for moisture prevention rather than thermal retention and were left uninsulated. Additionally, the move to suspended timber floors in this era often makes this cohort significantly prone to higher air infiltration rates compared to their solid-walled predecessors. As a result, these homes tend to have poorer baseline efficiency and higher heat loss without targeted retrofit measures. It should be noted that the EPC data will reflect where changes have occurred to the properties since the year built, i.e. the installation of double glazing or addition of loft insulation. This has therefore been captured in our assessment.

The 1983–1995 (11%) and Post-1996 (11%) segments, coincides with the introduction and progressive tightening of Approved Document L within the Building Regulations. First introduced in 1985 and updated significantly in 1995, 2002, and 2006, these regulations mandated strict limits on air permeability, thermal bridging, and U-values. The 11% of stock built post-1996 likely benefits from mandatory double glazing, floor insulation, and high-performance loft insulation, achieving an EPC rating of C or higher by design. While these newer properties require minimal fabric intervention, they represent a small share of the domestic housing stock. This implies that to achieve area-wide decarbonisation, the primary focus must remain on the 71% of buildings constructed before 1983, where the gap between original performance and modern standards is widest.

Homes constructed post-2000 may only require minimal upgrades to reach EPC rating C and above, if they aren't already achieving these levels based on as built and installed fabrics and systems. It may, however, be difficult to achieve EPC rating C for the local area's older properties given the increased complexity in delivering full fabric and energy retrofit improvements, as well as the high costs associated with deep retrofit. Figure 6.2 to Figure 6.4 present the EPC rating distribution across Chesterfield, North East Derbyshire and Bolsover's domestic building stock respectively.

[23] Conservation of fuel and power: Approved Document L - GOV.UK

[24] Retrofit Internal Wall Insulation: guide to best practice

Figure 6.2 Chesterfield EPC Rating per MSOA

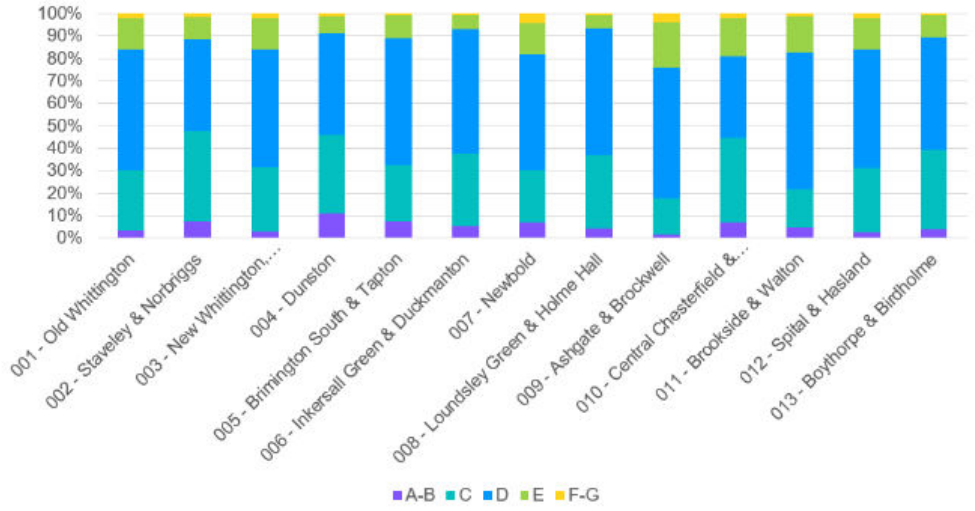


Figure 6.3 North East Derbyshire EPC Ratings per MSOA

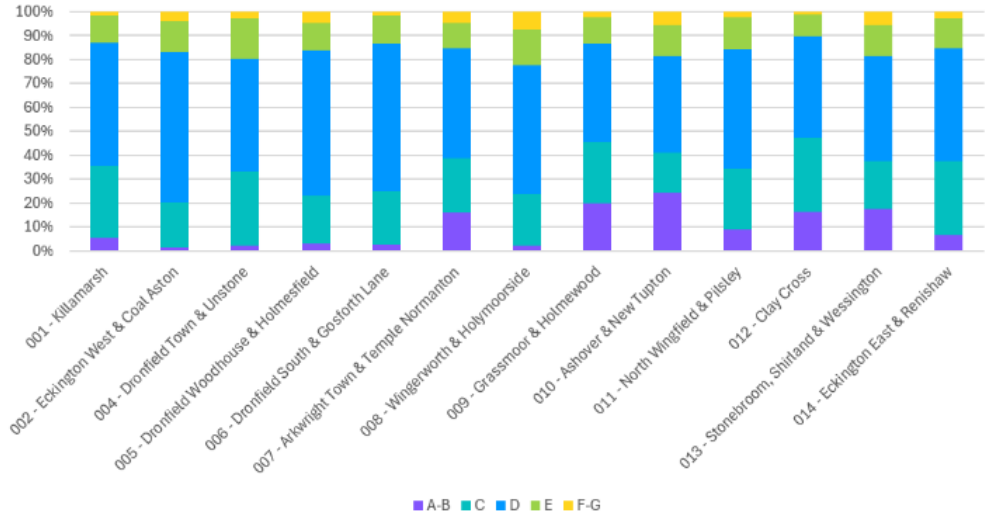
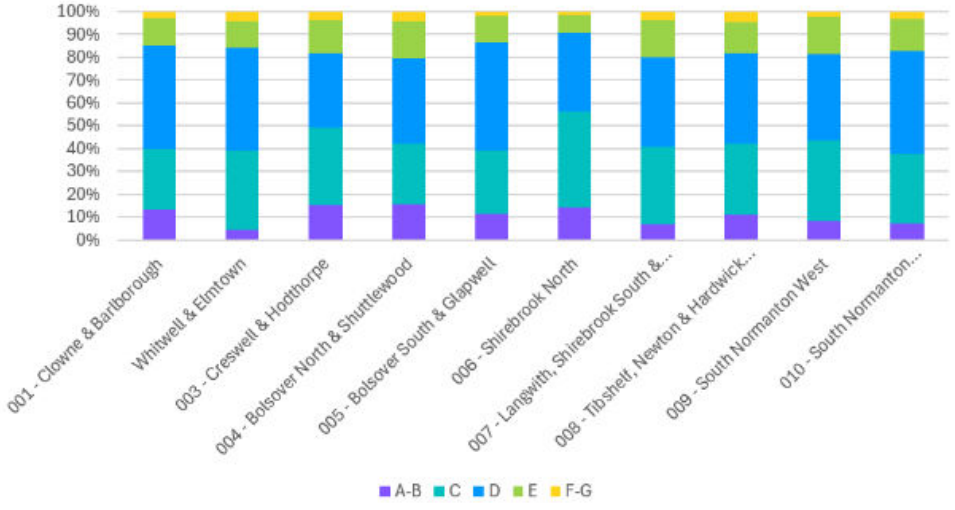


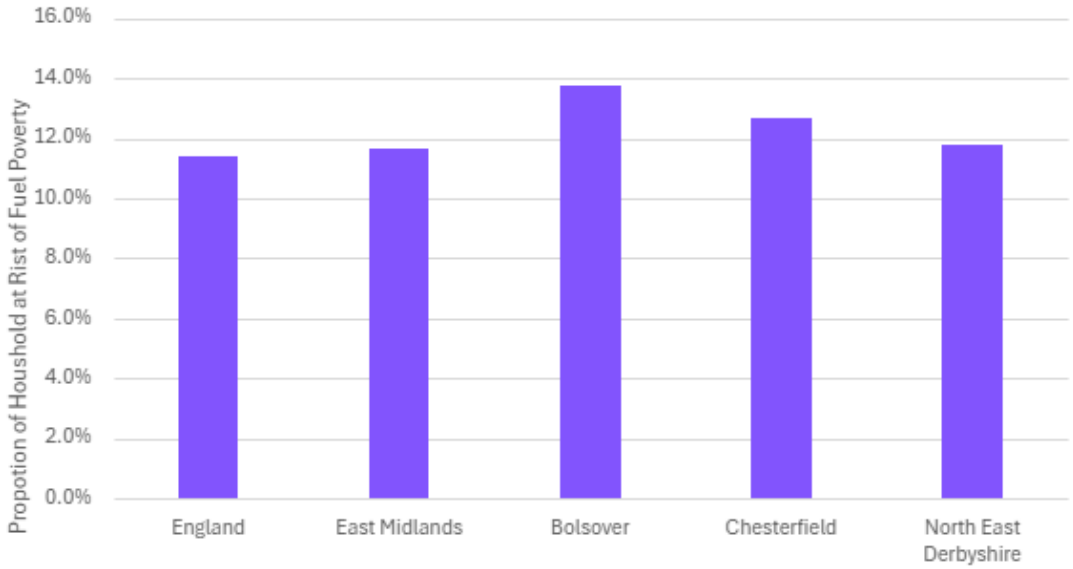
Figure 6.4: Bolsover EPC Ratings per MSOA



Given the area's large proportion of pre 1996 buildings, it is unsurprising to see a substantial proportion of homes falling below the UK Government's current recommended EPC rating of C. In Chesterfield, North East Derbyshire & Bolsover, 65%, 64%, and 57% of homes are rated D or lower, respectively, indicating high energy demand and poor insulation. This further raises the importance of fabric retrofit and energy efficiency as a priority in the area.

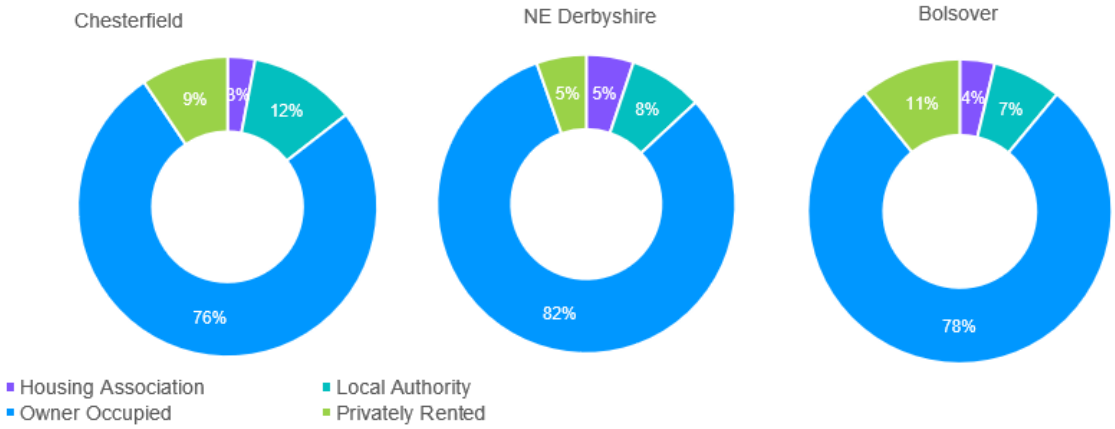
It is likely that this challenge will continue to influence the level of fuel poverty experienced in Chesterfield, North East Derbyshire & Bolsover. Each of these areas reports a higher proportion of fuel-poor households (12.7%, 11.8%, and 13.8% respectively) compared with the East Midlands regional average of 11.7% and the national average of 11.4%. Figure 6.5 presents these proportions and shows how they relate to both the East Midlands and England averages. How this can be addressed through targeted intervention is addressed in Section 13.

Figure 6.5: Proportions of Household at risk of fuel poverty



Addressing the below-average efficiency, indicated by the EPC distribution, requires an understanding not only of the housing fabric but also of who owns and manages these homes, since tenure strongly influences the feasibility of retrofit interventions. Figure 6.6 shows the tenure breakdown across each local authority. Of the homes within Chesterfield, North East Derbyshire & Bolsover, most are owner occupied, indicating a strong level of control of occupiers over the implementation of building fabric changes.

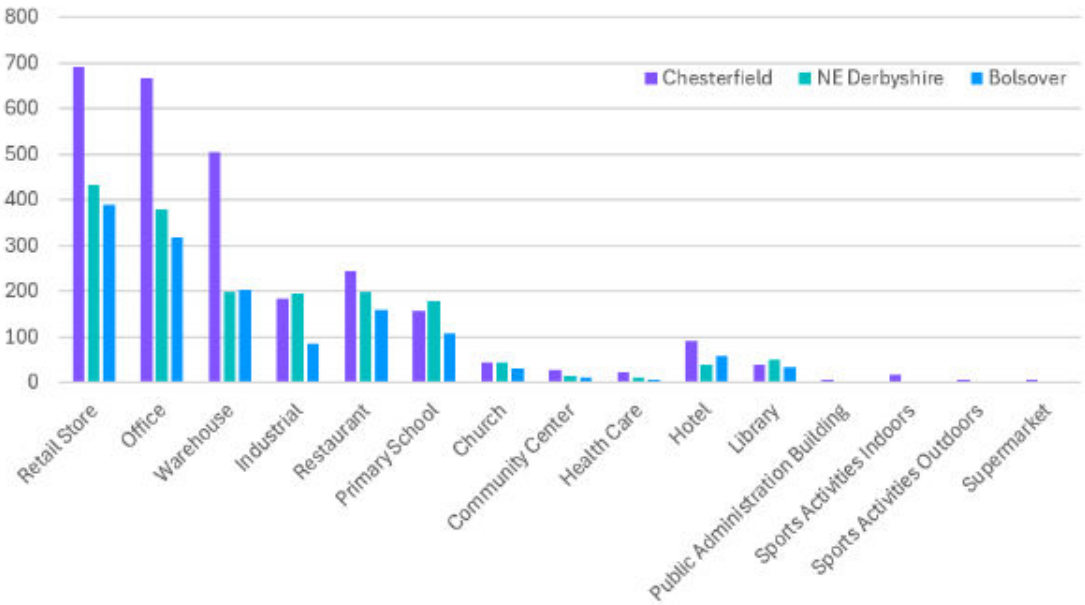
Figure 6.6: Proportion of Tenure Types across Chesterfield, North East Derbyshire & Bolsover MSOAs



6.1.2 Non-Domestic and Commercial Building Stock

The non-domestic sector accounts for 4% of the buildings across Chesterfield, North East Derbyshire and Bolsover. These buildings span the public and commercial sectors and are utilised for a variety of primary uses, as listed in Figure 6.7. Detailed in this figure is the total number of non-domestic building split by primary use case varying from Churches to Retail stores. Currently, the non-domestic building stock is predominantly made up of commercial buildings, with office and retail buildings accounting for the majority.

Figure 6.7: Total non-domestic buildings, split by primary use



While the EPC values of non-domestic properties are evaluated to identify priority areas across the region, a significant proportion of the non-domestic building stock in Chesterfield, North East Derbyshire & Bolsover lacks surveyed EPC data, meaning that the ratings of many properties are not captured. As a result, a large proportion (over 95%) of buildings in Chesterfield, North East Derbyshire & Bolsover are assigned an assumed EPC rating of C. This data gap reflects

broader issues with the methodology for undertaking and reporting non-domestic EPCs, where the current policy landscape has less strict drivers regarding the uptake of ongoing energy assessments. Currently, one of the only policies in place in this sector is all rented commercial properties in the UK must have a minimum EPC rating of E. To progress energy efficiency in non-domestic building stock requires further energy studies on non-domestic buildings to provide more available data to aid in identifying and implementing energy efficiency measures across the properties.

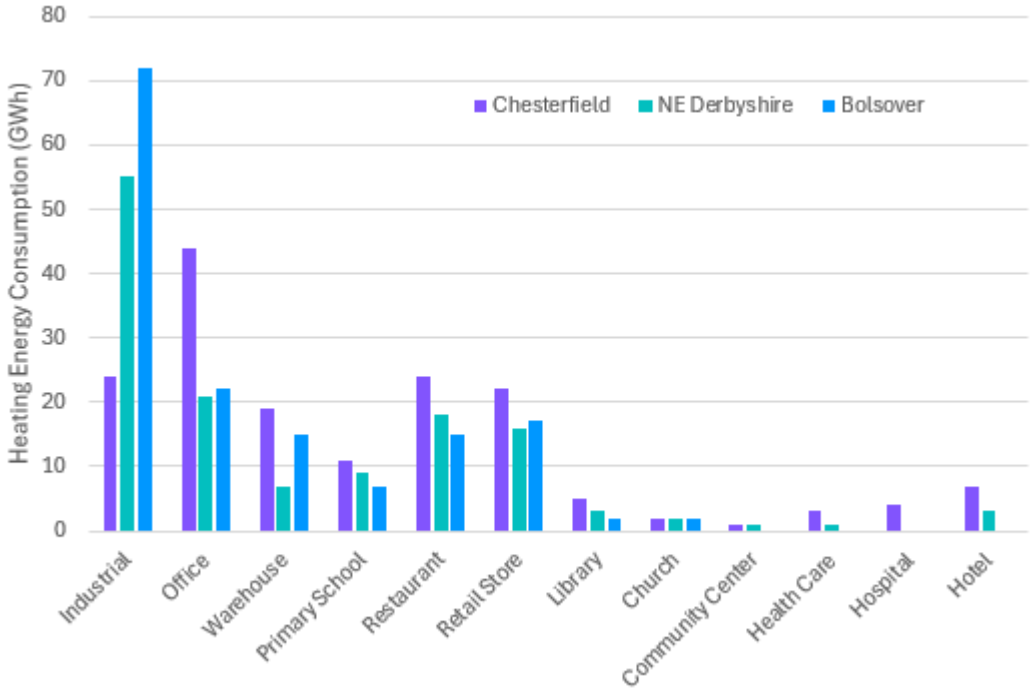
The total simulated thermal demand of non-domestic buildings was also assessed, as shown in Figure 6.8. The industrial and office properties exhibit significantly higher thermal demand than the other building types, with warehouses being prominent in Chesterfield too.

Office buildings tend to share similar characteristics, such as building envelopes, room layouts, and energy systems, presenting an opportunity for standardised retrofit approaches. Implementing retrofits at scale across these properties is likely to be more straightforward compared to other non-domestic building types, which tend to be more varied in design and function. For these building types, more bespoke retrofit approaches may need to be undertaken, which could incur additional complexity and costs.[25]

One challenge within the commercial buildings sector however is the commercial ownership and rental model, where large office or retail buildings are owned by large commercial asset owners and rented to those utilising the spaces. This means that the ability of the local business or organisation within the space to affect energy efficiency change within their environment is relatively minimal compared to the domestic sector, where most properties are owner occupied in Chesterfield, North East Derbyshire & Bolsover, due to limited allowances to change the properties and lower incentives due to payback periods being longer than typical tenures. However, by the same principle, increased energy efficiency and fabric standards applied to commercial buildings could impact those large asset owners encouraging their engagement in retrofitting their assets prior to rental or sale.

[25] Challenges and Opportunities in Commercial Retrofit | UKGBC

Figure 6.8: Total thermal demand of non-domestic properties by use



Within the scope of this LAEP, the opportunity to accurately represent the decarbonisation of the non-domestic sector, depends on the available data. The fabric and energy efficiency measures most appropriate for each non-domestic building will depend heavily on the primary use of the building. Different uses like offices and industrial buildings will have significantly different building fabrics, equipment type and profiles, and occupancy patterns which will affect which measures are most suitable for each building.

Different primary uses also have varying funding mechanisms for how to implement improvements; public sector buildings are more likely to receive more UK Government grant funding than private office buildings, the Public Sector Decarbonisation Scheme is a good example of this type of funding support. In the absence of available funding for commercial buildings, it is important other incentives or regulations for private building be developed by the UK Government to support the implementation of energy efficiency and fabric upgrade measures.

During the LAEP development and through the stakeholder engagement with non-domestic stakeholders and estate managers, ongoing retrofit programmes amongst non-domestic buildings, such as schools, colleges and the NHS, were highlighted. All programmes mentioned were following fabric first approaches despite funding limitations. To ensure continued operation of such buildings out of hours periods (e.g. end of term) were being used to implement such measures or complete upgrades.

6.2 Intervention Methodology

6.2.1 Energy Interventions

To meet the legally binding decarbonisation targets for the UK, significant levels of energy efficiency improvements need to be undertaken across the country. For Chesterfield, North East Derbyshire & Bolsover's diverse domestic and non-domestic sectors to reach the levels of

uptake needed for net zero compliance the two chosen scenarios - a 2040 and 2050 net zero scenario, as well as a counterfactual “Do Nothing” scenario – have been modelled following two energy efficiency approaches.

The specific fabric upgrades that are modelled in this LAEP are split into the following retrofit categories shown in Table 6.1.

Table 6.1: Light and Deep Retrofit Definitions

Light Retrofit Criteria	Deep Retrofit Criteria
Cavity Wall Insulation: Applied to properties identified as having cavity walls that are currently uninsulated. (excluding timber frame construction to avoid damp and moisture)	Window Upgrades: All single-glazed windows being proposed to be upgraded them to double glazing.
Full Loft Insulation: Targeted to properties where the predicted loft insulation depth is between 0–50mm.	Solid Wall Insulation: Applied to properties with solid brick or stone walls that are currently uninsulated.
Loft Top-Up Insulation: Applied to homes with an existing insulation depth of 50–150mm, where we topped up with an additional 200mm of insulation.	Floor Insulation: Based on Home Analytics data, we targeted buildings with either suspended floors or those with an unheated space below, provided these floors were not already insulated.

There are nearly 6,000 buildings requiring some degree of retrofit across these light and deep retrofit categories in order to meet MEES compliance as a minimum.

Due to limitations in the available data on fabric conditions and construction types of non-domestic properties, the modelled retrofit upgrades are limited to domestic buildings and do not include non-domestic stock.

6.2.2 Building Fabric – Do Nothing

This scenario takes into account the current pathway, based on currently mandated legislation at the time of completion of this LAEP. It assumes that all existing national legislation is implemented in relation to energy efficiency, which includes the following policies:

The UK Government’s Minimum Energy Efficiency Standards (**MEES**) **regulations**[26], which applies to private-rented properties not owner-occupied, currently states that a property cannot be rented unless it has an EPC rating of E or higher. This is anticipated to increase to EPC C or higher by 2030.

The Future Homes and Buildings Standard (2025) is assumed to be implemented and will mandate that all new builds are constructed as ‘net zero ready’, future proofed for low carbon heating and with ‘world leading’ levels of energy efficiency. This bill aims to have all new builds at an EPC rating of C or higher, however 85% of new build properties in England are already achieving a minimum EPC rating of B. We therefore assume that all houses constructed after 2025 will be to an EPC B or higher and will not require fabric retrofit intervention.

The UK Government is encouraging the improvement of housing stock via these policies and incentives, the impact of which have been incorporated into our modelling of the “Do Nothing” scenario.

[26] Improving the energy performance of privately rented homes: 2025 update

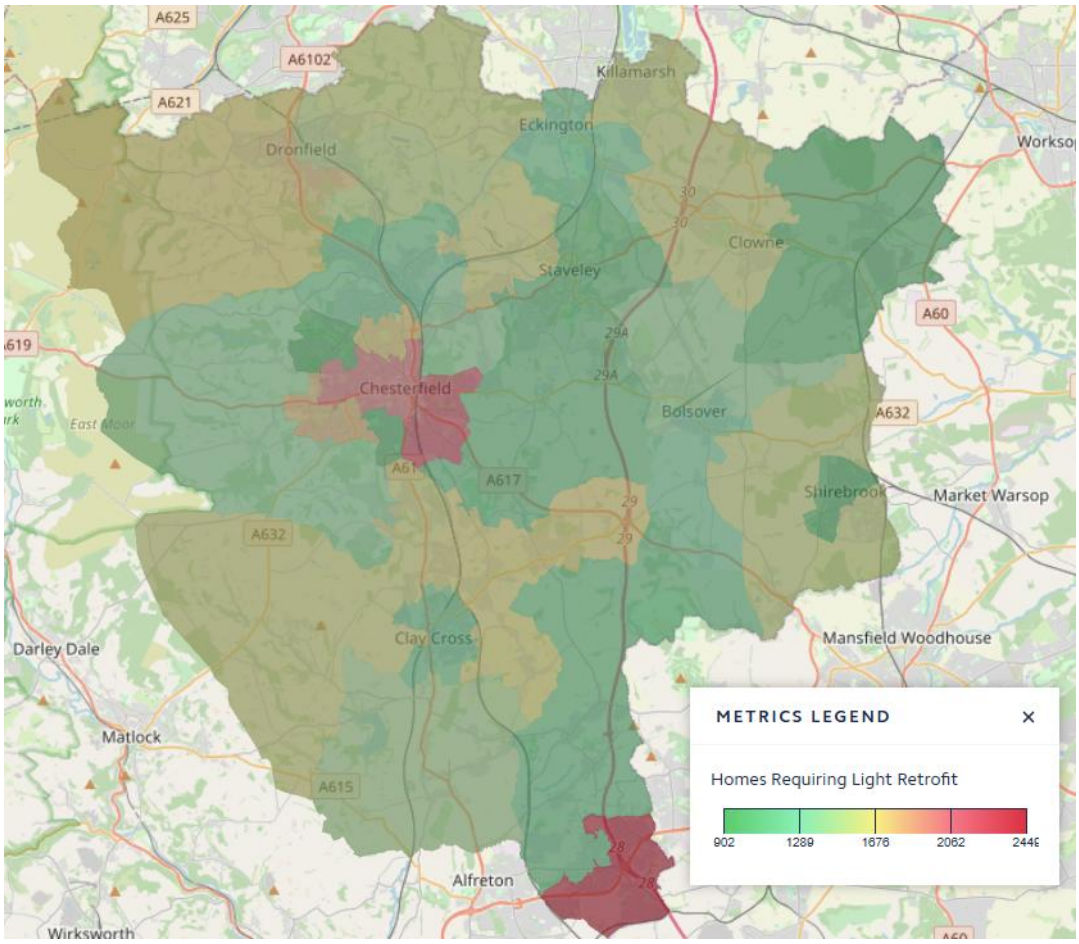
6.3 Light Retrofit

The light retrofit option represents the cheaper retrofit option, focusing on less intrusive insulation improvements. This option is targeted for homes requiring less significant thermal efficiency improvements.

Light retrofit measures such as cavity wall insulation and loft insulation are lower cost than internal and external solid wall insulation and have been identified to have a significantly reduced payback compared with deep retrofit approaches. To find which homes require light retrofits, the existing fabric levels are analysed to find where improvements are needed. The extent of the improvements required is compared against the criteria for light and deep retrofit, to identify which level of retrofit is required. With this analysis across the region, it is then possible to quantify the extent of light retrofit needed across Chesterfield, North East Derbyshire and Bolsover.

Figure 6.9 identifies the intensity of light retrofit installations required across Chesterfield, North East Derbyshire and Bolsover, highlighting significant concentrations of required measures in Dronfield South & Gosforth Lane and Dronfield Woodhouse & Holmesfield in North East Derbyshire; Spital & Hasland, Central Chesterfield & Stonegravels, and Ashgate & Brockwell in Chesterfield; and South Normanton Broadmeadows & Pinxton and Clowne & Barlborough in Bolsover.

Figure 6.9: Number of homes requiring light retrofit, by MSOA



The 2040 and 2050 scenario uptake growth rates are informed by mandated national and regional policies, including the UK Government's Warm Homes Plan, which seeks to front-load

retrofit measures with a particular emphasis on social housing[27]. Uptake rates are also aligned with the CCC's Seventh Carbon Budget net zero pathway, which prioritises the rapid deployment of energy efficiency measures ahead of low-carbon heating installations[28]. The uptake rates for the preferred 2050 Net Zero scenario are set out in Figure 6.10.

Additionally, the uptake profile assumes a slower rate of delivery between 2025 and 2030, reflecting current workforce and supply chain capacity. From 2030 onwards, however, retrofit demand is expected to drive significant growth in both workforce skills and supply chain capability, enabling a sharper acceleration in uptake.

[27] Warm Homes: Local Grant policy guidance

[28] The Seventh Carbon Budget - Climate Change Committee

Year	Annual percentage uptake	Chesterfield	NE Derbyshire	Bolsover 2050
		Annual	Annual	Annual
2025	0%	0	0	0
2026	0.70%	134	137	94
2027	0.80%	153	156	108
2028	1.70%	325	332	229
2029	3.00%	574	586	404
2030	4.60%	880	898	619
2031	7.00%	1,338	1,366	943
2032	9.60%	1,836	1,874	1,293
2033	11.60%	2,218	2,264	1,562
2034	12.10%	2,314	2,362	1,630
2035	11.00%	2,103	2,147	1,481
2036	9.00%	1,721	1,757	1,212
2037	7.00%	1,338	1,366	943
2038	5.00%	956	976	673
2039	3.90%	746	761	525
2040	3.00%	574	586	404
2041	2.70%	516	527	364
2042	2.60%	497	507	350
2043	1.50%	287	293	202
2044	1.10%	210	215	148
2045	0.90%	172	176	121
2046	0.50%	96	98	67
2047	0.40%	76	78	54
2048	0.20%	38	39	27
2049	0.10%	19	20	13
2050	0.00%	0	0	0

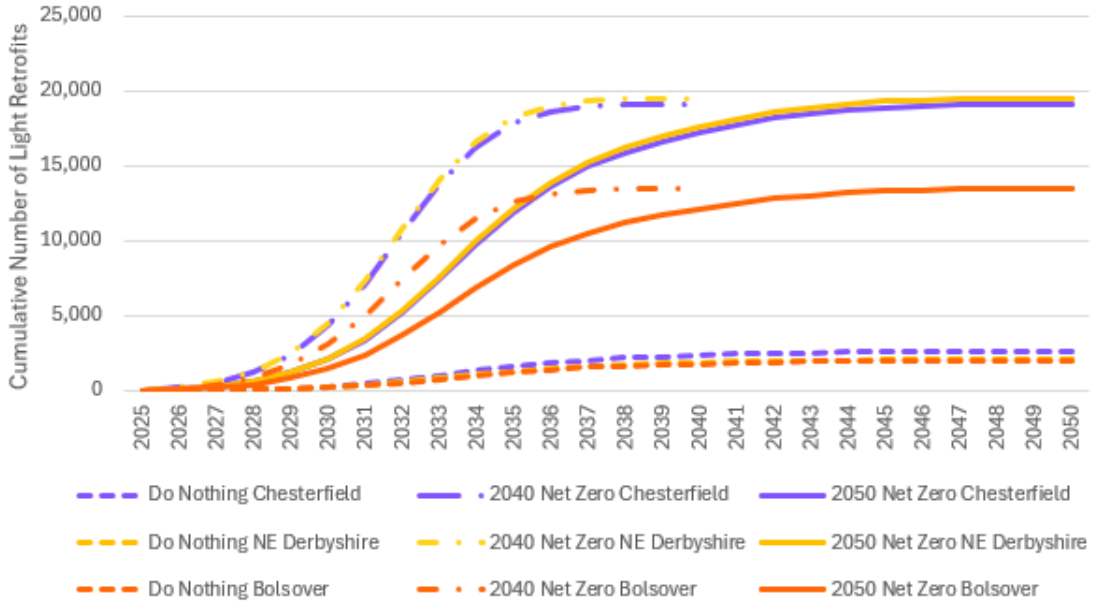
Figure 6.10: Annual light retrofit installations for preferred scenario

Figure 6.10 outlines the required year on year uptake light retrofit uptake rate for the 2050, 2040 and do-nothing scenarios. The Do Nothing represents the counterfactual scenario, considering the expected retrofit of private rented properties as part of MEES regulations and follows similar update trajectory.

In both the 2040 and 2050 scenarios, a total of around 52,108 homes are required to have light retrofit upgrades, representing approximately 40% of the total housing.

However, to meet the pathway targets of the local area in each scenario, light retrofit upgrades are not sufficient on their own. For some properties further thermal efficiency is required in order to meet the heat grade provided by a heat pump or district heating, so deep retrofit has also been modelled within the LAEP.

Figure 6.11: Cumulative uptake of light retrofit required per scenario



6.4 Deep Retrofit

The deep retrofit option represents the more expensive approach, requiring more intrusive insulation improvements. It is intended for homes that need significant enhancements in thermal efficiency. The deep retrofit encompasses fabric upgrades for solid wall insulation, glazing upgrades and floor insulation. These retrofit measures are tailored to older housing stock, which often feature building envelopes that benefit most from these fabric upgrades, such as solid stone walls, single glazing and suspended floors.

Figure 6.12: Homes Requiring Deep Retrofit by MSOA

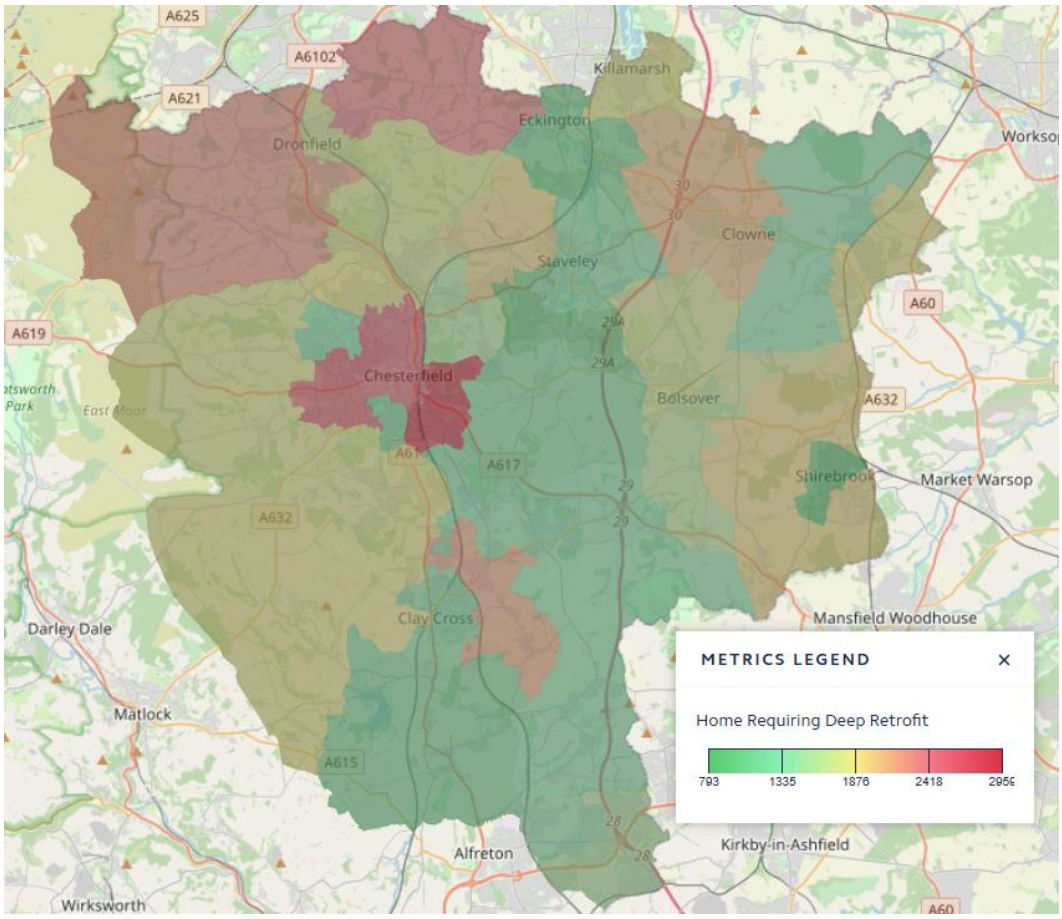
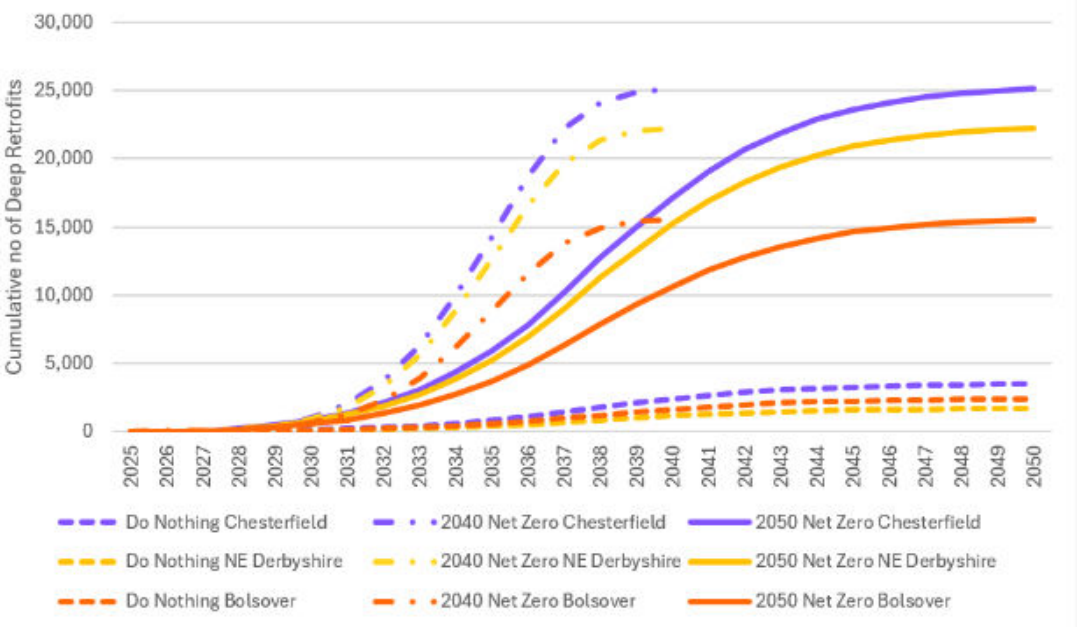


Figure 6.13: Cumulative uptake of deep retrofit required per scenario



Similarly to the light retrofit, the home analytics dataset within the digital twin of Chesterfield, North East Derbyshire & Bolsover was used to identify where deep retrofit measures would be suitable for each property, based on building fabric and construction type. The aim of this approach was to ensure that every property achieved adequate insulation levels, with a dual purpose of reducing the risk of fuel poverty and enabling the efficient installation and operation of a low-carbon heat source. This is discussed further in section 7.

It will be vital to target these older building types as they will be most at risk of poor thermal comfort levels, leading to poor health outcomes from risks such as mould. Deep retrofit measures in these properties, combined with the provision of suitable ventilation, will provide additional benefits of removing risks of condensation, dampness, and mould caused by excess heat loss.

Figure 6.14: Annual deep retrofit installations for preferred scenario

Year	Annual percentage uptake	Chesterfield 2050 Annual uptake	NE Derbyshire 2050 Annual uptake	Bolsover 2050 Annual uptake
2025	0%	0	0	0
2026	0.00%	0	0	0
2027	0.00%	0	0	0
2028	0.76%	191	169	119
2029	1.08%	271	240	168
2030	1.52%	380	337	236
2031	2.10%	528	467	327
2032	2.88%	722	640	447
2033	3.85%	967	856	599
2034	5.01%	1258	1,114	779
2035	6.29%	1579	1,398	978
2036	7.54%	1893	1,677	1,173
2037	9.56%	2401	2,127	1,487
2038	10.15%	2547	2,256	1,578
2039	9.15%	2296	2,034	1,422
2040	8.56%	2150	1,904	1,332
2041	7.54%	1893	1,677	1,173
2042	6.29%	1579	1,398	978
2043	5.01%	1258	1,114	779
2044	3.85%	967	856	599
2045	2.88%	722	640	447
2046	2.10%	528	467	327
2047	1.52%	380	337	236
2048	1.08%	271	240	168
2049	0.76%	191	169	119
2050	0.53%	134	119	83

Figure 6.13 underlines the required annual uptake retrofit uptake rate for the 2050, 2040 and do-nothing scenarios. The Do Nothing represents the expected retrofit of private rented properties as part of MEES regulations. Similar to light retrofits, the 2040 and 2050 scenario uptake growth rates were informed by mandated national and regional policies alongside considering the growth of the supply chain to limit the uptake to realistic levels. However, the rates have been slightly reduced to account for the increased scope and costs associated with deep retrofit upgrades, in comparison to light retrofits.

In both the 2040 and 2050 scenarios, a total of around 62,896 homes are required to have deep retrofit upgrades, representing 48% of the total domestic property stock.

6.5 Impacts

Displayed in Figure 6.15 is the total number of retrofit installations required across Chesterfield, North East Derbyshire and Bolsover, specifying the number of properties requiring either light, deep or no retrofit. Additionally, there is a separate category for the housing stock requiring both light and deep retrofits.

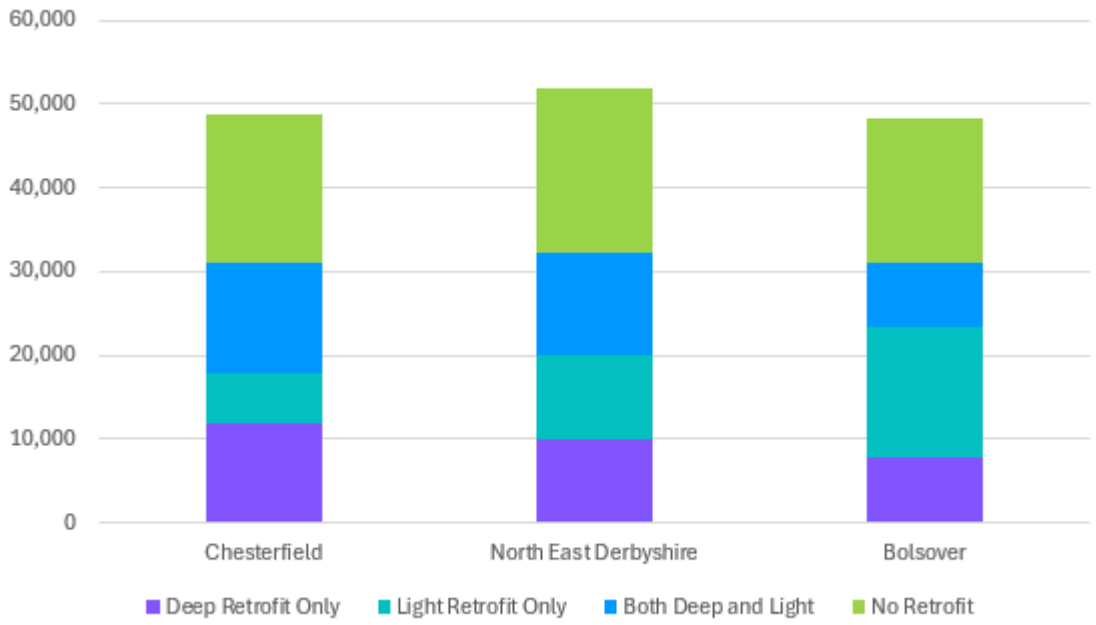
Retrofit installations are expected to be widespread across the region, necessitating installations across all tenure types. This will require coordinated engagement from both the public and private sectors, including the development of incentives and potential funding mechanisms to support the transition. As the capital expenditure will be the main hurdle for the implementation of retrofits, these funding mechanisms would aid in ensuring the retrofit upgrades are accessible to all properties.

Households with lower income levels will be the least likely to undertake and pay for the high cost of deep retrofit measures, so appropriate support must be given in such circumstances to ensure a just transition towards net zero by 2040 or 2050. Retrofit programmes must be designed with support mechanisms for landlords and incentives for low-income households.

Additional targeting may be required in areas of high fuel poverty that have a large proportion of privately rented homes. Owner-occupied homes may have greater autonomy to invest in upgrades, while rented properties particularly in the private sector, face challenges due to split incentives and regulatory constraints.

Refer to Section 12 - Economic Appraisal for further analysis and in depth technoeconomic discussion on costs of each intervention across each net zero scenario.

Figure 6.15: Number of Buildings requiring fabric retrofit



The successful implementation of these retrofits will introduce significant energy savings across the region while satisfying thermal comfort levels within each property. The energy savings will provide vast benefits both to residents and Councils, providing cost and carbon savings leading to a host of other benefits. These include alleviating fuel poverty, as households that were previously thermally inefficient would be able to heat their homes affordably.

Figure 6.16: Annual Projected Combined Energy Savings of Deep and Light Retrofit

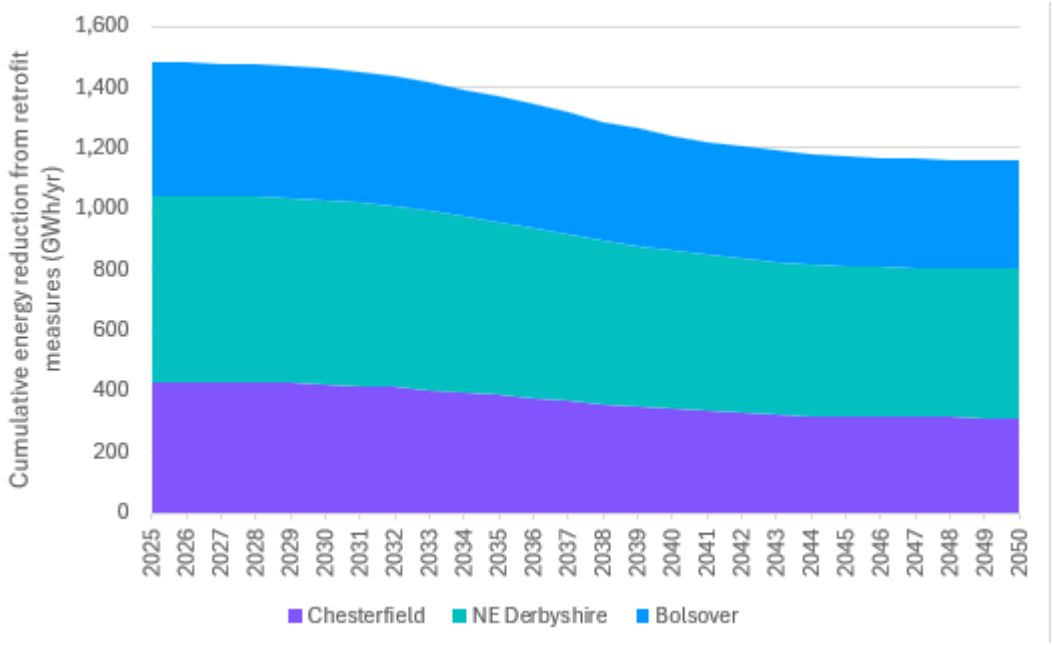


Figure 6.16 illustrates the cumulative reduction in domestic space heating energy demand resulting from the uptake of retrofit measures across the study area. In aggregate, the modelled interventions reduce total space heating energy demand by 28%, 20% and 18% in Chesterfield, North East Derbyshire and Bolsover respectively, relative to the baseline.

The results are presented at a local authority level and therefore reflect the combined impact across the entire domestic building stock. This includes both buildings that require retrofit and those that do not, either because their performance already meets relevant standards or because they are not considered suitable for intervention. As a result, the percentage reduction represents a system-wide outcome rather than savings across retrofit-eligible buildings alone.

These benefits will be further extended as low-carbon heating technologies are deployed. Retrofit measures act as a foundational step by reducing underlying heat demand, enabling low-carbon systems to operate more efficiently and deliver additional energy savings. This approach not only leads to immediate reductions in energy consumption and lower utility bills for residents, but also contributes to a reduction in carbon emissions associated with gas use. In addition, the resulting decrease in thermal demand will help mitigate future strain on the local electricity network as the region transitions towards a higher proportion of electrified heating.

For more information on the impacts of the installation of low carbon heating systems, please refer to section 7.

7 Low-carbon Heating

This section analyses how low-carbon space heating technologies can be implemented to help Chesterfield, North East Derbyshire & Bolsover achieve net zero carbon emissions. Currently, the majority of domestic and non-domestic buildings rely on fossil fuels to meet their space heating and hot water demands, presenting a significant challenge. To decarbonise heat consumption, most buildings will need to transition to low-carbon technologies, primarily those powered by electricity.

7.1 Domestic Sector

Current Share of Electric Heating	
Chesterfield	4.1%
NE Derbyshire	3.2%
Bolsover	3.2%

Required ASHPs for Net Zero	
Chesterfield	44,811
NE Derbyshire	45,412
Bolsover	35,594

Possible Heat Networks	
Chesterfield	Chesterfield Town Centre
NE Derbyshire	Dronfield
Bolsover	-

7.1.1 Existing System

Natural gas is the predominant fuel type used in Chesterfield, North East Derbyshire & Bolsover as shown in Figure 7.1 based on government data[29,30]. Over 93% of home energy usage is consumed in gas-powered boilers for space heating and hot water. Around 3.5% of homes use electricity for heating which includes both electric heat pumps and resistive electric heating. These homes can already be considered to have low-carbon heating systems, as their emissions will continue to decrease as the national grid decarbonises.

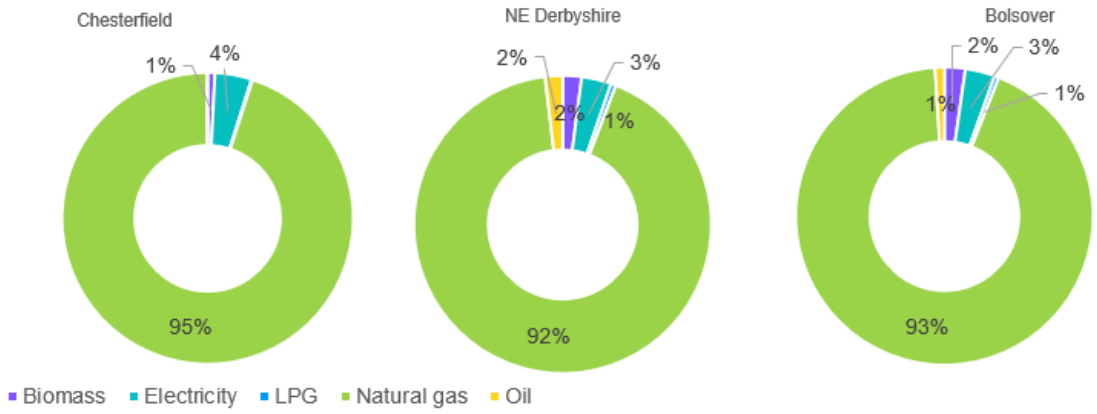
Chesterfield, North East Derbyshire and Bolsover do have 1%, 4.5%, and 3.8% of households respectively using oil, biomass or other heating fuels, which can be expected from rural properties not connected to the gas grid. Some of these homes in this category will need to transition to a decarbonised heat source and may prove more costly due to their more unusual heating systems.

From an emissions perspective, in Chesterfield, North East Derbyshire & Bolsover, domestic buildings using natural gas contribute 263 ktCO2e of emissions, followed by 72 ktCO2e from electricity-based heating systems and 18.5 ktCO2e from the remaining sources. There have been significant emissions reductions across all fuel types since 2005, predominantly from electricity use. This is in large part due to the decarbonisation of the grid as well as efficiency measures. Local retrofit programmes such as the Home Upgrade Grant (HUG) and Sustainable Warmth schemes have supported these reductions, particularly in hard-to-heat homes.

[29] Sub-national total final energy consumption data - GOV.UK

[30] Energy Consumption in the UK (ECUK) 2025 - GOV.UK

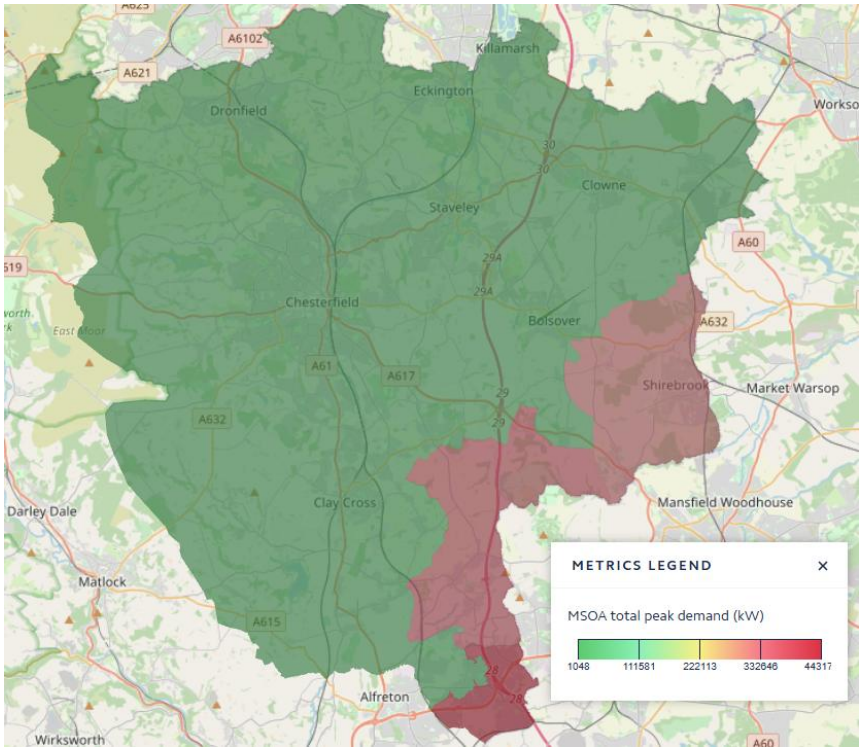
Figure 7.1: Domestic Heating split by Fuel Type for Chesterfield, North East Derbyshire & Bolsover (%)



North East Derbyshire has the highest share of oil heating (1.9%). While schemes like HUG2 and ECO grants have targeted off-gas homes with insulation and heat pump installations, the scale of rural housing and retrofit complexity means reductions have been incremental rather than transformative.

The current level of thermal demand per MSOA for domestic housing in Chesterfield, North East Derbyshire & Bolsover is shown in Figure 7.5. The MSOAs of Chesterfield 013 - Boythorpe & Birdholme, Chesterfield 012 - Spital & Hasland, North East Derbyshire 010 - Ashover & New Tupton, North East Derbyshire 009 - Grassmoor & Holmewood, and Bolsover 001 - Clowne & Barlborough record the highest peak heat demand.

Figure 7.2: Thermal Demand by MSOA

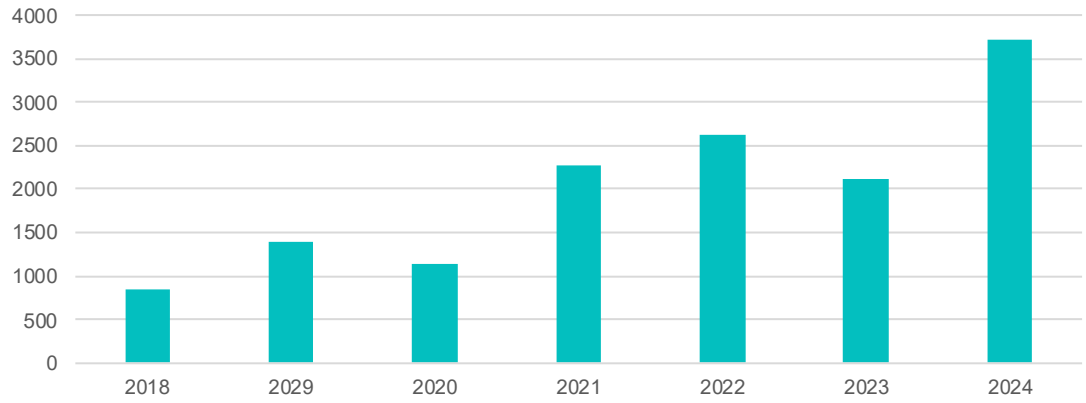


7.1.2 Low-carbon Heating System Installations

It has been assumed for this LAEP that air source heat pumps (ASHP) will be the primary alternative to natural gas fuelled heating systems in order to meet its net zero goals. Historic heat pump uptake across the East Midlands is illustrated in Figure 7.3. There is a steadily growing uptake of heat pumps since 2018 in the East Midlands with 3,726 installations recorded in 2024. While this upward trend is encouraging, heat pumps still represent a small fraction of space heating compared to the total housing stock.

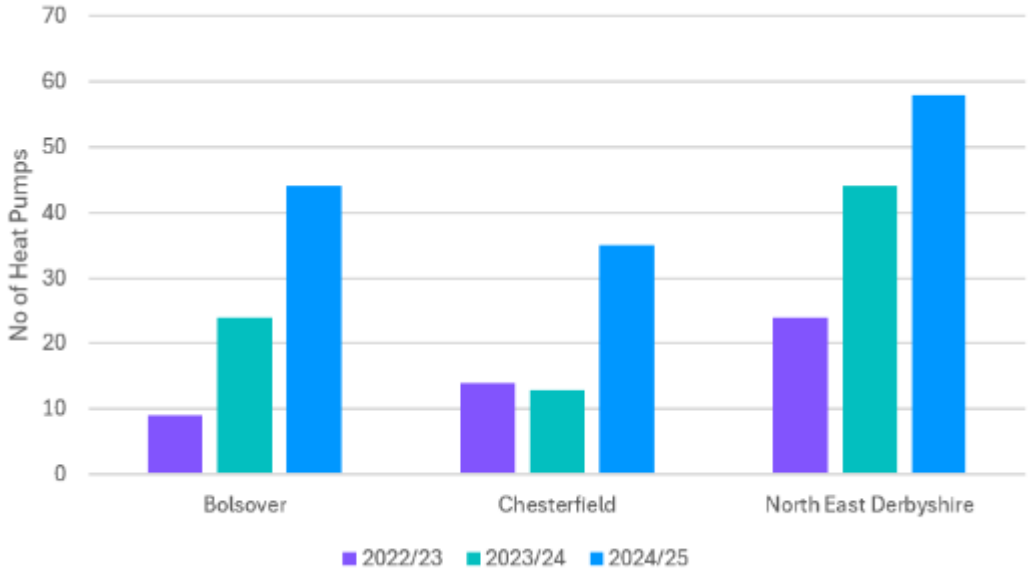
Government data also tracks heat pump installations at the local authority level through the Boiler Upgrade Scheme. Figure 7.4 shows that all three Local Authorities follows the regional trend, with an increasing trend in installation numbers.

Figure 7.3: East Midlands historical heat pump installations



Source: Heat pump deployment statistics: June 2025 - GOV.UK

Figure 7.4: Chesterfield, North East Derbyshire and Bolsover Boiler Upgrade Scheme Heat Pump Installations



Source: Boiler Upgrade Scheme statistics: August 2025 - GOV.UK

In the 2024/25 financial year, Chesterfield, North East Derbyshire and Bolsover recorded 35, 58 and 44 heat pump installations through the scheme. With over 46,082 homes in Chesterfield, 47,364 homes in North East Derbyshire and 37,124 homes in Bolsover using natural gas and an average boiler lifespan of 15 years, the region sees roughly 6,000 gas boiler replacements each year. However, less than 3% of these replacements are currently switching to heat pumps due to ongoing high upfront costs of installations, installation complexity and requirements for additional insulation before installations go ahead which we know to be expensive and complex in itself as per section 6.

To decarbonise domestic heating in the region, this percentage must rise sharply. Even if boiler replacements are banned in the 2030s, proactive measures are needed now to accelerate uptake in the short term.

7.1.3 Do Nothing

The Do Nothing scenario here assumes minimal policy requirements for heat decarbonisation. The only assumed policy intervention in this area is a ban on fossil fuel heating in new builds from 2030[31], with no policy implemented regarding the removal of fossil fuel heating systems from existing buildings.

While there is noticeable growth in heat pumps, most of these installations are assumed to be from the fossil fuel boiler ban in new builds, with only a small percentage occurring from existing gas boilers changing systems. Heat pump uptake is expected to be very low due to the lack of policy incentives and grant funding available. However, after 2035, gas boiler to heat pump conversions are expected to pick up slightly as per the planned phase-out of fossil fuel boilers.

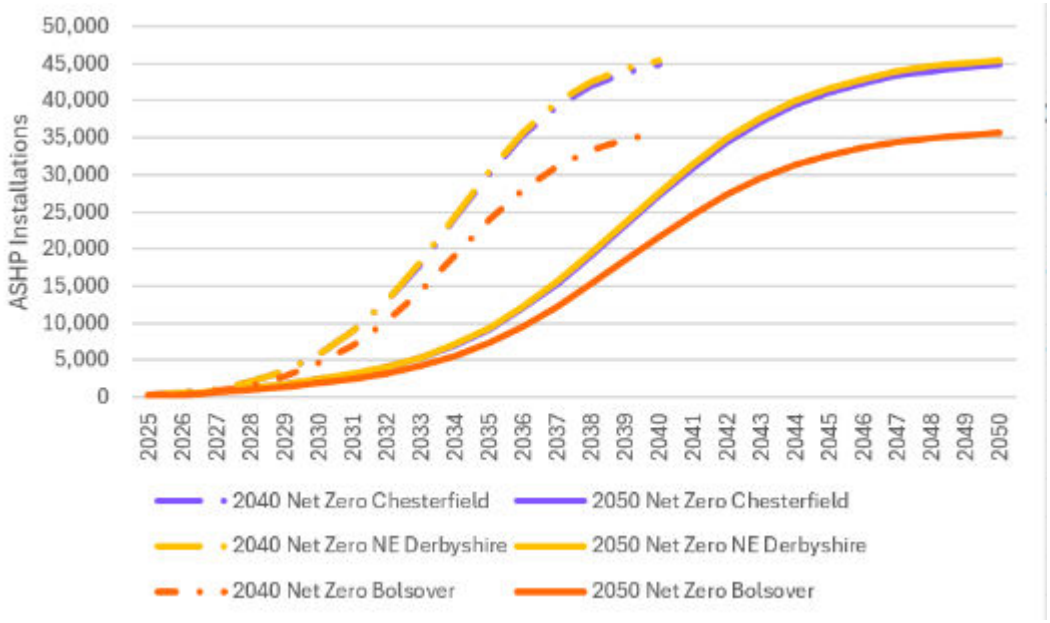
7.1.4 Intervention Methodology

We have considered feasible installation of ASHP in all building types that are currently using any fuel type other than electricity or biomass. The digital twin has been used to model the changes in energy use and carbon emissions from the switching of fossil fuel boiler systems to heat pumps.

The additional peak electrical demand and annual electricity consumption has been built into the projected modelling for carbon emissions reduction and impacts on the local grid. Therefore, the buildings' new total electricity consumption, post heat electrification, equals their electricity consumption post retrofit, plus the demand of the ASHP. For buildings already with an electrical heat source, it has been assumed that this will stay the same.

[31] Note that the new Future Homes Standard, summarised in Section 2.1.9 now legislates for no fossil fuel heating in new builds from 2025, at the time of the DFES publication this date was still set to be 2030

Figure 7.4: 2050 and 2040 scenario domestic heat pump uptake



7.1.5 Scenarios Overview

The two net zero scenarios developed as part of this LAEP anticipate significantly more installations to take place compared to the Do Nothing, by assuming all homes will have a low-carbon heating system by the net zero year.

The 2040 and 2050 scenarios assume a full electrification of space heating, with no hybrid heat pump installations. This scenario assumes a relatively consistent, steady uptake of heat pumps, which accelerates slightly in the mid-2030s in all three council areas. The annual uptake rates for the 2050 Net Zero scenario are set out in Figure 7.5.

All new builds are assumed to have a low carbon heating system, as per the Future Homes Standard, however the challenges lie with existing housing due to space constraints and the need for fabric upgrades in older housing stock as discussed in Section 6.

Heat pumps operate less efficiently in older buildings as they incur higher heat losses and may struggle to maintain thermal comfort in cold weather conditions. Therefore, it is important that fabric retrofit improvements are undertaken in such buildings as soon as possible to reduce the costs incurred by running them as well as achieving the necessary COP level for adequate thermal comfort.

Figure 7.5: Annual domestic ASHP installations in preferred scenario

Year	Annual percentage uptake	Chesterfield 2050 Annual uptake	NE Derbyshire 2050 Annual	Bolsover 2050 Annual
2025	0%	40	41	32
2026	0.71%	318	322	252
2027	0.82%	368	373	292
2028	0.98%	439	444	348
2029	1.20%	540	547	429
2030	1.52%	680	689	540
2031	1.50%	672	681	534
2032	2.08%	933	945	741
2033	2.85%	1276	1,293	1,013
2034	3.81%	1708	1,731	1,357
2035	4.96%	2223	2,253	1,766
2036	6.23%	2790	2,828	2,216
2037	7.47%	3346	3,391	2,658
2038	8.48%	3800	3,850	3,018
2039	9.05%	4057	4,112	3,223
2040	9.05%	4057	4,112	3,223
2041	8.48%	3800	3,850	3,018
2042	7.47%	3346	3,391	2,658
2043	6.23%	2790	2,828	2,216
2044	4.96%	2223	2,253	1,766
2045	3.81%	1708	1,731	1,357
2046	2.85%	1276	1,293	1,013
2047	2.08%	933	945	741
2048	1.50%	672	681	534
2049	1.07%	478	485	380
2050	0.76%	338	343	269

Overall, 125, 817 installations are modelled as required across the region by the net zero year. This is expected to reduce 1,021 GWh of gas consumption and result in 356 GWh of electricity consumption.

Space constraints in existing housing, particularly flats and terraced houses, present challenges to heat pump installation due to the required hot water cylinder to go alongside it. Social housing providers may be able to install heat pumps alongside the necessary insulation upgrades.

Regulatory changes to permitted development rights for ASHPs remove barriers like the 1-meter boundary rule for ASHP, which also make installations easier for more homes and can be expected to boost uptake significantly alongside the planned phase-out of fossil fuel boilers by 2035.

Collectively, these results highlight the significant contribution that low-carbon heating technologies can make toward local and regional decarbonisation objectives, reinforcing the importance of sustained investment in retrofit support, installer capacity, and grid infrastructure to enable continued growth in heat pump deployment.

7.1.6 Modelled Interventions

The technologies considered for heating decarbonisation are set out in Table 7.1. Of these, air source heat pumps (ASHPs) are the most viable and economical option going forward due to grid decarbonisation and their high efficiencies, providing heat for the building while meeting the Net Zero targets.

In comparison, GSHPs offer slightly higher efficiencies than ASHPs but come with higher upfront costs and require sufficient outdoor space for ground loops. Direct electric heating, though simple to install, is far less efficient and results in higher running costs and electricity demand. Finally, district heat networks can provide low-carbon heat in dense urban areas or large developments but are generally less cost-effective or practical for dispersed and rural housing.

ASHPs are electrically powered and use refrigerant to extract low grade heat from the air, which is then upgraded using compression. The resulting heat is then transferred to a wet central heating system through a plate heat exchange. The efficiency of a heat pump is known as Coefficient of Performance (COP) and measures the heat output in kWh of heat produced per kWh of electricity used (i.e., a system that produces 3kWh of heat per kWh of electricity has a CoP of 3). In our modelling, anticipated demand for ASHPs was represented by the building's new electrical consumption for space heating and DHW, with an assumed COP of 2.7.

Table 7.1: Heating Technologies

Technology	Description
Fossil Fuel Boiler	Heating technology that combusts fossil fuels to heat water for space heating and DHW demands. Most of these installations currently in the County use natural gas as the fuel source, although there are some using LPG and Oil in the off-gas grid postcodes. This is the most common heating system for domestic buildings in Chesterfield, North East Derbyshire and Bolsover.
Direct Electric	This category of heating technologies includes electric boiler, electric storage heaters, electric heat batteries and other direct electric technologies. They are typically cheaper to install than heat pumps, but more costly to run due to their lower efficiency. Any home currently with this technology is assumed to keep it in all scenarios. Some homeowners and landlords may opt to install one of these technologies instead of a heat pump.
Air Source Heat Pump (ASHP)	Electrical heating system that takes heat from the ambient air outside and delivers it internally, consuming electricity. This technology typically has significantly higher efficiencies compared to direct electric or fossil fuel boilers, of between 2.5 and 3.0. All heat pump uptake is assumed to be air source, unless otherwise specified.
Ground Source Heat Pump	Similar to an air source heat pump, but extracts heat from the ground via boreholes or pipes. Will typically have a higher efficiency compared to an ASHP, but usually require a garden and are costly and disruptive to install. These will likely represent an alternative to an ASHP for homes and buildings with available external space, that can front the additional capital required.
District Heat Network Connection	Some buildings in Chesterfield, North East Derbyshire and Bolsover may be able to decarbonise their energy usage by connecting to a district heating network; however, these are location specific and only in a feasibility stage for the area. District heat networks supply heat to buildings via hot water in underground pipes, from a centralised plant. See Section 7.3 for more details.
Hydrogen Boilers	Similar to a fossil fuel boiler but provides heat through burning hydrogen. If this hydrogen is considered 'green' (created via renewables) or 'blue' (created via carbon capture and storage of fossil fuel combustion) then it can be considered low carbon. This heating technology has not been considered for the regional LAEP, due to hydrogen for space heating not being considered viable as part of this programme, however it should be noted that some industrial process loads could having hydrogen as a possible alternative fuel source.

7.2 Non-Domestic Sector

Current share of electric heating	
Chesterfield	40%
NE Derbyshire	36%
Bolsover	41%

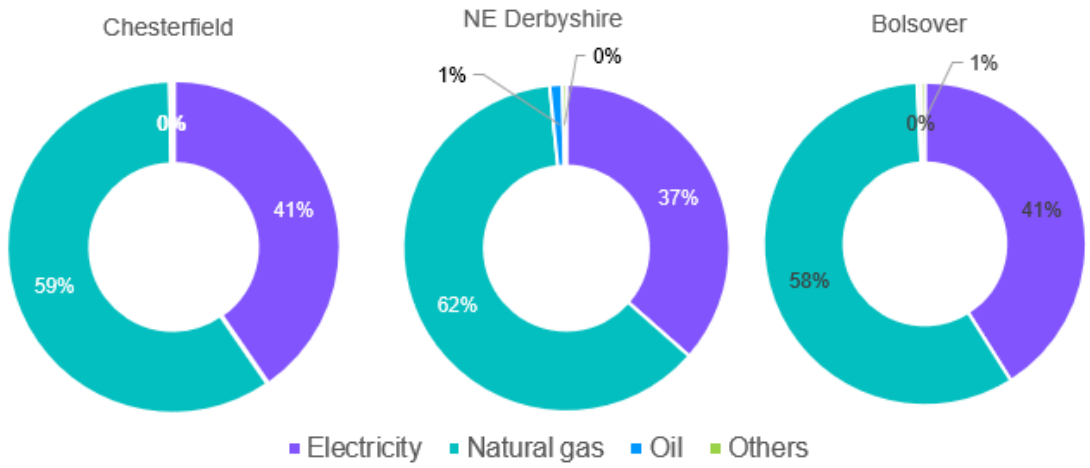
Required ASHPs for Net Zero	
Chesterfield	1,645
NE Derbyshire	1,121
Bolsover	804

7.2.1 Existing System

Alongside the domestic sector, the non-domestic will require the uptake of low-carbon heating technologies to decarbonise emissions associated with space heating across Chesterfield, North East Derbyshire & Bolsover.

In comparison to the domestic sector, there is more diversity in the heating fuel types in place, as shown in Figure 7.6. Between 59%, 62% and 58% of non-domestic properties in Chesterfield, North East Derbyshire & Bolsover respectively utilise natural gas for space heating and hot water, with approximately 40% of properties using electricity. The electrically heated properties do not require replacement systems, identifying that proportionally fewer properties require interventions than domestic properties.

Figure 7.6: Non-domestic heating split by Fuel Type for Chesterfield, North East Derbyshire & Bolsover (%)



7.2.2 Scenarios Overview

Figure 7.7: Annual installations of non-domestic ASHP in the preferred scenario

Year	Annual percentage uptake	Chesterfield 2050 Annual uptake	NE Derbyshire 2050 Annual	Bolsover 2050 Annual
2025	0%	1	1	1
2026	0.71%	12	8	6
2027	0.82%	13	9	7
2028	0.98%	16	11	8
2029	1.20%	20	13	10
2030	1.52%	25	17	13
2031	1.50%	25	17	13
2032	2.08%	34	23	17
2033	2.85%	47	32	24
2034	3.81%	63	43	32
2035	4.96%	82	56	42
2036	6.23%	102	70	52
2037	7.47%	123	84	63
2038	8.48%	139	95	71
2039	9.05%	149	101	76
2040	9.05%	149	101	76
2041	8.48%	139	95	71
2042	7.47%	123	84	63
2043	6.23%	102	70	52
2044	4.96%	82	56	42
2045	3.81%	63	43	32
2046	2.85%	47	32	24
2047	2.08%	34	23	17
2048	1.50%	25	17	13
2049	1.07%	18	12	9
2050	0.76%	12	8	6

Building on the approach applied to the domestic sector (see Section 7.1.5), the non-domestic modelling adopts consistent assumptions on technology performance, uptake rates and policy influences, while incorporating adjustments to reflect the differing characteristics of commercial, industrial and public buildings. ASHPs have been identified as the most feasible low-carbon heating option across the non-domestic stock, owing to their modular scalability, lower spatial requirements, and simpler installation compared with ground source systems.

Many non-domestic buildings also benefit from suitable external areas such as rooftops, service yards and plant enclosures that can accommodate ASHP units without major disruption. In addition, their higher and more consistent heating loads allow larger-capacity ASHP systems to operate efficiently and deliver substantial energy savings at scale. These assumptions have been applied consistently across the 2040 Net Zero and 2050 Net Zero scenarios.

The net zero scenarios assume a reduction in the total number of non-domestic properties using other types of electric heating, assuming that many will transition to heat pumps as the technology matures and funding becomes available. All properties not in the vicinity of a potential district heat network were marked as requiring a heat pump – those buildings which are already using an older less efficient electric heating system will likely require upgrading.

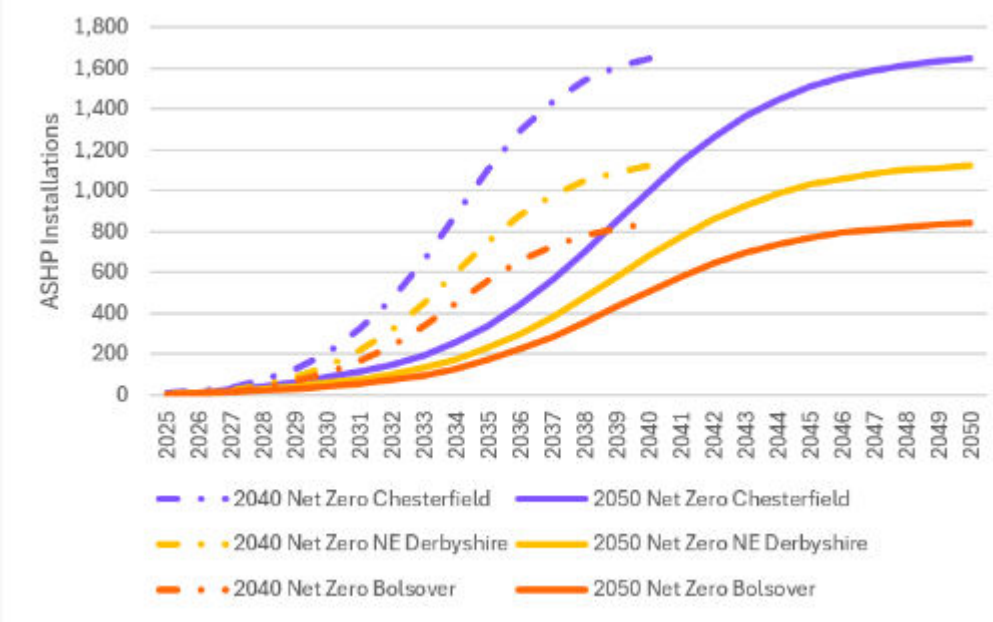
This is based on the replacement rate of boilers with a 15-20 year life span, using historic ASHP installation data to inform the rate at which heat pumps would be installed. Efficiency is assumed to be 85% for gas boilers and 270% for ASHPs, and ASHP CAPEX is £11k.

As heat pump technology improves and installation costs fall, larger scale heat pumps will become more accessible and cost effective which some non-domestic users and businesses may be suited to apply in a shared system.

Overall, the net zero scenarios require 3,606 regional non-domestic ASHP installations, resulting in reduced gas demand of 330GWh, and additional electricity demand of 122 GWh. The 2040 pathway delivers substantial cumulative gas savings earlier than the 2050 scenario, reflecting faster adoption under more ambitious decarbonisation timelines. Differences between councils largely stem from variations in building stock, heating demand intensity and retrofit potential, but the overall trend remains consistent.

It is critical financial support is available for more non-domestic buildings which already have good capability for heat pump use, to enable these buildings to upgrade their fabric to be able to quickly adopt heat pump technology.

Figure 7.8: 2050 and 2040 scenario domestic heat pump uptake across Chesterfield, North East Derbyshire and Bolsover



7.3 District Heating

At present, Chesterfield, North East Derbyshire & Bolsover do not have an operational large-scale district heat network. Heat provision across the area is dominated by individual gas boilers, with limited deployment of communal systems. This reliance on decentralised fossil fuel heating remains a key driver of local carbon emissions and contributes to fuel cost volatility.

7.3.1 Emerging Heat Network Developments in Chesterfield, North East Derbyshire and Bolsover

Several locations within these districts have been assessed against key feasibility criteria, including the presence of low-carbon heat sources, suitable anchor loads, and geographic constraints. As summarised in Table 7.2, viable zones include Chesterfield Town centre, and Dronfield, in North East Derbyshire. These areas offer strong anchor loads and manageable constraints, making them suitable for initial exploration.

Future heat networks in these areas would likely integrate large-scale heat pumps, thermal storage, and flexible backup generation to ensure reliability and cost optimisation. Development will require close collaboration between local authorities, developers, and energy providers to align planning policy, zoning, and investment strategies.

Table 7.2: Summary of Potential Heat Network Zones

Zone	Low Carbon Heat Source	Anchor Loads	Key Constraints / Notes	Included in LAEP?
Chesterfield Town Centre	River Rother/ Canal	Primary Schools Retail/Industrial sites	TBC	Yes
North East Derbyshire - Dronfield	River Dron, Waste heat from Bakery/Food production site	Good domestic potential	The location of the railway line could prove to be an infrastructure barrier	Yes

Figure 7.9 and Figure 7.10 present the indicative district heating zones for Chesterfield and North East Derbyshire, respectively. These maps highlight areas with concentrated heat demand and suitable building types for network deployment. The Chesterfield Town Centre has an estimated total network heat demand of 233 GWh/year and associated emissions of 17 $ktCO_2$/year, while the Dronfield zone in North East Derbyshire shows a heat demand of 118.7 GWh/year and emissions of 27.8 $ktCO_2$/year. These figures are derived from LAEP modelling, which aggregates building-level energy consumption data for domestic and non-domestic properties within the proposed district heating area.

The maps provide a spatial view of where initial development could be most viable, based on demand density and anchor load distribution. With a similar level of demand addressable in each zone, each should be assessed for feasibility in the near term. All these areas offer opportunities for phased expansion to smaller commercial and domestic customers over time.

Figure 7.9: Potential Heat Network Zone in Chesterfield

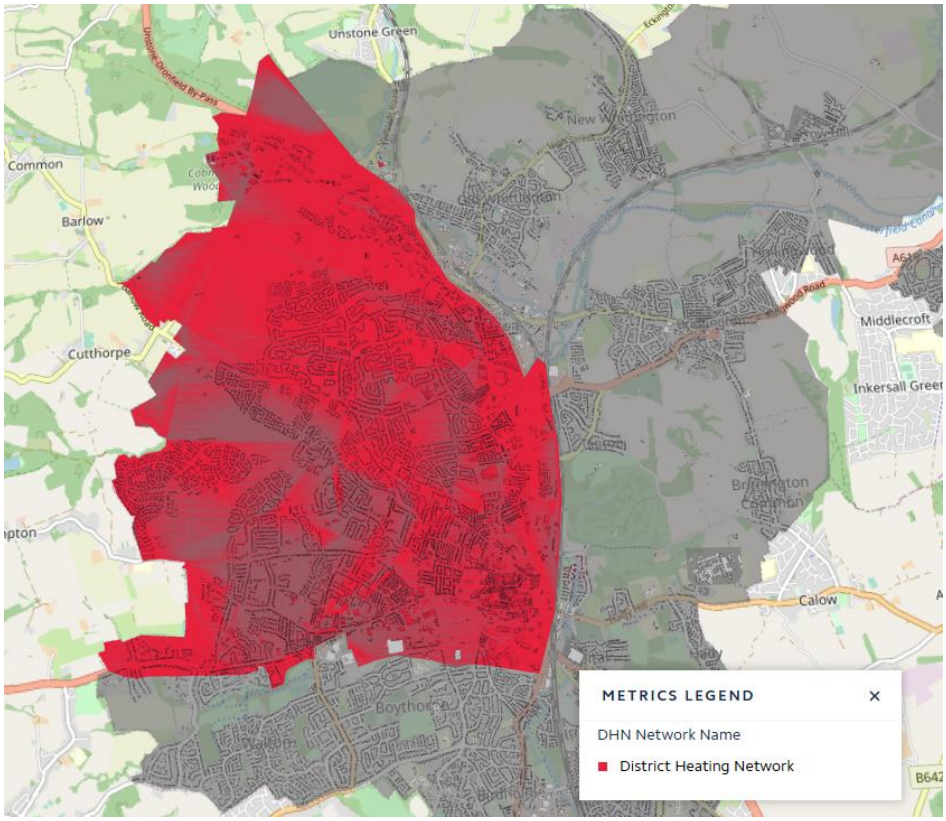
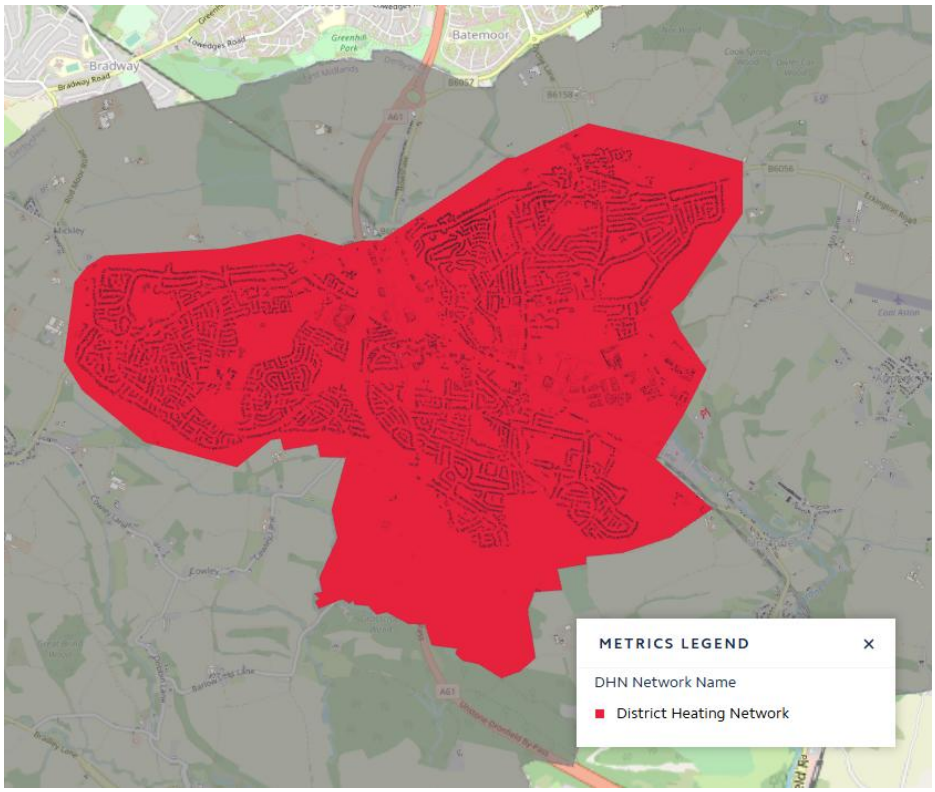


Figure 7.10: Potential Heat Network Zone in North East Derbyshire



7.3.2 Policy and Market Drivers

The UK Heat Network Zoning (HNZ) Regulations[32], which are due for rollout out in 2026 (however, keep being pushed back) under the Energy Act 2023,could be a key catalyst for local heat network delivery across Chesterfield, North East Derbyshire & Bolsover. HNZ will define areas where heat networks represent the lowest-cost decarbonisation pathway, and within these zones certain building types, such as large public, commercial, and multi-residential developments, will be required or strongly encouraged to connect.

For all three local authorities, zoning provides clear spatial and policy signals about where networks are technically and economically viable. Embedding this framework allows the council areas to align heat-demand mapping, anchor-load identification, and spatial planning policy with designated zones. This integration helps to:

- Direct investment and development activity toward areas with strongest heat network potential
- Secure anchor connections from public-estate or regeneration sites
- De-risk private-sector investment by demonstrating long-term demand certainty
- Strengthen funding bids to programmes such as the Green Heat Network Fund

Alongside the introduction of national consumer-protection and technical-performance standards, Heat Network Zoning will create a more stable and transparent market for heat network projects. By incorporating these policy mechanisms, Chesterfield, North East Derbyshire & Bolsover can ensure that heat networks are developed as part of a coordinated, place-based energy and planning strategy, supporting net-zero targets while enabling predictable, low-carbon heat for communities and businesses.

[32] Heat network zoning - GOV.UK

7.3.3 Obligation to Connect

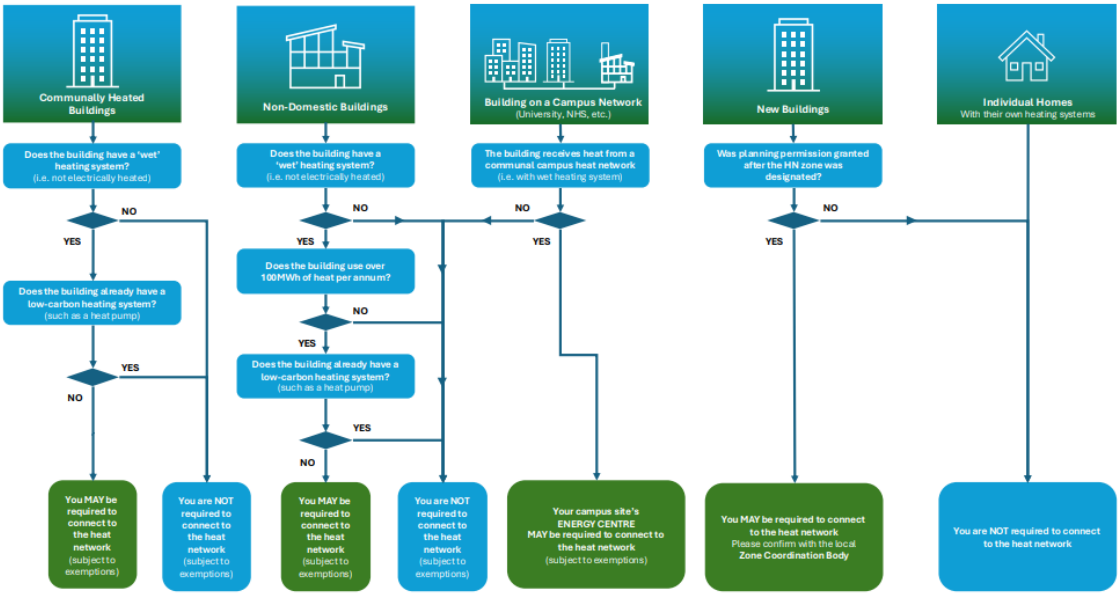
Under the Heat Network Zoning Regulations, once an area has been designated as a heat network zone, certain types of buildings and heat sources are required to connect to the heat network. Buildings within these designated zones must connect if they meet any of the following criteria:

- They are new developments.
- They undergo major refurbishment.
- They are large, non-domestic properties with significant heat demand over 100MWh.

Exemptions may apply where connection is deemed technically or economically infeasible, based on a defined set of criteria to ensure fairness and practicality.

In addition, potential sources of waste heat within the zone may also be required to supply heat to the network.

Figure 7.11: Buildings that may be required to connect



Source: Heat network zoning proposals overview: slidedeck

7.3.4 Next Steps

To fully realise this opportunity, coordinated action will be essential across stakeholders. Key priorities include supporting zoning implementation, securing anchor load commitments, and aligning local planning and development policies with heat network rollout. As networks expand, they are expected to become a cornerstone of sustainable infrastructure in Chesterfield and North East Derbyshire, enabling future connections and integration of additional renewable and low-carbon technologies.

8 Industrial Decarbonisation

This section examines the current industrial process loads across the area and models the expected changes in energy sources required to achieve full decarbonisation. Data from Gas Distribution Network has been used to map existing process loads. The analysis assumes that most low-temperature process loads will transition to electrification, while the majority of high-temperature process loads will require a shift to hydrogen.

8.1 Methodology

To analyse the industrial process loads currently operating in Chesterfield, North East Derbyshire & Bolsover, metered gas data for the non-domestic sector was obtained from the government and Gas Distribution Network at a high level. Local knowledge and further investigations were then conducted to derive an approximate view of which organisations were most likely to be the highest gas users in the given areas. This provides information on the gas consumption of each connection to the gas network from a non-domestic building. Across the region, the top 200 non-domestic gas users were selected for further analysis, representing 68% of total non-domestic gas demand. Of these, 18 sites are within the area covered by this LAEP, with 10 in Chesterfield and 8 in North East Derbyshire.

The primary use of each connection is determined from their standard industrial classification (SIC) code, which is an internal numbering system used by the GDN to indicate the use of each commercial and industrial connection. A description of the primary uses matched to each code has also been provided by the GDN to facilitate this process. Each SIC code primary use that is present in the area is then assigned as either low temperature, or high temperature, based on information gathered directly from stakeholders or site owners during one-on-one engagements with high energy users or industrial operators. Where such stakeholder input was unavailable, an informed assessment is made of the degree of heat required for the majority of process loads for that specific industry.

From the above process, the existing low and high temperature process loads of the major gas consumers in the area can be modelled and mapped at MSOA level. These loads are then used to calculate the projected requirements for additional electricity and hydrogen demand required to decarbonise low temperature and high temperature process loads respectively, through phasing out industrial fossil fuel use.

To model the projected changes in energy consumption and the associated carbon emissions for industrial process loads, the analysis assumes that all low-temperature process loads will transition to electrification, while all high-temperature process loads will convert to hydrogen. It is important to note that the low-temperature category includes certain industries that do not currently have cost effective technology available on the market to electrify but likely will within the next ten years or so. The high-temperature category generally refers to processes requiring heat in the range of 150°C to 200°C.

Given the level of data granularity available, the analysis should be considered most representative at the Local Authority level rather than on a site-by-site basis. Further engagement with large industrial energy users will be required over the delivery timeframe of the LAEP in order to better understand their specific requirements for low-carbon energy sources.

8.2 Overview of Key Industrial Sectors

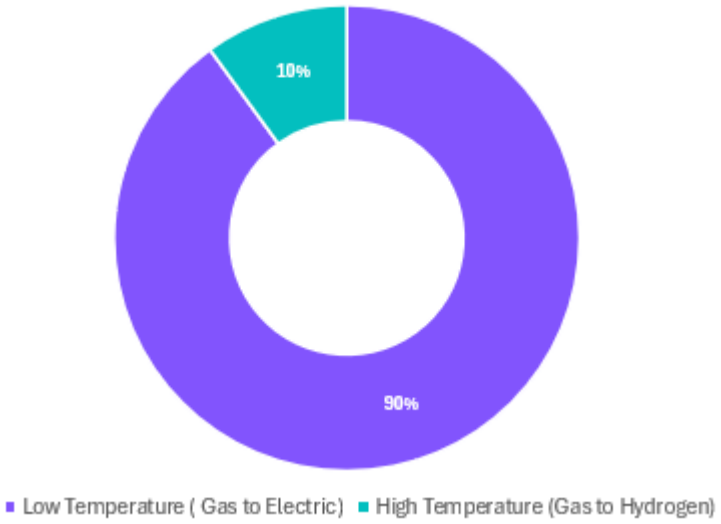
The economies of Chesterfield, North East Derbyshire and Bolsover are shaped by manufacturing, engineering, logistics, retail and public services. These districts retain a strong industrial base, particularly in metals, engineering and food and drink production, which continues to drive a significant share of non-domestic energy use. Industrial and commercial gas demand is especially influenced by large sites that operate heat intensive or continuous processes.

Alongside the major energy users, there are extensive industrial estates that accommodate many smaller businesses. Their combined energy consumption is substantial and reflects a wide variety of operational needs and fuel use, which can be difficult to interpret without deeper engagement. Chesterfield also has a sizeable town centre commercial sector with retail, hospitality and public services contributing notably to electricity and heat demand.

Overall, the sub region has a diverse and distributed pattern of industrial and commercial energy demand. The mix of large sites and varied industrial estates highlights the need for targeted engagement to understand processes, assess electrification potential and identify opportunities for low carbon heat and energy efficiency.

8.3 Existing System

Figure 8.1: Breakdown of process loads by energy demand



Source: Mott MacDonald Analysis of GDN Data

Figure 8.1 above illustrates the current natural gas consumption for industrial process loads in Chesterfield, and North East Derbyshire, segmented into low-temperature and high-temperature categories. Energy demand is split approximately equally between high and low temperature processes, based on the analysis. A detailed breakdown of the top non-domestic gas-consuming sites, including annual consumption and associated carbon emissions, is provided in Appendix D.

Given this context, the path to decarbonisation must be tailored to the nature of the thermal demand. High-temperature processes, due to their intensity and technical requirements, are

less amenable to electrification and will likely require low-carbon hydrogen as a viable alternative. In contrast, low-temperature processes, which generally involve heating below 100 degrees Celsius are more suitable for electrification, especially with the increasing availability of renewable electricity. This distinction is crucial for developing targeted strategies to reduce industrial emissions.

8.4 Decarbonisation Requirements

The rate of conversion for process loads from natural gas to hydrogen and electricity is based on the Climate Change Committee's 7th Carbon Budget advice to government, which sets out a pathway for the uptake of hydrogen and electrification for industrial loads that is compatible with 2050 Net Zero. The detailed uptake rates and associated demand levels for the 2050 Net Zero scenario are shown in Figure 8.2.

Figure 8.2: Annual conversion rates of process natural gas demand in preferred scenario

	Hydrogen		Electrification	
	2050		2050	
Year	Annual Percentage Conversion	Annual Conversion (MWh)	Annual Percentage Conversion	Annual Conversion (MWh)
2025	0%	0	1%	2,136
2026	0%	0	1%	2,136
2027	0%	0	2%	4,272
2028	0%	0	2%	4,272
2029	0%	0	4%	8,544
2030	2%	41	6%	12,815
2031	2%	41	6%	12,815
2032	2%	41	6%	12,815
2033	4%	81	8%	17,087
2034	4%	81	8%	17,087
2035	4%	81	8%	17,087
2036	8%	162	8%	17,087
2037	8%	162	8%	17,087
2038	8%	162	8%	17,087
2039	8%	162	4%	8,544
2040	8%	162	4%	8,544
2041	8%	162	4%	8,544
2042	8%	162	4%	8,544
2043	6%	122	2%	4,272
2044	6%	122	2%	4,272
2045	6%	122	2%	4,272
2046	4%	81	2%	4,272
2047	4%	81	0%	0
2048	0%	0	0%	0
2049	0%	0	0%	0
2050	0%	0	0%	0

The introduction of hydrogen as a significant low-carbon fuel is aligned to the planned timeline of the East Coast Hydrogen pipeline extension into the area, around the mid-2030s. It is important to note that the emissions reductions associated with conversion of processes to hydrogen depends largely on the emissions-intensity of the hydrogen production process. Additionally, hydrogen is in itself a potent greenhouse gas[33], so while it may not produce CO2 emissions in combustion, careful control and monitoring of leakage will be important to any implementation of hydrogen in processes.

Figure 8.3 shows the projected consumption of gas, electricity and hydrogen for process loads across the top industrial natural gas users.

[33] Global warming potential estimates for hydrogen vary but are around 10, meaning that over a 100-year period it would result in approximately 10 times the warming of the same mass of carbon dioxide.

Figure 8.3: Process Load Energy Consumption Projection

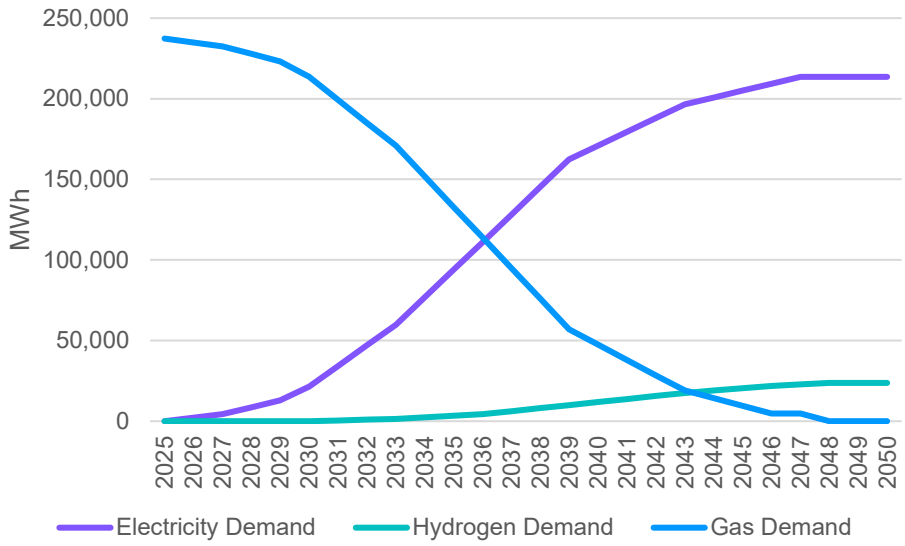


Table 8.1: Summary of Process load Emission Post Fuel Switch

Gas Consumption for Process Use (MWh)	Total Current Process Load Emissions (tCO2e)	Electrical Emissions post fuel switch (tCO2e)	Hydrogen Emissions Post Fuel Switch (tCO2e)	Total Process load Emissions Post Fuel Switch (tCO2e)	Percentage Reduction (%)
454,173	41,445	1,855	1,709	3,564	91%

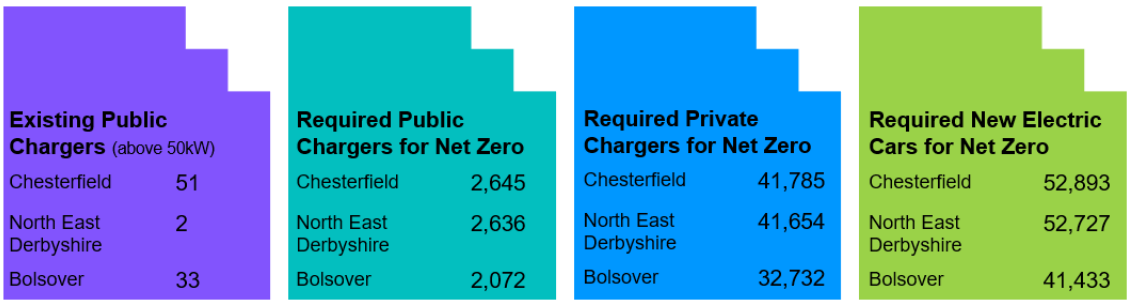
Table 8.1 provides breakdown of carbon emissions from process loads after the removal of fossil fuels, showing the respective contributions of electricity and hydrogen consumption. Electrifying process loads wherever feasible is essential because electricity generally has a lower carbon intensity than green hydrogen, which is assumed here to have an emissions intensity of 0.072 kgCO2e/kWh.

It is important to note that the analysis in this section focuses solely on industrial sites and companies connected to the gas distribution network, as these are the locations for which reliable process load data is available. It is noted, however, that several industrial sites across the area operate off the gas grid, relying instead on fuels such as oil, LPG, biomass, coal or other alternative energy sources. Due to limited data availability, these sites have not been fully represented within the current modelling. Nonetheless, many of these off-grid facilities have significant fossil fuel consumption and will require targeted decarbonisation pathways to transition away from these higher-carbon fuels.

To ensure a structured and timely transition, all industrial companies in Chesterfield, North East Derbyshire & Bolsover should develop comprehensive decarbonisation plans. These plans should clearly specify when each fossil-fuel-based process will be phased out and identify which alternative energy source, electricity or hydrogen, will replace it. Such planning is critical for achieving cost-effective, reliable, and sustainable industrial decarbonisation, including through leveraging a coordinated approach to developing a local and regional hydrogen supply chain.

9 Electrification of Private Transport

This section outlines the current state of transport emissions in Chesterfield, North East Derbyshire and Bolsover and the role electrified transport plays in reducing these. This section details the interventions modelled in the net-zero aligned scenarios to achieve decarbonisation of private vehicles.



9.1 Existing System

Transportation accounted for 28% of Chesterfield emissions, 43% of North East Derbyshire and 32% of Bolsover's emissions[34] in 2023, so supporting the decarbonisation of this sector is crucial to enable net zero achievement.

The scope of this LAEP (set out in Section 1.3) does not include transport planning, therefore this chapter focuses on the uptake of private electric vehicles only, as a key part of the transport sector decarbonisation challenge.

As of Q2 2025, the total number of licenced vehicles in Chesterfield is 75,416, 75,828 in North East Derbyshire and in Bolsover is 56,611,[35] 97.9%, 97.6 and 97.2% of which are petrol or diesel internal combustion engine (ICE) vehicles respectively. Of these vehicles, 69% are privately-owned. The number of licensed vehicles is expected to remain similar to current day volumes. Despite population growth increasing the total number of people who could have a vehicle, it is expected that future modal shifts will reduce the likelihood that an individual will own a vehicle, resulting in no material net change in overall volume.

Electric Vehicles (EVs) produce zero tailpipe emissions, which contributes to improved local air quality by not contributing to the levels of nitrogen oxides and particulate matter typically emitted by internal combustion engine vehicles. Therefore, expanding the current proportion of EVs to beyond its current level of 2.1%, 2.4 and 2.8% in the Chesterfield, North East Derbyshire and Bolsover fleets, respectively, is key to reducing the emissions from private transport.

9.2 Local Context

There are currently a total of 117 publicly available chargepoints in Chesterfield,20 in North East Derbyshire and 98 in Bolsover.[36] This equates to 112.4, 19.3 and 120.2 public chargepoints per 100,000 people respectively, Chesterfield and Bolsover have higher provision than the than the

[34] UK local authority and regional greenhouse gas emissions statistics, 2005 to 2022 - GOV.UK

[35] Vehicle licensing statistics data files - GOV.UK

[36] Electric Vehicle Public Charging Infrastructure Statistics: October 2025

East Midlands average of 78.2 chargepoints per 100,000 people, but lower than the England average of 129.8 chargepoints per 100,000.

As well as low access to public chargepoints, another barrier to EV adoption is practicality of private charging, specifically if a household only has access to on-street parking. 93% of current EV owners in the East Midlands have off-street parking, whereas only 68% of all East Midlands households have this access to easier private charging.[37] This means a considerable amount of work will be necessary to enable cross pavement charging or other solutions, to encourage all households to adopt EVs.

The Derbyshire Low Emission Vehicle Infrastructure (LEVI) Strategy aims to improve the regional situation by bringing particular focus to electric vehicles and setting specific targets to make EV ownership easier and less complex more affordable. The LEVI also aims to develop rapid and ultra-rapid charging hubs to support commercial and long-distance travel, and to strategically deploy infrastructure in residential, destination, and transit locations.

According to Midlands Connect the Midlands could have over 2 million electric vehicles (EVs) on the roads by 2030, with 32.5% of all vehicles expected to be electric[38]. To support this growth, 58,997 new public EV charging points will need to be installed across the region by the end of the decade. This translates to 27 new charging points per day, 194 per week, and 9,832 each year until 2030.

In Derbyshire, EV adoption is projected to increase by 440%, rising from 12,216 vehicles today to approximately 65,915 by 2030. Achieving this growth will require a significant expansion of public charging infrastructure to meet increasing demand. The research forecasts show Derbyshire requiring a further 6,949 public charging points by 2030 to support the increase in EV use over the next decade, a 1,534% increase from the 453 chargers existing across the region today.

9.3 Do Nothing

The Do-nothing scenario represents the best estimate of outcomes before the LAEP is implemented. In terms of modal shift (people switching to more sustainable modes of travel), this scenario assumes uptake is influenced solely by current mandated policies. As of 2025, these policies in the UK include the ban on the sale of new internal combustion engine (ICE) vehicles from 2030, as well as the Zero Emission Vehicle (ZEV) mandate, which requires vehicle manufacturers to sell an increasing proportion of zero-emission vehicles each year[39].

Whilst these existing policies would lead to the continued growth in trends of EV ownership, the insufficient charging infrastructure and lacking policy support would lead to limited progress towards decarbonisation. This highlights a significant scale of action would be required to shift the region away from reliance on petrol and diesel vehicles.

To evaluate this scale of intervention required, Midlands Connect conducted modelling to examine a business-as-usual scenario (BAU) through to 2050, as illustrated below.[40]

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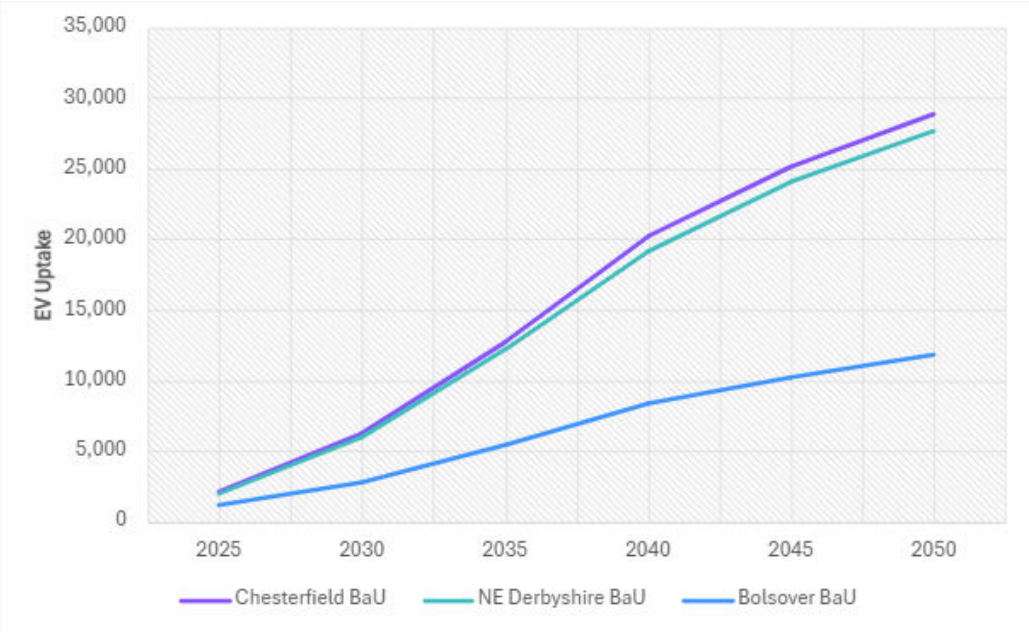
[37] https://www.midlandsconnect.uk/media/i1spcsr1/mc-supercharging-the-midlands-document.pdf

[38] Midlands Connect - Midlands still on track for EV boom, according to new research

[39] Phasing out sales of new petrol and diesel cars from 2030 and supporting the ZEV transition - GOV.UK

[40] STB EV Charging Infrastructure Visualiser

Figure 9.1:Do Nothing EV Uptake Scenario



Source: Mott MacDonald analysis based on Midlands Connect Business-as-Usual and Accelerated EV uptake projections

The Do Nothing estimates that 28,845 electric vehicles will be adopted by 2050 in Chesterfield, 27,624 in North East Derbyshire, and 11,790 in Bolsover, representing 42.9%, 36% and 21% respectively of currently licensed vehicles. Demonstrating that under existing policy conditions, the region is likely to fall considerably short of transitioning its entire vehicle fleet to zero-emission alternatives.

The Midlands Connect BAU scenario reflects projections based on current government policies that are confirmed and funded, as well as exogenous factors influencing adoption rates. This scenario anticipates that growth in the electric vehicle market will largely be shaped by factors such as national legislation and the natural turnover of the vehicle fleet. As this BAU scenario aligns with the criteria of the Do-nothing scenario within this LAEP, it has been adopted as the modelled Do-nothing scenario.

For the purpose of this LAEP, net zero is a requirement under different timescales, and this will mean an EV uptake in line with net zero targets. Therefore, to represent this, separate modelling was undertaken to forecast EV uptake in Chesterfield, North East Derbyshire and Bolsover by 2040 and 2050, in line with the Climate Change Committee's Seventh Carbon Budget.

9.4 Modelling Methodology

The modelling approach drew on 2021 ONS population data for Chesterfield, North East Derbyshire and Bolsover's MSOAs to determine the existing number of cars per area using a cars per capita assumption derived from midlands data.[41] By apportioning this national projection according to the region's population, the analysis provides locally specific estimates of EV uptake.

[41] Middle layer Super Output Area population estimates (supporting information) - Office for National Statistics

The uptake trends were modelled using the Climate Change Committees seventh carbon budget[42]. The CCC pathway is slightly more ambitious than the EV mandate through to 2035, citing reductions in EV costs as making this achievable. This pathway results in 97.5% of cars being battery electric by 2050. A large portion of the remaining 2.5% of cars is covered by other zero emission vehicle types including hydrogen fuel cell and biofuels. The final 1% of current transport emissions (made up of antique cars and 15-year-old ICE cars still in operation in 2050) is covered by nationally engineered removals like carbon capture.

To estimate the number of public EV chargers needed, a ratio of public chargers to EVs was taken from Midlands Connect 'Supercharging the Midlands' report[43] which cites 1-in-20, suitable for the more rural make up of Chesterfield, North East Derbyshire and Bolsover. As chargers are seen as a necessary precursor to mass EV adoption, the uptake curve of public chargers matches the uptake in EVs. Keeping the pace of charging infrastructure roll-out in line with growth in EVs is fundamental to growing public confidence in the viability of EV ownership and therefore achieving the emissions reductions required in private transport.

Similarly, private charger projections were derived using the EV uptake and an EV to private charger ratio based on Zapmap data and an assumption that development in cross pavement charging will enable the percentage of private charger installations to remain the same at 79%, even as uptake spreads further beyond households with off-street parking[44]. Further details of the assumptions used within the modelling are provided in Appendix B.

For the 2040 scenario (2040), the same uptake curve has been used accelerating from 2032, reaching the same final total volume as the 2050 scenario, ten years earlier. The total abated emissions differ from the 2050 scenario due to the changing grid emission intensity factor, across the transition timeline.

For the Do Nothing scenario (DN) the uptake curve has utilised the Midlands Connect BAU data. The annual percentage vehicle uptake in BAU compared to their accelerated uptake, is applied to our 2050 scenario uptake. For example, for the year 2050 the BAU scenario only has 40% of the volume of EVs in the accelerated uptake scenario, thus a factor of 40% is applied to the 2050 volume of EVs in our 2050 scenario to obtain the Do Nothing 2050 uptake value.

Relevant datasets used in the EV modelling are listed in Appendix B.

9.5 Results

EV uptake for Chesterfield, North East Derbyshire and Bolsover required from present day are 52,893, 52,727 and 41,433 EVs respectively, to achieve the 2050 and 2040 Net Zero scenarios.

These uptakes represent a significant proportion of the region's current fleet of vehicles, with the 2040 scenario requiring over 82% of the current fleet of vehicles to be replaced by 2035, and 59% in the 2050 scenario. To provide a sense of scale a quick calculation based on SMMT[45] and government[46] data shows that there are nearly 2 million cars registered a year and ~34 million cars licensed, resulting in an expected renewal rate to 2035 of 57% of the total car fleet. As this uptake will take place before the ban of the sale of new ICE vehicles, it will require significant additional coordinated policy interventions, incentives, and investment in supporting infrastructure to reduce the amount of fossil-fuel lock-in during this period.

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[42] https://www.theccc.org.uk/wp-content/uploads/2025/02/The-Seventh-Carbon-Budget.pdf

[43] https://www.midlandsconnect.uk/media/i1spcsr1/mc-supercharging-the-midlands-document.pdf

[44] Home and community EV charging stats

[45] 2024 (Full Year) Britain: New Car Market Overview and Analysis - Car Sales Statistics

[46] Vehicle licensing statistics, United Kingdom: 2024 - GOV.UK

Figures 9.2 shows the number of public and private EV chargers required in Chesterfield, North East Derbyshire and Bolsover under the modelled scenarios to support EV uptake.

As described in Section 9.4, this figure was derived from the 2025 ratio of EVs to private chargers, with the assumption that this proportion remains constant through to 2050. This reflects the expectation that many EV owners will prefer to have access to their own charger to ensure reliable charging.[47]

Figure 9.2: Required Number of private chargers

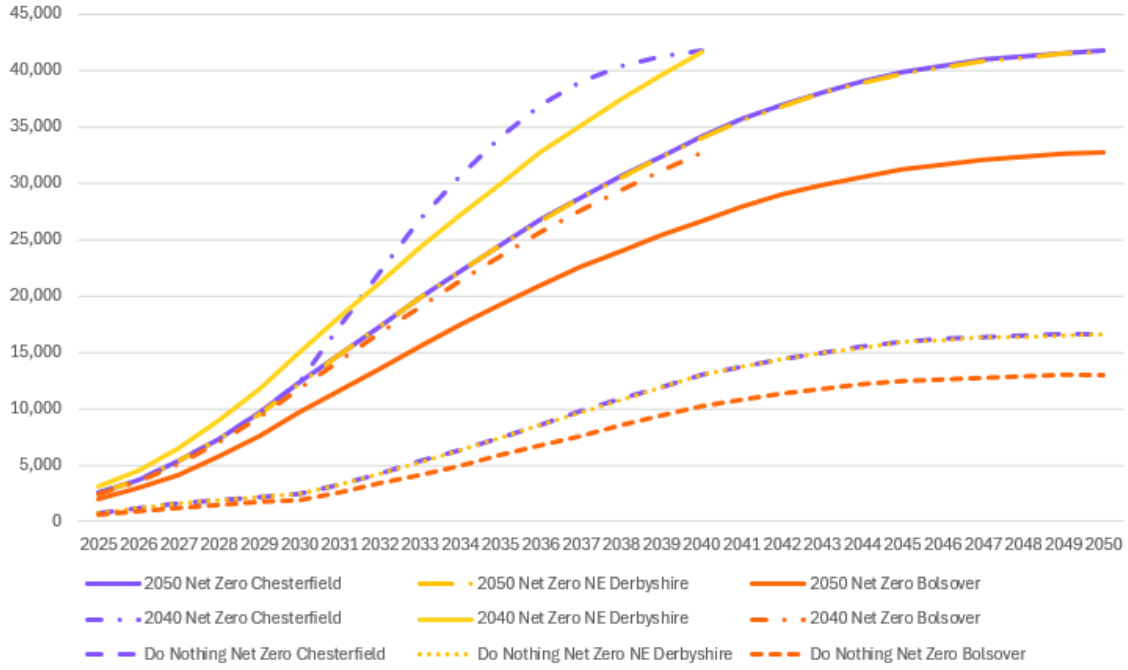
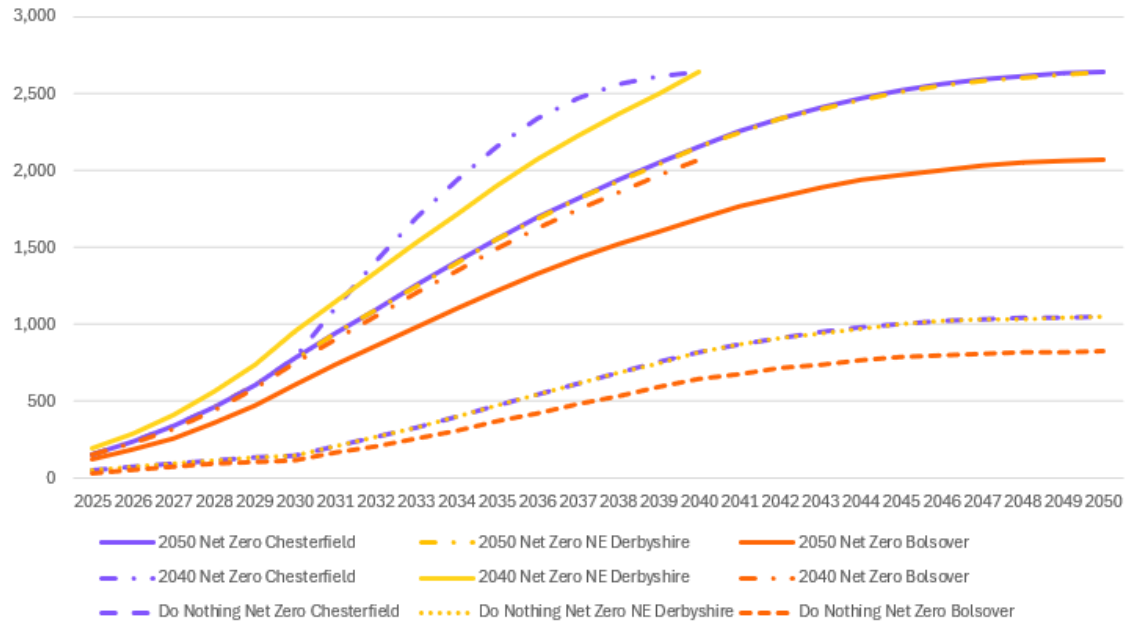


Figure 9.3: Required Number of public chargers



[47] Electric vehicle (EV) driver behaviours and attitudes tracker - GOV.UK

Alongside private chargers, public chargers play an important role in ensuring that charging points are accessible to all road users and giving drivers confidence in undertaking longer journeys. The LAEP pathway highlights that the rollout of public charging infrastructure must keep pace with the uptake of electric vehicles.

A total of 116,171 private and 7,353 public chargers were modelled for Chesterfield, North East Derbyshire and Bolsover to support the EV uptake for the 2040 and 2050 scenarios. This indicates a vast and comprehensive charging infrastructure would be required, with a broad distribution of chargers throughout the region to meet necessary charging needs. Charging points should be placed across the region so that they are accessible within a short distance, with placement decisions based on anticipated demand.

9.6 Impacts

9.6.1 Grid Impact of EV Infrastructure

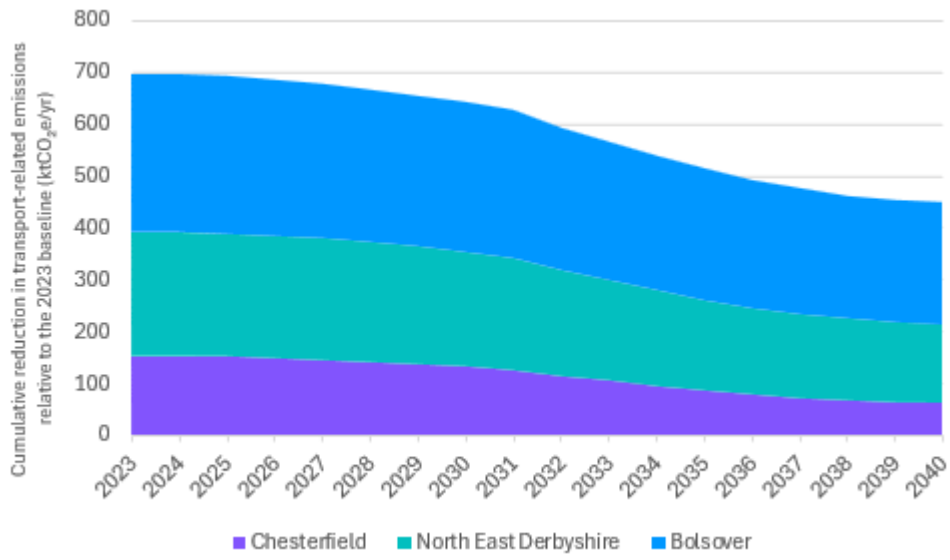
Chesterfield, North East Derbyshire and Bolsover will require more electricity to power these new EVs. It is key to determine which areas should take prioritisation when selecting the areas for continued EV charge point growth. Areas with high population densities, large coverage of flats and terraced housing, correlating with low percentages of off-street parking should take priority.

It will be crucial to work collaboratively and openly with the local Grid to ensure the region's grid is equipped to incorporate the extra demand increase EV use will bring, as well as the opportunities in Vehicle-to-Grid electricity storage flexibility. Please refer to Section 11 to find more information regarding impacts to the grid infrastructure.

9.6.2 Carbon Impact of EV Infrastructure

Figure 9.4 shows the cumulative reduction in transport-related emissions relative to a 2023 baseline, reflecting the impact of transitioning private vehicles from internal combustion engines to electric vehicles.

Figure 9.4: Total Abated Emissions from the transition away from Internal Combustion Engines ($ktCO_2e$/year)

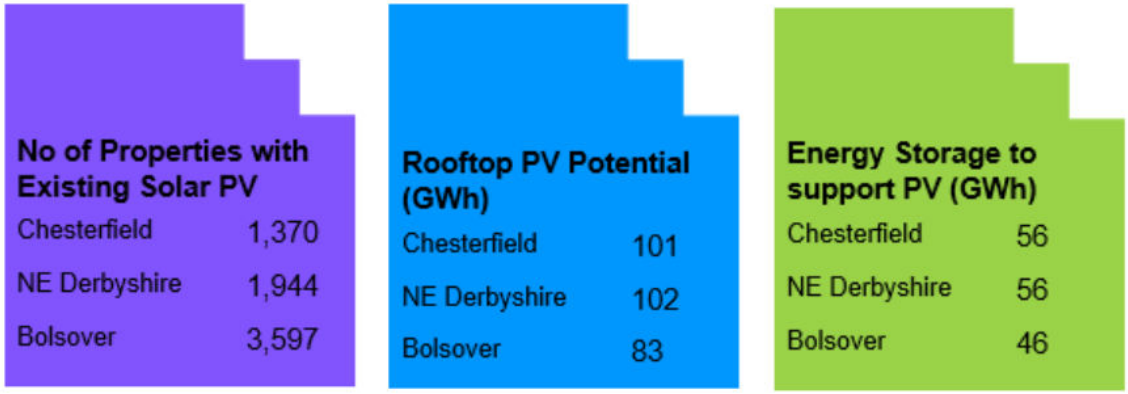


The analysis indicates that widespread uptake of electric vehicles could reduce transport-related emissions by approximately 59%, 37%, and 23% in Chesterfield, North East Derbyshire, and Bolsover, respectively. Given that transport currently accounts for around 32%, 28%, and 43% of territorial emissions in Chesterfield, North East Derbyshire, and Bolsover, these reductions in private vehicle emissions alone are equivalent to approximately 19%, 10%, and 10%, respectively, of each area's current total emissions. As the analysis does not account for decarbonisation of public, commercial, or freight vehicles, the overall emissions reduction from the transport sector would be expected to increase further as these vehicle types transition to low-carbon alternatives.

The results reflect abated emissions across the vehicle fleet and are driven by two primary factors: increased uptake of electric vehicles and the ongoing decarbonisation of the electricity grid. Under the 2040 and 2050 scenarios, average emissions per vehicle are projected to fall to 59 $kgCO_2$/year and 46 $kgCO_2$/year, respectively, from 1,641 $kgCO_2$/year in 2025. The slightly higher emissions intensity in the 2040 scenario reflects a higher assumed average electricity grid carbon intensity compared with 2050.

10 Local Generation

This section outlines the opportunity to deploy local generation to support the net zero scenarios for Chesterfield, North East Derbyshire & Bolsover. Overall, the generation considered in the LAEP is that likely to have local impacts, such as behind-the-meter solar PV and community energy schemes where the output is consumed locally. Utility-scale generation, which contributes to overall electricity grid decarbonisation is not considered within this LAEP.



10.1 Existing System

Chesterfield, North East Derbyshire & Bolsover's electricity demand is primarily met by the national electricity grid, while heat demand is mostly supplied by the national gas grid, and 6% of properties are off-gas-grid.[48] Most of the energy consumed in Derbyshire is sourced from outside the region, with local generation in 2021 totalling approximately 270.5 MW, mainly from renewable sources such as solar PV (76.2%), onshore wind (10.3%), and energy from waste (10%).

Most of the energy consumed in the districts is sourced externally, with limited local generation currently in operation. While granular asset-level data for Chesterfield, North East Derbyshire & Bolsover is not publicly available, regional datasets provide useful proxies.

While there is no policy mandating installation of rooftop solar on homes, recent trends [49] show continued growth in the region, with 180 properties in Chesterfield, 309 in North East Derbyshire, and 213 in Bolsover fitted with rooftop solar PV panels between January 2025 and February 2026.

10.2 Do Nothing

As outlined in Section 1, opportunities for large-scale distributed generation connected at distribution and transmission levels have been excluded from this LAEP analysis. These assets contribute to the national energy supply, and their associated emissions are already accounted for in the carbon intensity factors used for electricity consumption.

Chesterfield, North East Derbyshire & Bolsover's LAEP therefore focuses on distribution-connected and locally-influenced generation, such as rooftop solar and community-scale

[48] https://www.derbyshire.gov.uk/site-elements/documents/pdf/environment/planning/derbyshire-spatial-energy-study.pdf

[49] https://datadashboard.mcscertified.com/InstallationInsights

renewables. While there is currently no legislation mandating local generation, the government's clean power action plan does set out ambition for high level regions.

10.3 Context

Derbyshire's spatial energy strategy states that in terms of electricity supply, Derbyshire could develop between 50 and 300 MW of low carbon energy generation by 2040, including domestic and commercial solar PV, onshore wind, and supporting technologies like battery storage. This could meet up to 19% of electricity demand if deployed on domestic, commercial and industrial rooftops across the county, according to the Derbyshire Spatial Energy Strategy.

Battery Energy Storage Systems (BESS) present a promising opportunity for supporting the decarbonisation of Chesterfield, North East Derbyshire & Bolsover's energy systems, particularly at the domestic and commercial scale. When paired with rooftop solar PV, BESS can help maximise self-consumption of locally generated electricity, reducing reliance on the grid and improving energy resilience.

10.4 Intervention Methodology

A suitability assessment was undertaken using the calculated areas of rooftop space available and orientation of each building. The analysis assumes that solar PV panels could be optimally installed on 25% of feasible South, South-East, and South-West facing rooftops across Chesterfield, North East Derbyshire & Bolsover. This includes both domestic and non-domestic buildings. Suitability was determined based on roof orientation, size, and shading constraints with common architectural features such as hipped/gabled roofs, chimneys, and skylights reducing the number of viable installations. This approach draws on insights from previous R&D-funded projects focused on rooftop solar feasibility.

Under these assumptions, rooftop PV could enable up to 214 GWh of generation from domestic properties and 70 GWh from non-domestic buildings annually.

The average efficiency of solar panels is modelled at 18%. Domestic and non-domestic buildings are categorised as either single or multi-dwelling/unit, and total energy generation is calculated for each roof orientation (south, southeast, and southwest).

Although specific battery capacities (in terms of energy and power) are not calculated, it is assumed based on UK research that 45% of the photovoltaic energy yield is used by the building, while the remaining 55% is stored for later use. This storage capacity could be provided by a mix of technologies, such as home batteries or vehicle-to-grid connections. The share of storage to PV is representative at the local authority level, rather than at the individual property level, to allow for the flexibility in consumer choice and energy usage patterns.

10.5 Scenarios

Figure 10.1 illustrates the implementation of domestic and non-domestic rooftop solar PV installations for the 2040 Net Zero and 2050 Net Zero scenarios. The modelling assumes 100% uptake of eligible properties, defined as South, South-East, and South-West facing rooftops with suitable characteristics (see Section 10.4 for details). The uptake is projected to be fully realised by 2035 and 2040 for the 2040 and 2050 scenarios, aligning with the UK's anticipated grid decarbonisation and maximising the carbon reduction potential of rooftop solar generation. The detailed uptake rates are shown in Figure 10.1.

Since the carbon intensity of the electricity grid is expected to decline significantly by 2035, the greatest carbon benefit from rooftop PV occurs when installations happen before full grid

decarbonisation. Beyond this point, the marginal carbon savings from additional rooftop PV diminish.

Nonetheless, local expansion of grid capacity and generation capability will continue to bring benefits such as reducing grid connection and capacity constraints, particularly as electrification increases through technologies like space heating and EV charging. It also enhances demand-side response resilience, especially when paired with local storage capacity.

Figure 10.1: Rooftop PV annual uptake of installations in preferred scenario

Year	Annual Increase in Yield (MWh)			
	Annual % Uptake	Chesterfield	NE Derbyshire	Bolsover
2025	1.0%	646	651	535
2026	0.7%	737	743	610
2027	1.1%	1,126	1,135	932
2028	2.0%	1,983	1,999	1,642
2029	3.4%	3,457	3,486	2,863
2030	5.8%	5,812	5,861	4,814
2031	9.1%	9,117	9,193	7,551
2032	12.7%	12,798	12,905	10,599
2033	15.3%	15,390	15,517	12,745
2034	15.3%	15,390	15,517	12,745
2035	12.7%	12,798	12,905	10,599
2036	9.1%	9,117	9,193	7,551
2037	5.8%	5,812	5,861	4,814
2038	3.4%	3,457	3,486	2,863
2039	2.0%	1,983	1,999	1,642
2040	1.1%	1,126	1,135	932
2041	0.0%	0	0	0
2042	0.0%	0	0	0
2043	0.0%	0	0	0
2044	0.0%	0	0	0
2045	0.0%	0	0	0
2046	0.0%	0	0	0
2047	0.0%	0	0	0
2048	0.0%	0	0	0
2049	0.0%	0	0	0
2050	0.0%	0	0	0

Recent market analyses suggest that the cost of solar PV panels and battery storage systems is continuing to decline, driven by technological advancements, economies of scale, and supportive policy frameworks. For example, capital expenditure for battery energy storage in Great Britain has fallen by 30% since 2022, and further reductions are expected over the next five years. Global forecasts also indicate that battery storage costs could drop by up to 40% by 2030[50], making solar-plus-storage systems increasingly competitive with conventional energy sources.

In the context of this modelling, these cost trends support the assumption that solar PV and battery systems may become cost-effective for a majority of households within the next 5–7 years. This assumption influences the uptake trajectory in the net zero scenarios, where widespread adoption is required to meet carbon reduction targets.

The affordability of these technologies is a key enabler for achieving the area's 2040 and 2050 net zero targets, particularly in residential sectors where decentralised energy generation and storage can reduce grid dependency and enhance local energy resilience.

There is currently no direct funding available from the UK Government for domestic solar PV installations, which presents a significant barrier to uptake, not only for fuel-poor households, but also for middle-income families who may struggle with the upfront costs. This financial barrier risks slowing down the widespread adoption needed to meet Chesterfield, North East Derbyshire and Bolsover's net zero targets.

There is scope to encourage more widespread adoption of solar PV in the short term through community-owned renewable schemes, where a group of homeowners and landlords can communally purchase solar PV panels for their street or neighbourhood together. This helps to

[50] Outlook for battery demand and supply – Batteries and Secure Energy Transitions – Analysis - IEA

reduce costs through economies of scale and has the potential to save residents upfront costs and energy bills.

As shown in Figure 10.3, the MSOAs Bolsover 001 - Clowne & Barlborough, Chesterfield 012 - Spital & Hasland and North East Derbyshire 011 - North Wingfield & Pilsley show significant potential for solar rooftop installations compared to other areas.

Figure 10.2: 2050 scenario for domestic and non-domestic rooftop solar annual yield

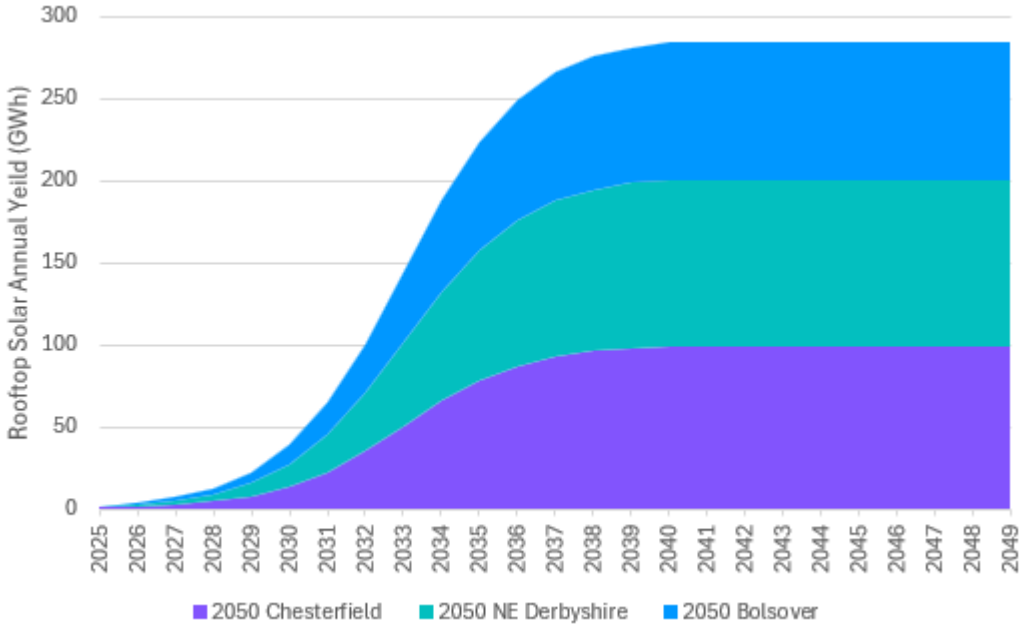
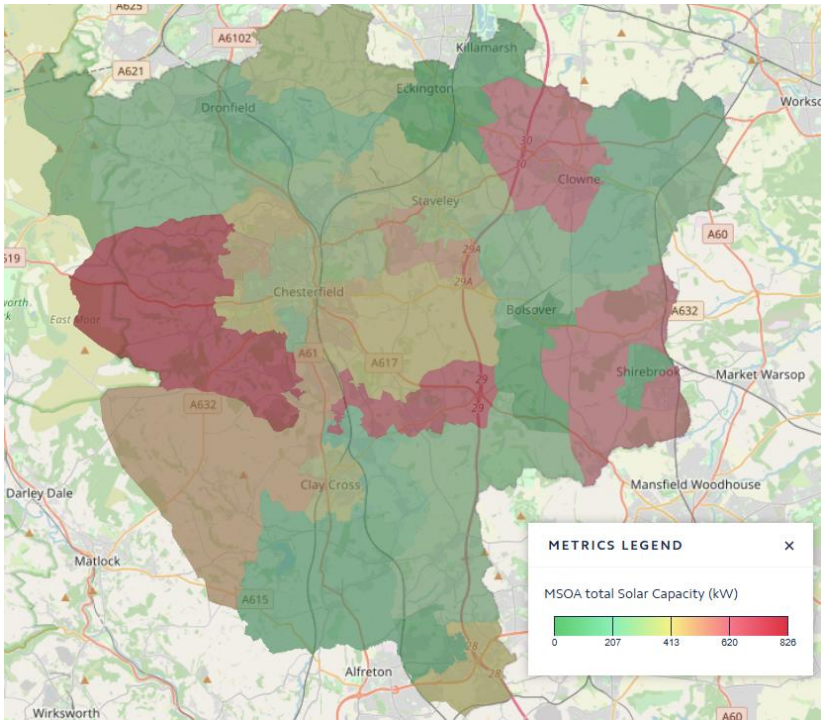


Figure 10.2 above presents the projected annual solar PV yield for the domestic and non-domestic sectors. This would significantly reduce reliance on grid-supplied electricity, helping to lower carbon emissions and support the region's transition to net zero. The increased availability of locally generated renewable energy enhances energy resilience by reducing exposure to national energy price fluctuations and supply disruptions. Additionally, the deployment of solar PV systems across domestic and commercial buildings can stimulate local economic activity through job creation in installation, and maintenance.

Figure 10.3: Total solar capacity in Chesterfield, North East Derbyshire & Bolsover by MSOA (kW)



11 Networks, Storage and Flexibility

This section explores the current state of the electricity network in Chesterfield, North East Derbyshire & Bolsover, the implications of planned infrastructure upgrades, and the impact of Low Carbon Technologies (LCTs) on local energy planning.

11.1 Existing Network Constraints

Electricity distribution in Chesterfield, North East Derbyshire & Bolsover is managed primarily by National Grid Electricity Distribution (NGED) under its East Midlands licence area. with Northern Powergrid servicing the parts of North East Derbyshire. Both organisations are the Distribution Network Operators (DNO) responsible for maintaining and operating the local electricity network infrastructure.

The local distribution grid connects to the National Grid Transmission System via Grid Supply Points (GSPs), which step down voltage from 400 kV/275 kV to 132 kV. From these GSPs, Bulk Supply Points (BSPs) (typically 132/33 kV) feed primary substations (usually 33 kV/11 kV), which then distribute electricity to homes, businesses, and industrial users across the districts.

Relevant GSPs for Chesterfield, North East Derbyshire & Bolsover include:

- Chesterfield GSP – a key node serving the wider Chesterfield area and supporting regional load growth.
- Willington GSP – a major supply point reinforcing the wider Derbyshire network.

These GSPs are critical nodes in the regional network and are referenced in NGED's Distribution Future Energy Scenarios (DFES) for planning reinforcement and flexibility interventions.

Demand Headroom

Considering secondary substations, which is the most granular level of substations, the demand headroom can be mapped to MSOAs as shown in Figure 11.1. This indicates that in many areas of Chesterfield, North East Derbyshire & Bolsover there is capacity for additional demand.

At the primary substation level, we can also look at the effect of contracted demand, which is due to connect in the near future. The Resulting primary substation demand headroom is shown in Figure 11.3.

Figure 11.1: Average Utilisation Factor (%)

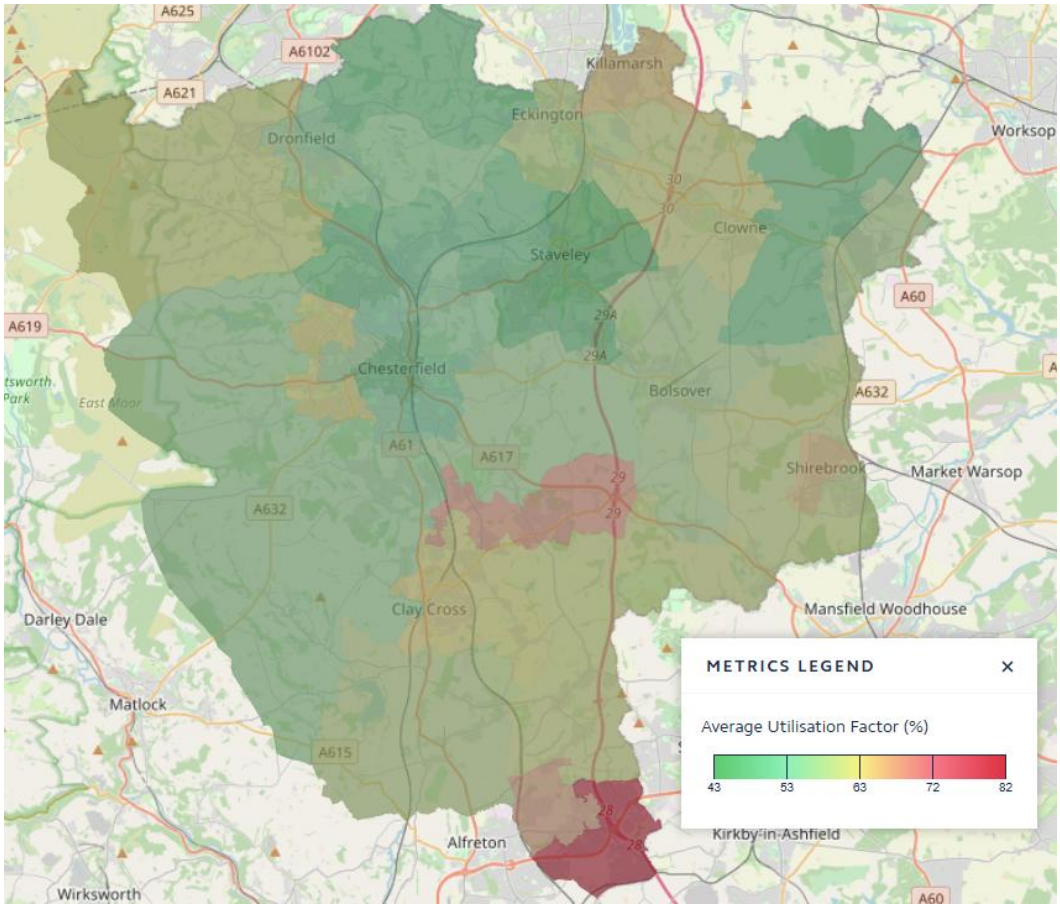


Figure 11.1 illustrates the average grid utilisation factor (%) of secondary substations across the electricity distribution network in Chesterfield, North East Derbyshire & Bolsover, colour coded by MSOA. The utilisation factor represents the ratio of maximum demand to the rated capacity of each local substation, providing an indication of how intensively the existing grid infrastructure is being used. Areas with higher utilisation (above 70%, shown in red) are operating closer to capacity and are more likely to require reinforcement in the short-to-medium term as electrification of existing heat and transport accelerates, while areas with lower utilisation retain greater flexibility to accommodate new electrical loads in the short term.

On average, all districts exhibit a utilisation factor of around 59%, indicating moderate pressure on existing infrastructure. In Chesterfield, MSOA 008 - Loundsley Green & Holme Hall records the highest utilisation at 63%, while in North East Derbyshire, 009 - Grassmoor & Holmewood shows an average utilisation of 69% and MSOA 010 - South Normanton Broadmeadows & Pinxton in Bolsver with 82% utilisation. These areas are likely to require early reinforcement or flexibility measures to enable electrification, and therefore implementation sin early years in these areas should focus on demand reduction through building fabric retrofit.

Conversely, MSOA 002 - Staveley & Norbriggs in Chesterfield shows the lowest utilisation at 44%. For North East Derbyshire, 002 - Eckington West & Coal Aston 49% and for Bolsover, Whitwell & Elmtown at 48%. These zones present relatively more capacity to accommodate early deployment of heat pumps, EV charging infrastructure, and distributed renewable generation without immediate reinforcement.

This variation underscores key opportunities for strategic sequencing of low-carbon initiatives. Areas with lower utilisation can support early electrification and distributed energy schemes, while higher utilisation zones will require close collaboration with National Grid Electricity Distribution (NGED) to plan reinforcement, flexibility services, or demand-side management. Coordinating these actions will be essential to ensure network readiness for the scale of electrification needed to achieve net zero across Chesterfield, North East Derbyshire & Bolsover.

Figure 11.2: Average Headroom (%)

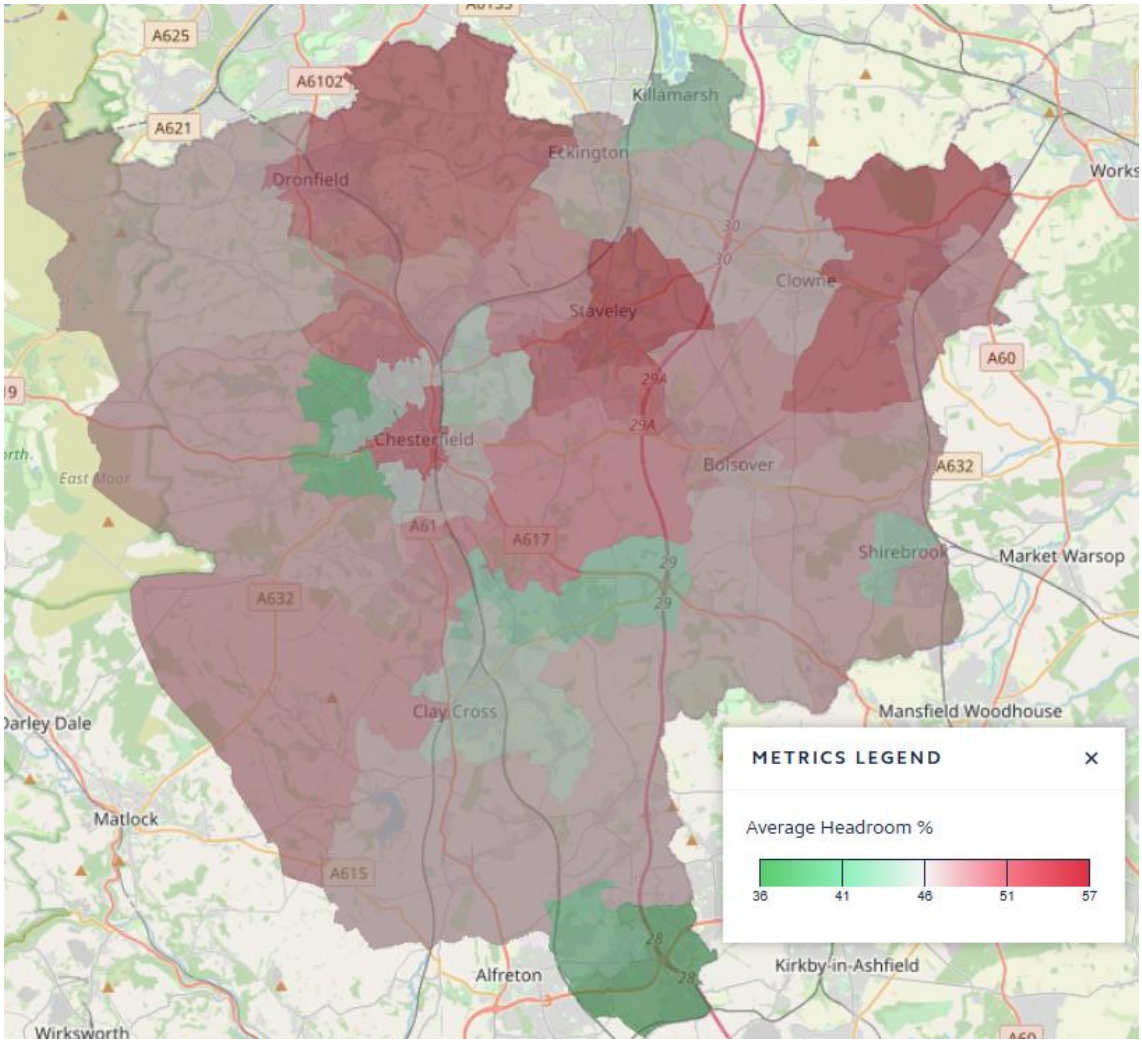


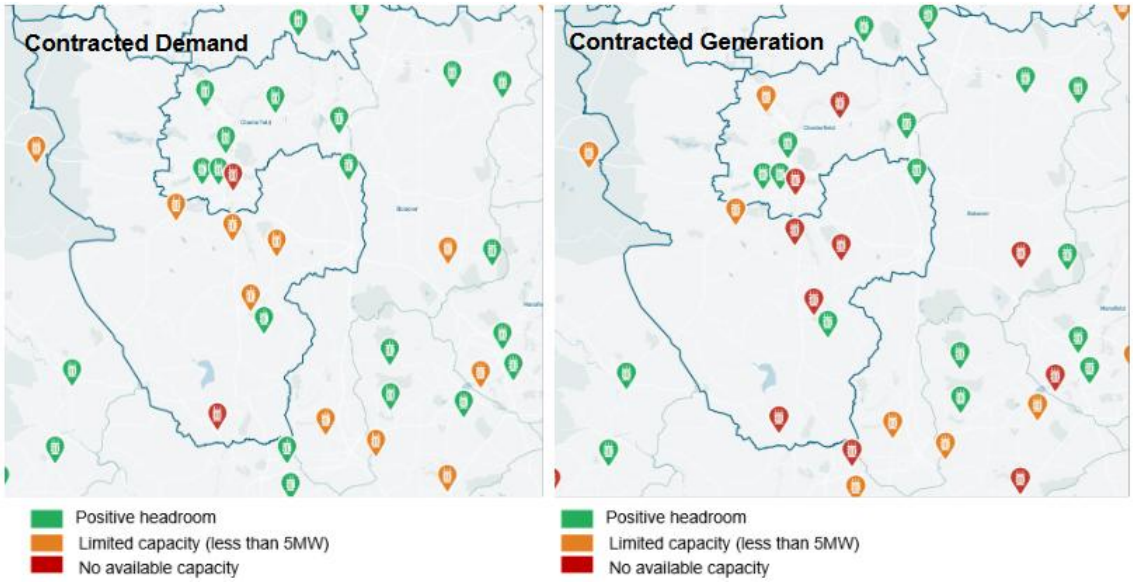
Figure 11.2 illustrates the average available headroom (%) across the electricity distribution network in Chesterfield, North East Derbyshire & Bolsover. Headroom represents the proportion of existing grid capacity that remains unused under normal operating conditions, providing a key indicator of the network's ability to accommodate future increases in demand from electrified heat, EVs, and new developments.

Across the three districts, average headroom stands at approximately 48%. In Chesterfield, 008 - Loundsley Green & Holme Hall and 011 - Brookside & Walton has the lowest headroom at 38%. For North East Derbyshire, 009 - Grassmoor & Holmewood records the lowest headroom at 42% and 010 - South Normanton Broadmeadows & Pinxton in Bolsover at 36%.

Conversely, 002 - Staveley & Norbriggs in Chesterfield (57%), 002 - Eckington West & Coal Aston in North East Derbyshire (54%) and Whitwell & Elmtown in Bolsover (55%) offer the highest headroom. These areas are well positioned to support early deployment of heat pumps, EV charging infrastructure, and distributed renewable generation without the need for immediate reinforcement.

This spatial variation has important implications for sequencing low-carbon technologies. Areas with high headroom should be prioritised for early electrification and distributed energy schemes, while lower headroom zones will require targeted engagement with NGED to plan reinforcement, flexibility solutions, or smart demand management ahead of widespread heat and transport electrification

Figure 11.3: Network Map: Primary demand and generation headroom



Source: National Grid Network Opportunity Map

Figure 11.3 illustrates contracted demand and generation headroom across primary substations in Chesterfield, North East Derbyshire & Bolsover. Each pin on the map corresponds to a Primary or BSP substation and indicates the potential demand that could be connected without triggering reinforcement, excluding any upstream constraints.

Each substation is colour-coded using the standard RAG (Red-Amber-Green) rating:

- Green indicates more than 5% spare capacity,
- Amber represents a positive headroom of less than 5%, and
- Red signifies negative headroom, where demand exceeds available capacity.

These figures highlight existing network pinch points and identify areas where infrastructure is already constrained. These constraints reinforce the need for targeted reinforcement measures to accommodate future demand and enable the deployment of low-carbon technologies such as electric vehicles and heat pumps.

Chesterfield, North East Derbyshire & Bolsover are projected to experience significant growth in energy demand driven by planned housing developments, population increases, and expansion of commercial and industrial activity through to 2040. The transition to low-carbon technologies will substantially raise electricity consumption and peak loads. This shift places pressure on the capacity and resilience of the local electricity network. To meet future needs, targeted

reinforcement, flexibility solutions, and smart energy management will be essential to enable decarbonisation and maintain security of supply.

Alongside percentage headroom remaining, it is also important to consider absolute contracted headroom available at different substations due to their variety in ratings.

11.2 Network Impact

After Diversity Maximum Demand (ADMD) represents the maximum expected electrical demand, adjusted to reflect the fact that not all homes and businesses will use their peak load simultaneously. This diversity of usage, where appliances and systems are not all operating at full capacity at the same time enables network planners to design infrastructure more efficiently, avoiding unnecessary oversizing while still maintaining reliability. ADMD is a critical metric in assessing the total connected capacity required at substations. By applying ADMD values to the number of dwellings or technologies modelled, planners can estimate the aggregate peak demand that substations must be capable of handling. This informs decisions about transformer sizing, cable ratings, and switchgear specifications.

We have modelled the ADMD for LCT adoption across Chesterfield, North East Derbyshire and Bolsover, focusing on ASHP and electric vehicle (EV) charging demand. This includes heat pumps for both domestic and non-domestic users, as well as public and private EV charging infrastructure. The modelling approach uses scenario-based uptake rates for EVs and heat pumps, applying diversity factors of 0.7 for Private EV chargers and 0.3 for Public Chargers, 0.8 for non-domestic ASHPs, and 0.65 for domestic ASHPs.

Table 11.1: Estimated increase in ADMD across Chesterfield, North East Derbyshire and Bolsover attributable to adoption of LCTs (EV charging and ASHPs)

Scenario	2030	2035	2040	2050	Average annual growth (MW)
2040 Net Zero Chesterfield	90	309	412		28
2040 Net Zero North East Derbyshire	102	286	405		27
2040 Net Zero Bolsover	99	254	362		24
2050 Net Zero Chesterfield	77	172	298	412	16
2050 Net Zero North East Derbyshire	76	176	294	405	16
2050 Net Zero Bolsover	74	162	267	362	14

Figure 11.4: Regional ADMD increase (MW)

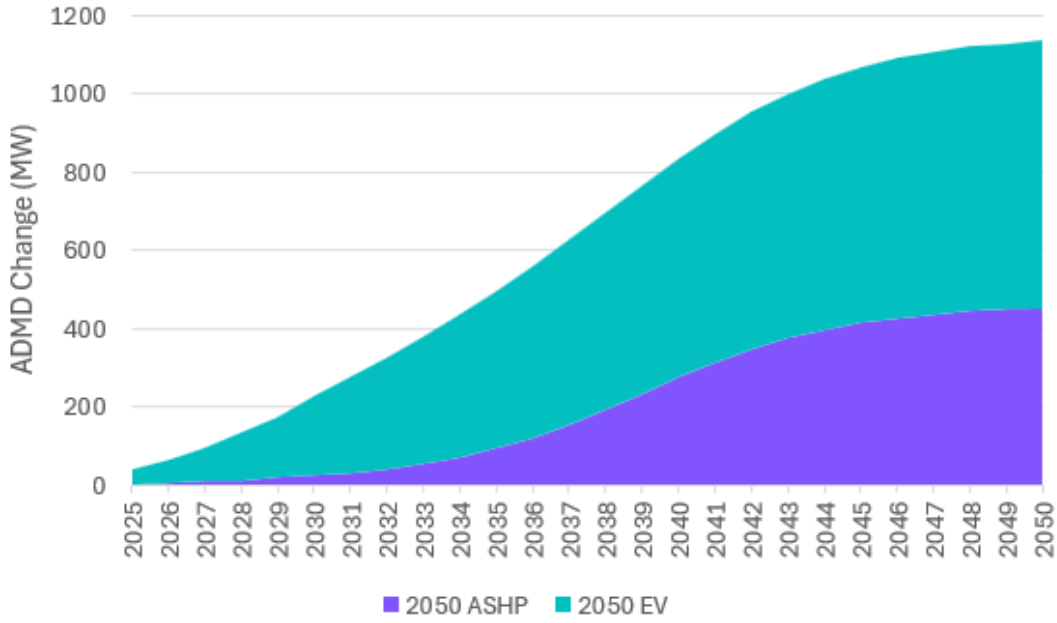


Figure 11.4 above illustrates the additional increase in demand from low-carbon technologies (LCT) across the region on an annual basis. It is important to note that secondary substation areas do not perfectly align with MSOA boundaries; therefore, possible restrained areas represent a high-level estimation based on the closest overlaps between secondary substation and MSOA boundaries.

This model presents a strong case for proactive investment in distribution network upgrades, as any net zero-compliant scenario is expected to significantly increase ADMD beyond the capacity of the current infrastructure. Without timely reinforcement, substations may face breaches of headroom, leading to delays in new connections and limiting the pace of electrification and decarbonisation across the districts.

11.2.1 Impact of Negative Headroom on Net Zero

As demonstrated in the previous section, any net zero compliant scenario for Chesterfield, North East Derbyshire & Bolsover results in '**negative headroom'** at the substation level. This means that the projected ADMD exceeds the available network capacity, indicating that the existing infrastructure is no longer sufficient to accommodate future load growth.

A breach of headroom signals the need for reinforcement measures, such as substation upgrades or the deployment of flexibility solutions, to avoid constraints, maintain reliability, and support continued connections to the electricity network. These constraints directly affect how quickly and affordably new connections, whether domestic, commercial, or related to LCTs, can be made. In constrained areas, connection requests may be delayed or queued until reinforcement works are completed, potentially slowing the pace of electrification, decarbonisation, and urban development.

From a financial perspective, a breach at a substation can trigger the need for infrastructure upgrades, such as new transformers, expanded substation capacity, or reinforced feeder circuits. Under the current regulatory framework, new customers are liable only for costs at the point of connection, while upstream reinforcement costs are covered by the DNO and recovered through fixed daily charges applied to all consumers. For example, if a large industrial site in

Chesterfield, North East Derbyshire & Bolsover applies for additional capacity to decarbonise its operations, and this causes a breach at the primary substation, the customer would only pay for the direct connection. The DNO would manage and fund any upstream upgrades, although delays may still occur depending on network availability and planning timelines

In areas with persistent constraints, alternative approaches such as flexibility services, energy storage, or demand-side management may be considered to defer or reduce the need for capital investment. However, these solutions require coordination, digital infrastructure, and regulatory support to be effective. The results shown in the LAEP should be reviewed in detail by NGED and NESO to enable proactive, system-level planning. This would help ensure that individual customers do not bear disproportionate costs or face delays, and that the electrical network infrastructure keeps pace with decarbonisation and growth in the region.

11.3 Storage and Demand Side Response

Demand Side Response (DSR) refers to the strategic adjustment of electricity consumption patterns by end users in response to signals from the network operator. These signals may include price incentives, time-of-use tariffs, or direct requests to reduce or shift demand during peak periods. DSR enables the electricity system to operate more flexibly by aligning demand with available supply, particularly during times of network stress or limited capacity.

The implementation of DSR alongside stationary energy storage, particularly when integrated with PV systems, offers a powerful mechanism for managing grid constraints and enhancing local energy resilience. Solar PV enables sites to generate their own electricity, while battery storage captures surplus generation for later use. This stored energy can then be discharged during peak demand periods, aligning on-site consumption with grid needs and reducing pressure on the network.

This coordinated flexibility helps lower peak demand during periods of increased consumption, mitigating breaches of headroom and deferring the need for costly infrastructure upgrades. By enabling the generation and use of low-carbon, locally produced energy, the combined use of DSR and storage supports a more affordable, secure, and sustainable energy system, aligning with national energy goals.

While the financial benefits of DSR and storage will vary depending on market conditions, technology costs, and consumer participation, their coordinated use presents a viable opportunity to reduce peak demand, defer infrastructure upgrades, and unlock new value streams for energy users. The feasibility of this opportunity in Chesterfield, North East Derbyshire and Bolsover will depend on factors such as digital infrastructure readiness, regulatory support, and collaboration between DNOs, aggregators, and end users.[51]

[51] Energy Institute. Introduction to Demand Side Response.

12 Economic Assessment

12.1 Overview of economic assessment

The high-level assessment of costs and benefits for decarbonising the area under the two transition scenarios, 2040 and 2050, indicates that investment in the local energy transition could deliver significant benefits relative to the 'Do nothing' scenario. Although the required investment is substantial and the pace of transition will depend on sustained policy and grant support, it is expected to generate benefits through lower energy bills, carbon reduction, improved air quality, and employment stimulation in the local economy.

This analysis estimates indicative capital expenditure (capex) and cash and non-cash costs and benefits[52] for the interventions within scope. This reflects the strategic, early-stage nature of the LAEP and aligns with other LAEPs developed across the UK. If this capex is spent, then significant benefits can be realised, summarised in Table 12.1 for both scenarios.

- **Total estimated capex to 2050 in both scenarios is £4.9 billion in 2025 values, before the impact of discounting.** This is the gross cost without considering the contribution from government subsidy programmes, therefore the cost of investment to the local economy is likely to be significantly lower given existing grant support and national government commitment enshrined in law to achieve Net Zero by 2050. The success of the transition under current market conditions is dependent on sustained grant support, which will strongly influence the scale and pace of action.
- **Deep fabric retrofit and domestic and non-domestic ASHP account for 69% of the total investment (£3.4 billion**). This investment is expected to be funded through a combination of public sector support and household/organisation contributions.
- Benefit estimates from deploying technologies in the two net zero scenarios include:
  - **Carbon savings:** £1.7 billion for 2040 and £1.3 billion for 2050 (discounted) in carbon reduction driven primarily driven by the installation of domestic air source heat pumps.
  - **Air quality improvements:** £26 million for 2040 and £18 million for 2050 (discounted) of benefits to human health, productivity, wellbeing, and the environment due to improvements in air quality.
  - **Impact on bills:** £504 million for 2040 and £510 million for 2050 (discounted) of savings from utility bills which are a result of self-generation (rooftop solar), fuel switching to lower-cost technologies, and reduced energy demand through retrofit measures. Sensitivity analysis suggestions this could vary to bill savings between £925 million and £281 million under the 2050 scenario, depending on energy price trends.
  - **Substantial economic activity could be generated from the transition.** Assuming installation and fitting of these technologies are carried out by workers, the average economic contribution per year could be between £76 million and £81 million, with an aggregate impact of £2.0 billion to £2.1 billion to 2050.
  - **Transition to EVs enabled by charging infrastructure could generate significantly greater benefits,** most notably additional £738 million - £838 million of carbon reduction benefits. These enabled benefits are always shown separately in the subsequent analysis.

[52] Cash benefits reduce actual expenditure or release cash that can be reallocated elsewhere such as direct financial savings, revenue generation, and avoided costs.

non-cash benefits do not result in direct financial savings but still contribute to public or social value – for example carbon savings.

Table 12.1: Estimated capex and associated benefits, vs do nothing

£m (2025)	2040	2050
Discounted values		
Capex (discounted)	(3,767)	(3,243)
Carbon savings	1,668	1,257
Air quality improvements	26	18
Impact on bills (ex VAT)	504	510
Undiscounted values		
Capex (financial)	(4,870)	(4,870)
Average annual economic contribution (GVA)	81	76
Aggregated economic contribution (GVA) to 2050	2,105	1,975

Source: Mott MacDonald

12.2 Approach to analysis and key considerations

For the two transition scenarios (2040 and 2050), costs and benefits from the scenarios are estimated. These cover capital expenditure (both undiscounted and discounted) and welfare-enhancing benefits and economic contribution, which are derived from the following core inputs:

- Modelled installation volumes for net-zero technologies
- Modelled changes in gas and electricity consumption
- Unit costs for technology purchase and installation, based on published sources (e.g., DESNZ), as well as internal data from Mott Macdonald cost consultants
- Published assumptions on carbon appraisal values, air-quality damage costs, and the economic value of net-zero transition activities

This assessment quantifies and presents capital expenditure (CAPEX) to 2050 - both discounted and undiscounted - for net zero technologies deployed under two scenarios: delivery by 2040 and delivery 2050, each assessed relative to a 'do minimum' counterfactual.

Undiscounted CAPEX is provided to show the total financial outlay required to 2050, in 2025 prices, without adjustments for risk, inflation or the time value of money.

Discounted CAPEX is presented to show the adjusted CAPEX value reflecting the time value of money, for economic analysis and in line with HM Treasury Green Book best practice. This applies the Green Book social time preference of money.

In addition to capital costs, the analysis considers associated cash and non-cash benefits, including carbon savings, air-quality improvements. In addition, a high-level estimate of economic contribution from employment associated with capex is presented.



CAPEX (cash)



Valuation of carbon impacts (non-cash)



Impact on bills (cash)



Improvement in air quality (non-cash)



Valuation of economic contribution (non-cash)

When interpreting the analysis, several key considerations should be considered around:

- The scope of analysis
- Price base, discounting and appraisal period
- Cost base assumptions
- Bill impacts
- Benefits associated with EV charger deployment
- Assumptions and sources.

12.2.1 Scope of the analysis

While we have estimated capex and outlined indicative benefits that might result from investment, some costs and benefits fall outside the scope of this exercise (e.g., operational expenditure). Accordingly, this is not a full Cost Benefit Analysis (CBA) and the analysis is not presented as an aggregate Net Present Social Value (NPSV).

However, the analysis provides a clear foundation for understanding capital investment requirements and associated benefits. A comprehensive assessment capturing operating expenditure and wider societal benefits to derive a Net Present Social Value would be a valuable next step.

12.2.2 Price base, discounting and time horizon

All costs and benefits are presented in constant 2025 prices (real terms). Historic and nominal inputs are converted to 2025 using the Office for Budget Responsibility (OBR) GDP deflator. Discounting follows the HM Treasury Green Book (2026) social discounting schedule to convert future streams into present values, reflecting time preference. To capture the full operational lifespan of all assets, the model extends beyond 2050 by the longest asset life.

12.2.3 Cost base assumptions

Capital costs in this assessment are based on unit costs derived from Mott MacDonald's internal cost benchmarking, supplemented by published sources such as DESNZ and other relevant industry data. To reflect uncertainty at this stage of appraisal, the Association for the Advancement of Cost Engineering (AACE) Class 4 accuracy ranges (–20% to +50%) are applied to show possible ranges, which are appropriate for early-stage, high-level estimates. This approach ensures the cost base is robust, transparent, and aligned with best practice for strategic economic assessment.

12.2.4 Bill impacts

Bill impacts reflect changes in energy consumption gas and grid electricity, only. Household expenditure on maintenance, servicing, or replacement are excluded. Bill impacts are presented in economic appraisal terms (net of tax, and discounted).

12.2.5 Benefits associated with EV ChargePoint investment

EV charge points have the potential to generate benefits through enabling the displacement of Internal Combustion Engine (ICE) vehicles, thereby generating reductions in carbon emissions, improvements in air quality, and lower energy bills. However, the extent to which the provision of charge points directly drives EV uptake is highly uncertain. As a result, the potential benefits associated with enabling EV adoption are not included in the core assessment.

12.2.6 Assumptions – based on published sources

Where available, assumptions from HM Treasury's Green Book (2026) have been applied including for the discount rate, forecast energy retail price movements, and carbon emission factors. All inputs are set to 2025 prices using the Office for Budget Responsibility's (OBR) GDP Deflator, to reflect the 2025 base year of the model for benefits and costs. All benefits and costs are measured in millions of pounds (£m). Key assumptions used in this analysis are set out in Table 12.2.

12.2.7 Treatment of gross value added (GVA)

High level estimates of the potential economic contribution from the direct creation of jobs associated with fitting and installation of decarbonisation measures (GVA) is estimated based on publicly sourced type 1 multipliers[53], assuming that there is no leakage i.e. those employed to support the transition are locally employed. This is a high level estimate of Gross Value Added (GVA).

12.2.8 Scenarios

Three scenarios are modelled in this appraisal: the Do nothing, 2040, and 2050. The results are presented with the 2040 and 2050 in comparison to the Do nothing to show the relative costs and benefits versus a minimum/baseline scenario.

12.3 Assumptions

12.3.1 Use of published sources

Where available, assumptions from HM Treasury's Green Book (2026) have been applied including for the discount rate, price profiles, and carbon emission factors. All inputs are set to 2025 prices using the Officer for Budget Responsibility's (OBR) GDP Deflator[54], to reflect the 2025 base year of the model for benefits and costs. All benefits and costs are measured in millions of pounds (£m). Key assumptions used in this analysis are set out in Table 12.2.

12.3.2 Key assumptions

Table 12.2 lists the key assumptions used in the Economic appraisal.

[53] Sustainable Transition Effects on Labor Market, Sustainable Development Solutions Network, Available at: https://www.jstor.org/stable/pdf/resrep29195.3.pdf

Table 12.2: Key assumptions used in the Economic appraisal

Assumption	Description
Discount rate	A social time preference discount rate of 3.5% and a health discount rate of 1.5% per the HM Treasury's Green Book (2026).
Carbon price	The HM Treasury's Green Book (2026) 'Medium' carbon price profile escalated to 2025 values using OBR's GDP deflator.
Domestic utility prices (electric, gas)	Ofgem energy price cap with future prices aligned to HM Treasury's Green Book (2026) price forecast escalated to 2025 values using OBR's GDP deflator.
Non-domestic utility prices (electric, gas)	HM Treasury's Green Book (2026) long run variable cost (LRVC) price forecast escalated to 2025 values using OBR's GDP deflator.
Road fuel prices	The HM Treasury's Green Book (2026) 'Medium' road fuel price Long Run Variable Cost profile escalated to 2025 values using OBR's GDP deflator.
Carbon emission factors	The HM Treasury's Green Book (2026) long run marginal carbon emission factors.
Gross value added (GVA)	Output per job figure for the construction industry provided by ONS escalated to 2025 values using OBR's GDP deflator.

Source: UK GOV, Ofgem, ONS, OBR

12.4 Detailed results

12.4.1 Capital expenditure

Capital expenditure (capex) is presented in two ways:

- **Undiscounted capex is provided to show the total financial outlay required to 2050 in today's prices**, without adjustments for risk or the time value of money.
- **Discounted capex is presented to show the adjusted capex value reflecting the time value of money**, for economic analysis and in line with HM Treasury Green Book best practice. This applies the Green Book social time preference of money discount rate.

All capex is presented as the additional spend above the Do nothing scenario, which assumes minimum building fabric improvements to achieve MEES EPC compliance and minimal levels of electric vehicle uptake.

12.4.1.1 Undiscounted capex

Undiscounted capex informs how much might be needed to be invested in today's prices, without reducing future spend for the time value of money (discounting) or increasing for inflation. These values are referenced in the Funding and Finance section below. Table 12.3 below shows the total undiscounted capex, which is identical between the two scenarios.

- **£4.9 bn in today's prices is required** to deliver both net zero scenarios.
- **All capex figures are shown as incremental to the Do nothing scenario**, representing the additional investment required over and above a baseline.
- **The only difference between the two scenarios is the timing of the installations:** while the total number of installations remains the same, the 2040 scenario assumes significantly earlier installations. This will require rapid scale up of supply chains, high levels of consumer adoption and ongoing policy support.
- **The largest areas of expenditure are deep fabric retrofit and air source heat pumps:** These account for 69% of total capital expenditure. To achieve this level of investment the benefits of these measures must be clearly articulated, and supported by continued government grants.

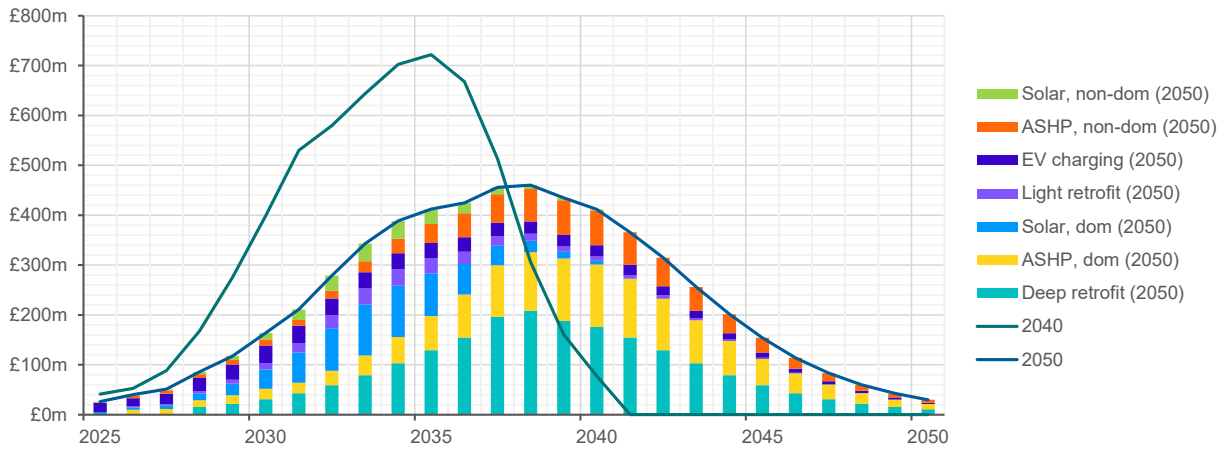
Table 12.3: Undiscounted capex, vs counterfactual

£m (2025)	2040	2050	% of total (2050)
Light fabric retrofit	247	247	**5%**
Deep fabric retrofit	1,733	1,733	**36%**
Domestic solar PV	671	671	**14%**
Non-domestic solar PV	233	233	**5%**
Domestic air source heat pumps	923	923	**19%**
Non-domestic air source heat pumps	728	728	**15%**
EV chargers	334	334	**7%**
Total	**4,870**	**4,870**	**100%**

Figure 12.1 illustrates the capex timing profiles for the 2040 and 2050 scenarios. In the 2050 scenario, capital expenditure is broken down by intervention, showing the deployment timeline for each technology. This allows for a direct comparison with the 2040 scenario, which is presented as a single aggregated capex curve.

- **The 2040 scenario assumes much faster deployment rates:** all investment is concluded by 2040, compared to 2050. This assumes all investment over the next 14 years, rather than the next 24 years.
- **The acceleration and peak of investment is much greater in the 2040 scenario:** to achieve the earlier targets, the 2040 scenario assumes rapid scale up of investment with a peak at £722m per year, compared to a slower scale up and peak at £460m a year in the 2050 scenario.
- **Solar and EV chargers lead investment in early years** under both scenarios, with retrofit and ASHP gathering momentum through the 2030s.
- **Achievement of the 2040 scenario relies on accelerating investment in ASHPs and retrofit:** this will be aided by sustained grant support, reduction in electricity prices, and supply chain maturity.

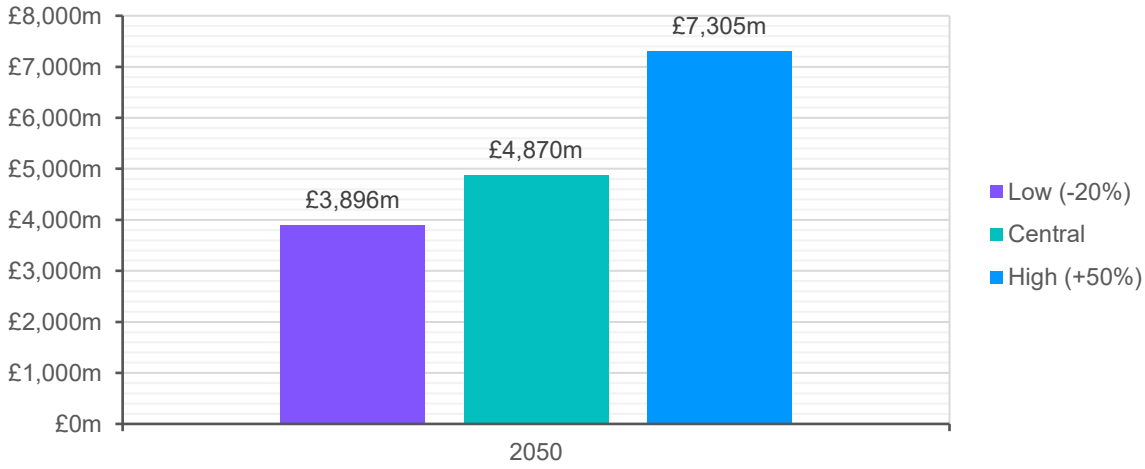
Figure 12.1: Capex, £m, real, 2025, undiscounted



Early strategic assessments have uncertainty over future costs, therefore interval ranges have been applied to illustrate a possible range of investment, reflecting the AACE Class 4 expected accuracy ranges:

- **An upper confidence interval of +50%**, reflecting the potential for cost escalation due to unforeseen scope changes, market volatility, or design evolution.
- **A lower confidence interval of -20%**, accounting for potential cost efficiencies or scope reductions.

Figure 12.2: 2050 Capex, vs counterfactual with confidence intervals, real, undiscounted, 2025



12.4.1.2 Discounted capex

Discounted capex illustrates how timing impacts the value of capex, and should be considered when appraising capital costs against other costs and benefits. The further the spend occurs in the future, the lower its valuation for the purposes of economic appraisal.

- The impact of discounting reduces the valuation of capital expenditure to £3.8 bn (2040) and £3.2 bn (2050). Which is relevant when comparing to other types of costs and benefits.
- While the 2050 capital expenditure is lower, the potential benefits from this spend will also be valued lower due to the impact of discounting.
- The slower pace of investment in the 2050 scenario reduces the valuation of capital costs by 14%, with slower deployment in all categories resulting in a lower valuation of cost.

Table 12.4: Undiscounted capex, vs counterfactual

£m (2025)	2040	2050	% total (2050 scenario)
Light fabric retrofit	196	177	5%
Deep fabric retrofit	1262	1,099	34%
Domestic solar PV	558	505	16%
Non-domestic solar PV	194	175	5%
Domestic air source heat pumps	732	577	18%
Non-domestic air source heat pumps	541	455	14%
EV chargers	284	255	8%
Total	**3,767**	**3,243**	**100%**

12.4.2 Carbon impacts

The value of carbon savings is calculated by multiplying the value of carbon saved per intervention by carbon valuation rates per tonne of CO2e per the HM Treasury Green Book[55]. Both scenarios deliver over £1 billion of carbon savings compared to the counterfactual. These are presented in Table 12.5, with the following key findings:

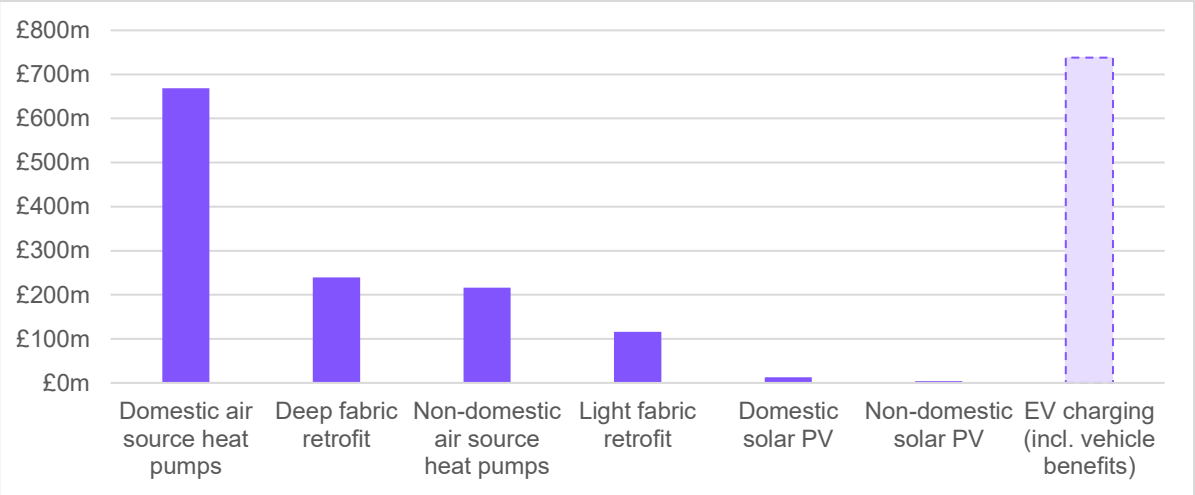
- **Early action drives greater carbon savings.** The 2040 scenario delivers greater carbon savings than the 2050 scenario (approximately £1.7 billion versus £1.3 billion), largely due to earlier deployment of key technologies like air source heat pumps and deep fabric retrofit. This means that accelerating implementation can yield stronger environmental benefits.
- **Domestic air source heat pumps are the most impactful intervention:** Domestic air source heat pumps are responsible for over 50% of carbon savings in both scenarios, contributing between £940 million and £669 million in benefits.
- **EV charging could enable substantial carbon savings.** Even though installation of chargers does not directly create carbon savings, the vehicle emission reductions that could be enabled are very significant. When vehicle benefits are included, EV charging could become the largest contributor to carbon savings (£838 million in 2040 and £738 million in 2050).
- **Solar PV has very low impact on carbon reduction,** as the electricity grid is assumed to decarbonise through the coming decade. The benefits of PV will come through impact on bills and energy security, not through carbon reduction.

Table 12.5: Carbon impacts, Scenarios vs Do nothing

£m (2025)	2040	2050	% total (2050 scenario)
Light fabric retrofit	126	116	9%
Deep fabric retrofit	267	239	19%
Domestic solar PV	24	13	1%
Non-domestic solar PV	8	4	0%
Domestic air source heat pumps	940	669	53%
Non-domestic air source heat pumps	303	216	17%
EV charging (excl. vehicle benefits)	-	-	-%
Total	**1,668**	**1,257**	**100%**
EV charging (incl. vehicle benefits)	838	738	

[55] Department for Energy Security and Net Zero, 2023, Green Book supplementary guidance: valuation of energy use and greenhouse gas emissions for appraisal available at: Green Book supplementary guidance: valuation of energy use and greenhouse gas emissions for appraisal - GOV.UK

Figure 12.3: Valuation of carbon benefits, 2050 scenario (2025, real, discounted



12.4.3 Air quality improvements

Air quality improvements are assessed considering the change from fossil fuel heating and transport to electric sources. The change in fuel use is valued as an air quality improvement applying HM Treasury indices for air quality[56]. Air quality improvements carry less significant benefits for both scenarios compared to other types of impacts.

- **Air source heat pumps deliver small air quality gains:** air source heat pumps improve air quality a modest amount, with improvements increasing the earlier ASHPs are installed.
- **Enabling EV uptake could stimulate further air quality improvements.** Although EV charging infrastructure does not directly cause EV displacement of ICE vehicles, the vehicles supported could create benefits of a further £46 million to £53 million in improvement in air quality.
- **Many of the technologies were not assessed for air quality improvements**, as their impact on local emissions is negligible and their installation does not directly impact human exposure to airborne pollutants, in the LAEP area. For instance, rooftop solar PV replaces grid electricity, which is often generated outside the region. As a result, any potential air quality benefits would not directly apply to the area.. For instance, rooftop solar PV replaces grid electricity, which is often generated outside the region. As a result, any potential air quality benefits would not directly apply to the area.

Table 12.6: Air quality improvements, vs counterfactual

£m (2025)	2040	2050	% total (2050 scenario)
Light fabric retrofit	n/a	n/a	0%
Deep fabric retrofit	n/a	n/a	0%
Domestic solar PV	n/a	n/a	0%
Non-domestic solar PV	n/a	n/a	0%
Domestic air source heat pumps	20	14	78%
Non-domestic air source heat pumps	6	4	22%
EV charging (excl. vehicle benefits)	0	0	0%
Total	**26**	**18**	**100%**

[56] Department for Energy Security and Net Zero, 2023, Green Book supplementary guidance: valuation of energy use and greenhouse gas emissions for appraisal available at: Green Book supplementary guidance: valuation of energy use and greenhouse gas emissions for appraisal - GOV.UK

£m (2025)	2040	2050	% total (2050 scenario)
EV charging (incl. vehicle benefits)	53	46	

12.4.4 Impact on bills

Substantial energy bill savings could result from the transition. Discounted values are presented below, excluding VAT and tax.

- The 2050 scenario delivers a slightly greater reduction in bills (£510 million) compared to the 2040 scenario (£504 million) due to the timing of asset installations. While there are lower savings from generation in the 2050 scenario, there are also lower additional costs from ASHPs.
- **Generation technologies deliver significant bill savings:** Rooftop solar PV installations are projected to deliver bill savings of £420 million to £474 million for domestic and over £100 million for non-domestic. These savings represent the avoided purchase of electricity from the grid.
- **Heating technologies risk increasing bills:** if consumers switch to ASHPs with flat rate tariffs at current average and forecast prices, they risk increasing energy bills on aggregate because the cost of electricity over gas outweighs efficiency gains.
- **Air source heat pump bills can be reduced by use of bespoke tariffs** linked to the hours of use (time-of-use tariffs). This impact is not reflected below, but is a key enabler to make the case for the adoption of ASHPs, alongside pairing with renewable generation.
- **Cost of EV charging is sensitive to tax impacts and method of purchase of fuel:** adoption of electric vehicles enabled by public infrastructure yields higher bills valued at £90 million to £103 million. However, this cost is likely to change into a saving if the impact of the significant taxes on petrol and diesel fuel are also considered. These are excluded in this analysis, to reflect Green Book guidance on economic benefits valuation.

Table 12.7: Impact on bills, vs counterfactual, Discounted, excluding VAT and tax

Note – figures in black are a bill saving. Figures in (red) are a bill increase.

£m (2025)	2040	2050	% total (2050 scenario)
Light fabric retrofit	64	58	11%
Deep fabric retrofit	132	115	23%
Domestic solar PV	474	420	82%
Non-domestic solar PV	119	107	21%
Domestic air source heat pumps	(236)	(157)	(31%)
Non-domestic air source heat pumps	(48)	(33)	(6%)
EV charging (excl. vehicle benefits)	-	-	-%
Total	**504**	**510**	**100%**
EV charging (incl. vehicle benefits)	(103)	(90)	

12.4.4.1 Impact on bills sensitivity analysis

Sensitivity analysis assesses the impact of energy price volatility, which is an important consideration given the unpredictable nature of energy markets. The analysis involves adjusting

gas and grid electricity prices using the low, medium, and high trajectories outlined in HM Treasury's Green Book. Two scenarios are assessed, and presented in Table 12.8:

1. **Favourable scenario (A):** High gas price, and a low grid electricity price
2. **Unfavourable scenario (B):** Low gas price, and a high grid electricity price

Results

- **The favourable scenario leads to further bill savings of £414m** (+81%) for the 2050 scenario. Under this scenario, total savings reach £925 million.
- Under the favourable scenario, ASHPs and EV chargers now save bills, due to lower electricity prices.
- **Under the favourable scenario, solar PV savings are lower,** as savings vs retail prices are lower. However, these reductions are offset by the bill savings from ASHPs.
- **The unfavourable scenario leads to lower bill savings, by £230m** (-45%) for the 2050 scenario. Total savings are still positive, but low at £281 million.
- **In the unfavourable scenario, the dynamics reversed.** A high electricity price made rooftop solar PV more beneficial. However, air source heat pumps suffered a significant decline in performance due to both higher running costs and the reduced benefit of offsetting now cheaper gas.

Table 12.8: Impact on bills sensitivity analysis, 2050 vs counterfactual, £m (2025)

Intervention	Impact on bills			Variance to central assumptions	
	Central	A	B	A	B
Light fabric retrofit	58	91	41	33	(18)
Deep fabric retrofit	115	180	80	65	(36)
Domestic solar PV	420	395	447	(25)	27
Non-domestic solar PV	107	101	117	(6)	10
Domestic air source heat pumps	(157)	82	(304)	240	(146)
Non-domestic air source heat pumps	(33)	76	(99)	108	(67)
EV charging (excl. vehicle benefits)	-	-	-	-	-
Total	**510**	**925**	**281**	**414**	**(230)**
EV charging (incl. vehicle benefits)	(90)	395	(362)	485	(272)

12.4.5 Employment contribution – Gross Value Added (GVA)

The creation of employment from investment delivers substantial benefits across both scenarios. These figures are indicative for the benefit across the economy as a whole. Key results include:

- **Economic contribution ranges from an average annual value of £76 million to £82 million per year**, with aggregated figures to 2050 of £2.0 billion to £2.1 billion.
- **The 2040 scenario generates more benefit due to the earlier installation of assets.** As these assets require ongoing maintenance and eventual replacement up to 2050, the overall volume of installation and upkeep activity is higher, resulting in increased job creation.
- **The assets that require the most investment generate the greatest employment contribution**: deep fabric retrofit and heat pumps account for over 70% of employment

contribution benefits, which mirrors the similar proportion of investment required for these assets.

Table 12.9: Cumulative value of employment contribution, vs Do nothing, £'m (2025, undiscounted)

£m (2025)	2040	2050	% total (2050 scenario)
Light fabric retrofit	85	85	4%
Deep fabric retrofit	596	596	30%
Domestic solar PV	215	215	11%
Non-domestic solar PV	75	75	4%
Domestic air source heat pumps	556	484	25%
Non-domestic air source heat pumps	408	368	19%
EV charging	171	151	8%
Total	2,105	1,975	100%
Average per year (2025 – 2050)	**81**	**76**	

12.5 Capex - who might pay?

This section provides a view of how different capital interventions could be financed or funded to indicate where the cost of delivery may be borne by mapping interventions to funding mechanisms. The information provided is illustrative, based upon typical project examples and market dynamics.

Table 12.10 outlines the capital interventions identified by funding type and intervention category. It summarises probable sources of finance whether private capital, self-funding by residents or building owners, or reliance on government grants.

Table 12.10: Potential funding and financing sources

Who pays	Undiscounted capex[57]	Net Zero measure /technology	Potential funding/financing mechanisms
Private developers	£334m	EV Chargers (shared public)	Cost borne by private investment based on commercial viability
Self-funded, residents	£671m	Rooftop solar PV, domestic Private EV chargers	Self-funded Smart Export Guarantee (SEG) EV chargepoint grant Warm Homes Plan
Grant-reliant, residents	£2,903m	Light fabric retrofit Deep fabric retrofit Air source heat pumps, domestic	Boiler Upgrade Scheme (BUS) Warm Homes Plan (ECO4)
Self-funded, public and private building owners	£233m	Rooftop solar PV, non-domestic	Self-funded Smart Export Guarantee (SEG) Local Power Plan
Grant-reliant, public and private estates	£728m	Air source heat pumps, non-domestic	Local authority and regional grants

[57] Undiscounted capex refers to the net capex required under the 2040 and 2050 scenario vs the counterfactual. Undiscounted capex has been used to reflect the real-world cost of the intervention.

Who pays	Undiscounted capex[57]	Net Zero measure /technology	Potential funding/financing mechanisms
Total	**£4,870m**		

The categorisation above is based upon experience of current market conditions and typical project performance. The categories are expanded on below for the relevant interventions:

Private developers

it is assumed that these technologies are commercially viable for private developers and offer a sufficient profit incentive to attract investment. Investment is expected to come from energy developers, infrastructure funds, and private sector partnerships, with planning and grid coordination supported by local authorities.

Self-funded, residents

These interventions are considered financially viable at the household level, with market evidence that residents are investing their own capital. This is supported currently by zero VAT on solar panels and batteries, access to Smart Export Guarantee tariffs and actions for reduced capital installation costs. The financial resources available to residents is variable, (e.g. variation in household income), therefore additional support in the form of grants is likely required for some households.

Grant-reliant, residents

These interventions are considered reliant on existing grants for residents to install the intervention, as the payback is either uncertain or not significant enough to justify the capital. Existing grants could cover full or partial costs of insulation upgrades and low-carbon heating systems. Depending on the intervention, grant eligibility can be based on income, benefits, and property energy performance.

Self-funded, public and private building owners

These interventions are considered financially viable, with evidence that the public sector and businesses are investing their own capital. Rooftop solar PV installations on non-domestic buildings including commercial premises, industrial facilities, and public sector assets could be self-funded by the building owners or operators.

Grant-reliant, public and private estates

These interventions are considered reliant on existing grants for residents to install the intervention, as the payback is either uncertain or not significant enough to justify the capital. Funding is expected to come from national schemes. These measures are capital-intensive and often not commercially viable without subsidy, particularly in older or energy-intensive buildings.

12.6 Funding and financing

This section explores the mechanisms available to cover upfront and ongoing costs, from non-repayable grants that reduce capital burdens to repayable finance options that leverage future revenues, as well as models that transfer risk and responsibility to third parties. It also considers the role councils can play in enabling businesses and residents to invest their own capital, ensuring that local energy projects are financially viable, equitable, and aligned with net zero objectives.

12.6.1 Non-repayable funding sources for project costs

Non-repayable funding mechanisms are typically used when projects face financial barriers that make traditional debt or equity financing impractical. They help reduce overall capital costs, making projects more affordable and attractive to investors or communities. These funds are also critical for projects where the expected financial return cannot cover full life-cycle costs, ensuring essential low-carbon or social value initiatives can proceed. Additionally, they provide upfront capital to avoid drawing heavily on reserves or savings, enabling local authorities, businesses, and residents to launch projects without compromising financial stability.

Non-repayable sources of funding are presented below, split by those available to local authorities, and businesses and residents.

12.6.1.1 Local authority

Community Infrastructure Levy (CIL)[58]

The CIL is a planning charge by local authorities in England and Wales on new developments to fund infrastructure such as transport, schools, parks, and public amenities. CIL funds can only be used for infrastructure supporting development and must comply with strict statutory regulations.

Section 106 (S106)[59]

S106 agreements are legally binding planning obligations between developers and local authorities, used to mitigate the impact of new developments by funding infrastructure, affordable housing, or community facilities. Unlike CIL, S106 is negotiated case-by-case and can include both financial contributions and in-kind provisions tied to specific planning permissions. They remain a key tool for delivering site-specific benefits and ensuring developments are sustainable and aligned with local needs.

Great British Energy Community Fund (GBECF)[60]

The GBECF is a £5 million UK government-backed grant scheme by regional Net Zero Hubs to support feasibility and development costs for community-owned renewable energy project. It offers up to £40,000 for Stage 1 feasibility studies and up to £100,000 for Stage 2 development work. Proposals require at least 50% community ownership and generating local benefit. The scheme was extended in 2025 for one year, and while funds are likely now allocated, it is possible that the scheme will be extended with further grant available in future years.

Public Works Loan Board (PWLB)

The PWLB is a UK government facility that provides low-cost loans to local authorities for capital projects, funded through the National Loans Fund, repayable from the overall council budget but not from the project. Councils use PWLB borrowing to finance infrastructure such as housing, transport, and regeneration, with rates typically linked to gilt yields plus a margin. It offers flexible repayment terms but requires compliance with prudential borrowing rules and restrictions on debt-for-profit activities.

Offsetting/insetting[61]

Retrofit Credits allow organisations to offset their emissions by funding energy-efficiency upgrades in social housing, generating verified carbon credits. For councils, this offers two

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[58] Community Infrastructure Levy, GOV.UK, available at: Community Infrastructure Levy - GOV.UK

[59] Section 106, GOV.UK, available at: Planning obligations - GOV.UK

[60] Great British Energy Community Fund, Community Energy England, available at: Great British Energy Community Fund - Community Energy England

[61] Retrofit Credits, Housing Associations' Charitable Trust, available at: Retrofit Credits - HACT

opportunities: they can purchase credits to compensate for residual emissions and meet net zero targets, or, if they own housing stock, they can implement retrofit projects, generate credits, and sell them to corporates. The revenue can then be reinvested into further retrofits, creating an insetting effect and accelerating decarbonisation of their own assets.

12.6.1.2 Businesses and residents

Warm Home Plan[62]

The Warm Home Plan is a UK government initiative announced in 2025 to accelerate home energy efficiency and heat decarbonisation, backed by £13.2 billion of funding. It focuses on upgrading insulation, installing low-carbon heating systems, and supporting vulnerable households to reduce energy bills and emissions. The plan complements existing schemes like GBIS and the BUS, aiming to deliver large-scale retrofits.

Local Power Plan[63]

The UK Government's Local Power Plan, announced in 2026, outlines £1 billion of investment for community owned energy projects through grants, loans and advice. This support is being delivered by DESNZ, Great British Energy and the National Wealth Fund through to 2030, with the purpose to support community energy groups to develop energy generation and storage projects that deliver benefits to the local area.

Great British Energy Community Fund (GBECF)

Refer to above

Boiler Upgrade Scheme (BUS)[64]

The BUS is a government grant program in England and Wales that offers households and small businesses up to £7,500 toward replacing fossil fuel heating systems with low-carbon alternatives like air-source heat pumps. It aims to accelerate heat decarbonisation by reducing upfront costs, with installers applying on behalf of customers and funding available until March 2028. The end date of this scheme poses a risk to the sustained uptake of heat pumps, and a replacement scheme or change in the capex and running costs of heat pumps is required for continued rates of adoption.

Electric Vehicle Chargepoint Grant[65]

The EV Chargepoint Grant, available to March 2027, is a UK government scheme that provides funding for installing electric vehicle chargepoints at homes and workplaces. For homeowners and renters with off-street parking as well as households with on-street parking, the grant provides up to £500 towards the cost of installing a chargepoint. Businesses, workplaces and landlords can access grants for multiple chargepoints up to a limit of £500 per socket. Under the Workplace Charging Scheme businesses can apply for grants for up to 40 sockets across all their sites with landlords able to apply for grants for up to 200 sockets across all their sites. A separate Workplace Charging Scheme is also outlined for state-funded education institutions, with grants of up to £2,000 available per chargepoint socket.

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[62] Warm Homes Plan, GOV.UK, available at: Apply for the Warm Homes: Local Grant to improve a home - GOV.UK

[63] Local Power Plan, GOV.UK, available at: Local Power Plan

[64] Boiler Upgrade Scheme, GOV.UK, available at: Apply for the Boiler Upgrade Scheme: Overview - GOV.UK

[65] Electric Vehicle Chargepoint Grant, GOV.UK, available at: Electric vehicle chargepoint grants - GOV.UK

12.6.2 Repayable funding sources for upfront project costs

Repayable funding mechanisms are used when projects have a clear revenue stream but need capital upfront to bridge the gap between construction costs and future income. They provide financing where the project's financial return is sufficient to cover third-party finance costs, making them suitable for commercially viable schemes. This approach is common when the organisation retains ownership and operational responsibility for assets, ensuring control while leveraging external capital to deliver net zero infrastructure without delaying implementation.

12.6.2.1 Local authority

National Wealth Fund (NWF)[66]

The NWF is a UK government investment vehicle launched in 2024 to accelerate the transition to a green economy and boost economic growth. It channels public and private capital into strategic sectors such as clean energy, green steel, carbon capture, and advanced manufacturing, aiming to crowd in private investment and create high-quality jobs. Managed by the UK Infrastructure Bank, the fund supports projects that align with Net Zero goals and regional development priorities.

Local Climate Bonds[67]

Local Climate Bonds are a UK municipal investment mechanism that allows councils to raise funds for local net zero and climate projects by issuing bonds to residents and investors. They offer a low-risk, fixed-return investment, and proceeds are earmarked for projects such as renewable energy, EV infrastructure, and building retrofits. This approach promotes community engagement in climate action while providing councils with affordable finance for sustainability initiatives.

Green Bonds[68]

Green bonds are fixed-income instruments issued to raise capital specifically for projects with environmental benefits, such as renewable energy, energy efficiency, or sustainable transport. They work like traditional bonds but are earmarked for green projects. This financing tool helps governments, companies, and institutions attract investors committed to sustainability while supporting the transition to a low-carbon economy.

UK Municipal Bonds Agency (UKMBA)[69]

The UKMBA is a financing platform created to help local authorities access cheaper borrowing by issuing bonds collectively rather than individually. It pools councils' borrowing needs to achieve economies of scale and better rates compared to traditional sources like the PWLB. This approach aims to diversify funding options for infrastructure and regeneration projects while reducing reliance on central government lending.

12.6.2.2 Business and residents

Community share offers

Community share offers are a way for local people to invest in and own a stake in community-led projects, such as renewable energy, local services, or social enterprises. They raise capital by selling shares directly to individuals, often with modest financial returns and strong social or

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66 National Wealth Fund, available at: National Wealth Fund | National Wealth Fund

67 Local Climate Bonds, Green Finance Institute, available at: Green Finance Institute

68 Green Bonds, IMCA, available at: green-bonds-principles-june-2018-270520.pdf

69 UK Municipal Bonds Agency, available at: Home - UK Municipal Bonds Agency - UKMBA

environmental benefits. This model promotes democratic ownership and keeps profits within the community while funding projects that deliver local impact.

12.6.3 Financing through third party delivery

Financing through third-party delivery is used when a private or external organisation takes responsibility for developing, funding, and operating an asset on behalf of the public or community sector. This approach transfers the need for upfront project finance and shifts operational and financial performance risks away from the commissioning body to the third party.

12.6.3.1 Local authority

Service or Concession Agreement

A service or concession agreement typically allows a private provider to finance, install, and operate low-carbon infrastructure. Examples include heat networks, EV charging hubs, or renewable generation under a long-term contract with a public authority. The provider recovers costs through user tariffs or availability payments, while the authority sets performance standards to ensure carbon reduction goals are met.

Heat as a Service (Haas)[70]

HaaS is an emerging business pilot model where customers pay for the outcome including warmth and comfort, rather than for units of energy like gas or electricity. It typically involves smart controls and service agreements that guarantee a set temperature or heating schedule, enabling providers to optimize energy use and integrate low-carbon technologies. This approach shifts incentives toward efficiency and decarbonisation, making heating more affordable and sustainable for households. Models for heat as a service are in development for both domestic and non-domestic sectors.

12.6.3.2 Businesses and residents

Heat as a Service (Haas)[71]

As above.

Pay As You Save (PAYS)[72]

PAYS is a financing model that enables households or businesses to install energy efficiency or low-carbon technologies such as insulation, heat pumps, or solar panels without paying upfront. The cost is repaid over time through a charge on the energy bill, with repayments designed to be lower than the savings achieved, so customers see immediate net benefits.

12.6.4 Council actions to enable business and resident investment

To help businesses and residents invest their own capital in local energy projects, councils can play a vital enabling role by reducing barriers and creating confidence in returns. This often involves providing clear information on opportunities, offering technical guidance, and facilitating access to trusted suppliers or installers. Councils can also support through measures such as aggregating demand, coordinating bulk purchasing, and promoting financial incentives or accreditation schemes, all of which make investment more attractive and lower perceived risk for individuals and businesses.

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[70] Energy as a Service Pilot Phase Evidence Report, EON, available at: Energy as a Service: final report

[71] Energy as a Service Pilot Phase Evidence Report, EON, available at: Energy as a Service: final report

[72] Pay As You Save, UK Green Building Council, available at: Microsoft Word - GBC PAYS exec sum_FINAL.doc

Group purchase

A group purchase scheme is a collective buying model where residents/organisations pool demand for clean solutions like solar or heat pumps to secure lower costs and accelerate adoption. It reduces upfront barriers and sends strong market signals to scale decarbonisation.

The leading scheme, Switch Together, previously known as Solar Together, has recently extended from solar to also include heat pumps. Switch Together is a group purchasing scheme, coordinated by local authorities, which enables residents to install technologies at reduced rates. Suppliers compete in a reverse auction to offer the lowest price, and participating households benefit from costs typically lower than those available individually. At present, Switch Together is the only established provider of this model, but similar group purchasing approaches could be explored for other technologies such as heat pumps or battery storage.

Revolving Loan funds[73]

Revolving loan funds allow councils to provide low-cost loans for energy efficiency and renewable projects, using an upfront capital pool that is replenished as loans are repaid. These funds are typically administered by third parties such as community finance institutions or banks. While arrears are around 1%, risk can be mitigated through affordability checks and legal safeguards, making this a viable option for councils to support the able-to-pay market.

Accredited supplier lists

The council could seek to collect and publish a list of known suppliers with suitable accreditation.

Facilitate events and forums for suppliers and interested parties

The council could seek to facilitate events and forums where residents and businesses could meet with potential suppliers. The council could maintain a neutral stance by allowing all suppliers to attend who meet certain accreditation levels.

Innovation mechanisms

Council can run pilots/support innovation mechanisms such as blended finance.

12.7 Next Steps

This chapter provides a high-level assessment of the economic implications of decarbonising the area, focusing on capital investment, benefits, and funding pathways across two transition scenarios. The analysis offers a foundation for understanding the scale and impact of net-zero interventions.

To build on this work for deeper strategic decision-making, we recommend the following next steps:

Expand to a Full Cost-Benefit Analysis (CBA): Building on the current capital expenditure and benefit assessment, the next stage should incorporate operational expenditure (OPEX) and wider societal benefits, enabling calculation of aggregate Net Present Social Value (NPSV). Undertaking a full CBA will provide a more holistic and transparent view of the long-term value and trade-offs associated with net-zero investments, strengthening the evidence base for investment decisions and policy development.

Deep dive on funding and financing pathways: While this chapter sets out funding and finance pathways at a high level, a more detailed review is required. This should include in-depth modelling of funding mechanisms, sources, and delivery models for each intervention.

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[73] Lendology, available at: Accessible Finance for Home Energy Improvements

Achieving a clear and actionable approach will require proactive stakeholder engagement working with local authorities, residents, developers, and industry partners to validate assumptions, clarify roles, and co-design effective funding solutions.

These next steps will ensure the economic case for decarbonising the area is robust, comprehensive, and tailored to local needs, providing a strong foundation for future investment and delivery.

13 Prioritisation

This section details the recommended framework for prioritising decarbonisation interventions within the Chesterfield, North East Derbyshire & Bolsover LAEP. It identifies projects for short-term and long-term action, outlines key focus zones, and addresses dependencies and uncertainties. A diagram of the overarching combination of activities is set out in Figure 13.3.

13.1 Prioritisation methodology

Interventions have been prioritised through a structured analysis that integrates both quantitative and qualitative considerations. This process has been further strengthened by insights derived from stakeholder engagement sessions, ensuring that the prioritisation reflects not only technical feasibility but also local context and stakeholder aspirations. The combined approach provides clarity on the categorisation of actions into “quick wins,” which deliver immediate and visible benefits, “enablers,” which create the necessary conditions for future progress, and longer-term strategic investments that underpin systemic transformation.

Table 13.1 summarises the core criteria applied in this analysis and how they have been ranked relative to each other by the local authorities and other stakeholders. Overall, near-term implementations have been agreed to focus on the impact to levels of fuel poverty, use of existing funding streams that can be leveraged in the short term and taking into account the local grid readiness. The system carbon impact of implementations was not considered to be a priority as the measures collectively are set out to achieve Net Zero, so the feasibility of implementation in the short term was considered to be more relevant in determining short-term actions.

Table 13.1: Summary of Prioritisation Criteria

Core Criteria	Definition	Why it matters	Ranking
Equity and fuel poverty	Extent the measure impacts on levels of fuel poverty.	Supports a just transition by ensuring vulnerable groups benefit from decarbonisation efforts	Higher
Funding Availability	Access to public or private finance for implementation	Determines the likelihood of implementation and scalability, especially in resource-constrained environments.	Higher
Local grid readiness	Likelihood of DNOs being able to facilitate implementation at the local level in the short term	Contributes to stable operation of the electricity network and allows time for DNOs to plan and execute necessary upgrades in constrained areas	Higher
Cost effectiveness (WLC)	Net present value of an intervention, as a proxy for affordability for end users	LAEP requires robust cost inputs and standardised assumptions to identify “most cost-effective combination of options”	Medium
Deliverability & readiness	Consenting, supply chain readiness, ease of installation	Ensures practical feasibility and timely deployment of measures to a high standard of quality	Medium

Local economic & health co-benefits	Job creation and improvements to air quality	Considers wider benefits associated with energy decarbonisation and how these can be realised locally	Lower
Risk & uncertainty exposure	Technology maturity, future-proofing, interoperability	Reduces exposure to technology uncertainty and focusses on long-term viability of investments	Lower
Carbon impact	Carbon abatement potential, including lifetime tCO_2e savings per project	Acknowledges the time-value of emissions by pursuing steep decarbonisation in the early years	Lower

13.2 Dependencies and uncertainties for interventions

Delivery of the interventions identified in the LAEP is influenced by a set of dependencies and uncertainties that shape its feasibility, timing, and overall impact. Dependencies refer to the enabling conditions or prerequisite actions that must be in place for successful delivery. These may include the availability of supporting infrastructure, alignment with regulatory frameworks, readiness of supply chains, and access to skilled labour. For example, the rollout of heat pumps may depend on grid capacity upgrades, installer training programmes, and consumer incentives.

Uncertainties, on the other hand, arise from factors that are difficult to predict or control, such as fluctuations in technology costs, changes in policy direction, market behaviour, and the pace of innovation. These uncertainties can influence both the cost-effectiveness and deliverability of interventions, requiring adaptive planning and risk mitigation strategies. Recognising these dynamics is essential for sequencing actions effectively, as interventions with high dependency or uncertainty may need to be phased later or supported by enabling measures.

Table 13.2 summarises the key dependencies and uncertainties relevant to the successful delivery of this LAEP and provides a clear reference point for understanding the conditions that underpin successful implementation and the risks that must be managed to maintain progress toward long-term objectives.

Table 13.2: Summary of dependencies and uncertainties

Dependency / Uncertainty	Why it matters	Suggested mitigation
Funding	Funding availability is essential for project delivery and scalability	Identify and align with existing funding streams. Coordinate with EMCCA to explore alternative funding mechanisms and partnership opportunities. Explore public-private sector partnerships to enable access to wider expertise and funding, to accelerate delivery. Leverage the ‘able to pay’ market through education around the benefits associated with interventions.
Electricity network capacity	PV, ASHPs, EV projects depend on headroom;	Ongoing detailed engagement with NGED with regard to the outcomes of this LAEP

& connection queues	connection delays can defer benefits	and with regard to any projects that are taken forward off the back of the LAEP. Ensure relevant parties have information to establish targeted grid reinforcement to enable delivery of priority projects.
Energy price volatility	Operating costs (ASHP vs Gas vs Heat network)	Adopt a fabric first approach to minimise demand when switching to lower carbon solutions. Adopt local renewable generation and energy storage systems to help shift demand and reduce exposure to pricing risk. Smart local energy systems can also be considered to help manage this. Ensure energy consumers are educated on the opportunities and risks associated with prosumer behaviours, such as use of time-of-use tariffs for ASHP.
Supply chain & skills	Heat pump, insulation, delivery capacity may constrain pace	Policy considerations such as training programmes, funding and incentives, including focus on quality over pace to address public perceptions. Strategic partnerships between public and private sector. Leverage existing expertise in local community energy groups.
Public trust & uptake	Public acceptance is essential to drive uptake	Community engagement and communication programmes to share good news stories. Work with community energy groups to support with messaging and delivery. Undertake demonstration/pilot projects to enable delivery of and showcase best practice.
Policy evolution	Changes to boiler phase out, tax incentives, market design or zoning rules could shift the plan.	Ensure policy tracking is in place, i.e. through a framework to monitor national and regional policy developments and regularly review the LAEP or subsequent project to align with these. Engage with or create local energy forums to enable collaborative adaptation of plans and projects to policy changes.
Hydrogen availability/cost	The industrial decarbonisation pathway for Chesterfield, North East Derbyshire & Bolsover is highly sensitive to hydrogen	Detailed engagement with key stakeholders in this space such as East Midlands Hydrogen to advise on potential hydrogen needs in the area. Maintain focus on hard-to-treat high temperature loads with more readily

	price, hydrogen emissions intensity and technology availability.	available technologies utilised for wider decarbonisation.

13.3 Focus zones

Given the large scale of interventions required to achieve a net zero energy system at the local level, it is important to determine where to start the roll-out. Based on the priorities set out, 'focus zones' can be identified that will meet the criteria for short-term implementations. Within these focus zones, specific schemes can then be developed by the local authorities to move towards delivery.

13.3.1 Areas With High Fuel Poverty

Fuel poverty remains a significant challenge for Chesterfield, North East Derbyshire & Bolsover, the areas report a higher proportion (12.7%,11.8% and 13.8%) of fuel-poor households compared to the East Midlands regional average (11.7%). For reference, the national average is 11.4%.

The Low-Income Low Energy Efficiency (LILEE) definition of fuel poverty was introduced in 2019. Before this, a home was classified as fuel poor if it spent more than 10% of its annual income on space heating and energy services. This is far more likely in a home rated EPC E or below due to lack of insulation and poor thermal retention capability.

Fuel poverty currently contributes to around 155 excess winter deaths across EMCCA annually. Retrofitting homes can have a huge impact on this, alongside reducing health inequalities and reducing absences from school and work arising from damp and cold air related illnesses.

The spatial distribution of fuel poverty within Chesterfield, North East Derbyshire & Bolsover is uneven, illustrated in Figure 13.1, with certain neighbourhoods experiencing disproportionately high rates. The analysis of percentage average risk of fuel poverty is equivalent to the percentage of households within the MSOA that are classed as being fuel poor. This disparity underscores the urgent need for targeted interventions that address energy affordability and thermal comfort. Analysis at the MSOA level shows the three areas with the highest proportion of households in fuel poverty in each local authority area, which are set out in Table 13.3.

Table 13.3: MSOAs with highest levels of fuel poverty in Chesterfield, North East Derbyshire & Bolsover

Local Authority	MSOA	Total Number of Fuel Poor Households	Proportion of Fuel Poor Households
Chesterfield	Chesterfield 010 - Central Chesterfield & Stonegravels	669	19.4%
	Chesterfield 013 - Boythorpe & Birdholme	500	15.8%
	003 - New Whittington, Hollingwood & Barrow Hill	553	14.9%
North East Derbyshire	North East Derbyshire 012 - Clay Cross	406	13.9%
	North East Derbyshire 013 - Stonebroom, Shirland & Wessington	507	13.7%

Local Authority	MSOA	Total Number of Fuel Poor Households	Proportion of Fuel Poor Households
	014 - Eckington East & Renishaw	401	13.1%
Bolsover	Bolsover 004 - Bolsover North & Shuttlewood	548	16.9%
	Bolsover 003 - Creswell & Hodthorpe	579	20.1%
	Bolsover 007 - Langwith, Shirebrook South & Pleasley	726	16.5%

Focusing retrofit programmes on these zones offers significant benefits. Fabric-first measures, including improved insulation, airtightness, and glazing upgrades, can substantially reduce heat loss, lower energy bills, and improve indoor comfort. Beyond carbon reduction, these interventions deliver critical social co-benefits: alleviating fuel poverty, improving health outcomes, and reducing financial stress for vulnerable households.

Figure 13.1: Percentage average risk of fuel poverty for households per MSOA

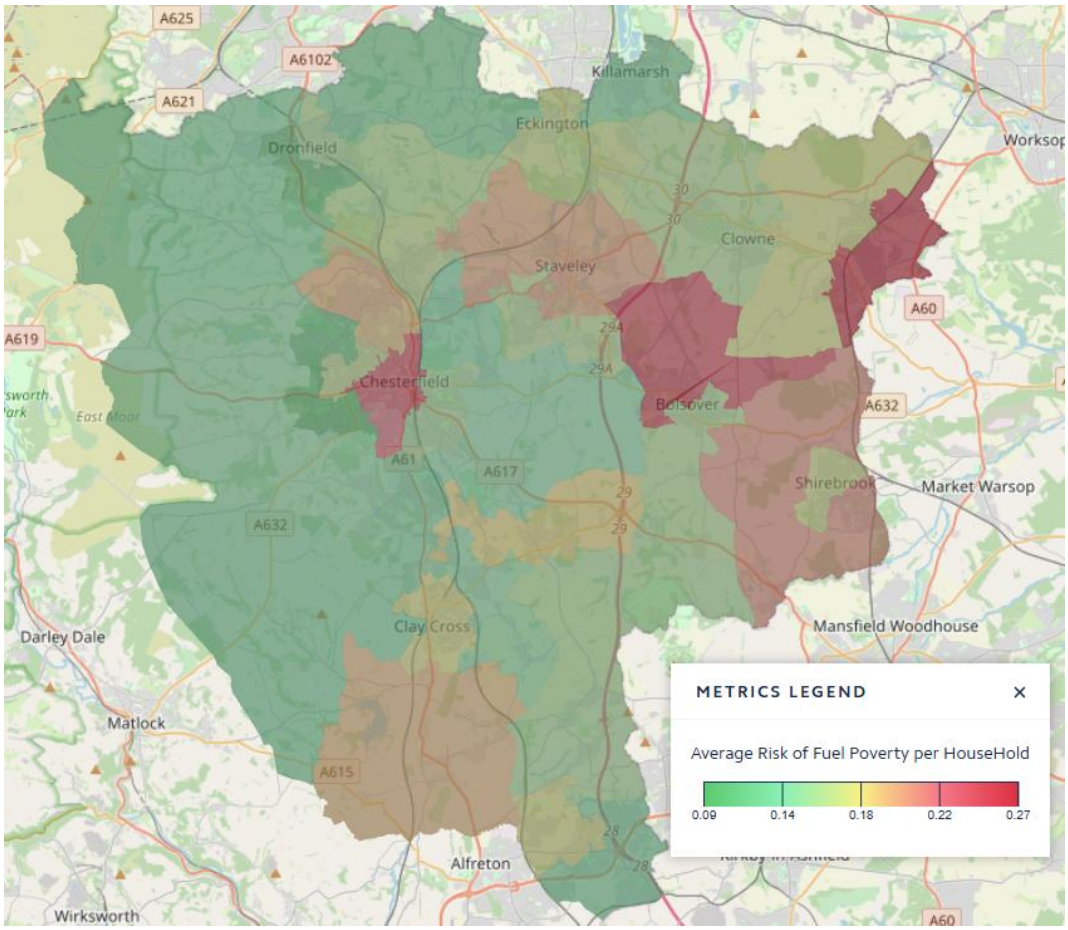
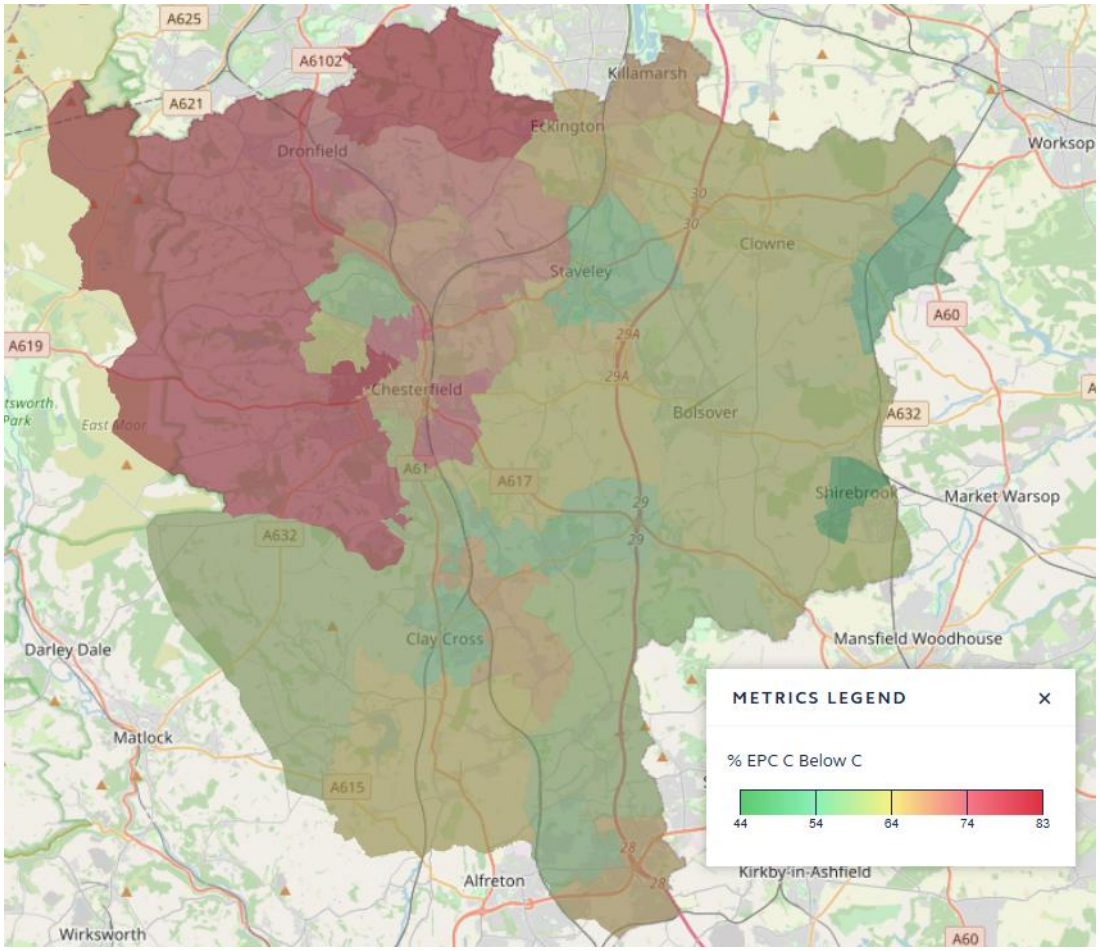


Figure 13.2: Percentage of properties below EPC rating C per MSOA



Within the areas with high fuel poverty, implementation can be further focused on properties with an EPC rating below C. The spatial distribution of these properties across the area is shown in Figure 13.2. The number of these properties within each of the MSOAs is shown in Table 13.4. Within these identified properties, the local authorities can have the most influence over housing association properties.

Through combining these characteristics, we can determine the number of social housing properties in each MSOA that are suitable for a “light + deep” retrofit package, and those that are suitable for a light retrofit only. These are summarised in Table 13.4.

Table 13.4: Fuel-poverty led domestic retrofit implementation quantification

MSOA	Number of homes below EPC C (1)	Of (1), number occupied for social housing (2)	Of (2), number suitable for light retrofit only	Of (2), number suitable for light + deep retrofit
Chesterfield 010 - Central Chesterfield & Stonegravels	2,772	219	33	50
Chesterfield 013 - Boythorpe & Birdholme	1,606	459	80	62
Chesterfield 003 - New Whittington, Hollingwood & Barrow Hill	2,367	182	25	35
Chesterfield Total	**31,673**	**3,270**	**475**	**382**
North East Derbyshire 012 - Clay Cross	2,381	662	175	23
North East Derbyshire 013 - Stonebroom, Shirland & Wessington	2,522	392	82	52
North East Derbyshire 014 - Eckington East & Renishaw	2,288	446	125	20
North East Derbyshire Total	**31,822**	**3,541**	**924**	**184**
Bolsover 004 - Bolsover North & Shuttlewood	2,227	152	10	12
Bolsover 003 - Creswell & Hodthorpe	1,593	175	71	15
Bolsover 007 - Langwith, Shirebrook South & Pleasley	2,664	191	31	11
Bolsover Total	**22,074**	**1,399**	**321**	**99**

Based on the implementation rates set out in the Net Zero 2050 pathway, and factoring in non-social housing these focus zones could achieve the pathway implementation of light retrofit for 2025 – 2031/2032 and implementation of deep retrofit for 2025 – 2035/2036.

In addition, a majority of the social housing properties in Chesterfield, North East Derbyshire and Bolsover respectively in these focus zones have been identified as suitable for ASHP, which could be implemented at the same time, in a ‘touch the property once’ approach. It should be noted, though, that in order to achieve the fuel poverty alleviation benefits of ASHP in these

properties, education of the residents on how to realise the benefits through appropriate electricity tariffs and operation of the system is likely to be required to avoid unintended outcomes.

13.3.2 Electricity Headroom Pockets

Electricity network capacity is a key determinant of where electrification measures, such as heat pump deployment and EV charging, and electricity generation, can be accelerated and scaled. Analysis of grid utilisation and headroom across Chesterfield, North East Derbyshire & Bolsover, in Section 11, identifies pockets of available headroom for both demand and generation, where additional electrical systems can likely be accommodated without immediate reinforcement. These areas represent prime opportunities for early roll out of ASHP, PV and EV charging, as they are likely to be able to be delivered with minimal infrastructure upgrades, reducing cost and complexity.

13.3.3 Demand Headroom

Based on Analysis in section 11, focus zones for the early roll-out of ASHPs and EV charging hubs would be centred around Staveley & Norbriggs in Chesterfield, Eckington West & Coal Aston in North East Derbyshire and Whitwell & Elmtown in Bolsover.

Areas with low headroom require a different approach. In these zones, demand-side response (DSR) strategies should be prioritised to manage peak loads and defer costly reinforcements. DSR measures may include PV paired with battery systems, or leveraging vehicle-to-grid technology. These interventions enhance flexibility, as we prepare the network for future electrification. In Chesterfield, Loundsley Green & Holme Hall and Brookside & Walton has the lowest headroom. For North East Derbyshire, Grassmoor & Holmewood records the lowest headroom and South Normanton Broadmeadows & Pinxton in Bolsover. This suggests a focus on energy efficiency and demand side response delivery in this area in the short term, in conjunction with conversation with NGED around the timeline for accessing additional headroom in this area.

Further detailed engagement with NGED will be required to determine viable timescales for delivery as projects are developed in more detail, ensuring that planned interventions align with network reinforcement schedules and operational constraints and support a coordinated and efficient rollout of electrification measures. The analysis undertaken here is based on MSOA boundaries, which do not directly match with the electricity network operational boundaries, so verification of headroom with NGED will be key in the early stages of defining delivery schemes.

Table 13.5: ASHP potential in high absolute demand headroom MSOAs

MSOAs with highest demand headroom	Number of homes above EPC D (1)	Of (1), number occupied for social housing (2)	Of (2), number suitable for ASHP	Of (1), number suitable for ASHP
002 - Staveley & Norbriggs	1,709	562	560	1,599
006 - Inkersall Green & Duckmanton	1,284	270	269	1,230
010 - Central Chesterfield & Stonegravels	2,229	274	268	1,761
Chesterfield Total	**16,708**	3,747	3,714	15,471

MSOAs with highest demand headroom	Number of homes above EPC D (1)	Of (1), number occupied for social housing (2)	Of (2), number suitable for ASHP	Of (1), number suitable for ASHP
002 - Eckington West & Coal Aston	662	72	72	635
004 - Dronfield Town & Unstone	1,141	173	173	986
006 - Dronfield South & Gosforth Lane	814	45	42	784
North East Derbyshire Total	**17,309**	**2,890**	**2,843**	**16,278**
002- Whitwell & Elmtown	1,133	282	280	1,094
003 - Creswell & Hodthorpe	1,555	296	291	1,491
004 - Bolsover North & Shuttlewood	1,627	259	256	1498
Bolsover Total	**16,475**	**2,854**	**2,824**	**15,712**

13.3.4 Heat Network Zones

Potential heat network zones have been identified in Section 7.3, clustering around key anchor loads and off-takers that provide a strong foundation for network viability. Developing these zones as a priority intervention offers multiple benefits: it alleviates grid constraints in surrounding areas by reducing reliance on electricity for heating, supports rapid decarbonisation at scale, and delivers lower-cost, and potentially lower-carbon, heat compared to the alternative scenario of widespread ASHP deployment in these zones.

This approach leverages existing infrastructure and demand clusters to create a strategic, cost-effective pathway for heat decarbonisation. The identified areas are set out in Section 7.3.

13.4 Quick win projects

Quick wins represent a category of interventions that can be implemented immediately with minimal complexity and high confidence in successful delivery. These actions are often described as “no regrets” because they rely on existing evidence, proven technologies, and established funding routes, making them low-risk and highly practical. They deliver immediate carbon savings, are highly cost-effective, and offer visible progress that builds momentum for more complex programmes. Quick wins also generate wider benefits such as reduced operational costs, improved system efficiency, and enhanced social and economic outcomes. Their prioritisation is underpinned by high scores for system carbon impact, cost-effectiveness, and deliverability, while also addressing equity and co-benefits where possible.

13.4.1 Rooftop Solar PV on Public Estate Buildings

Installing rooftop solar PV systems on suitable public buildings, such as libraries, schools, and community centres, paired with battery storage where viable, presents an immediate opportunity to decarbonise public sector operations. This intervention focuses on sites with consistent daytime energy loads, making effective use of existing roof space for on-site renewable generation. By reducing grid dependency and lowering operational costs for public services, it

delivers strong technical and economic benefits. The measure scores highly on carbon impact, cost-effectiveness, and deliverability, while also performing well on network impact by optimising grid flexibility. In addition, it offers local economic co-benefits through job creation in installation and maintenance and demonstrates visible leadership that can encourage wider adoption.

A significant proportion of North East Derbyshire District Council owned operational buildings have already undergone decarbonisation interventions, delivered primarily through successive phases of the Public Sector Decarbonisation Scheme. As a result, the scope for further emissions reduction within the directly owned council estate is more limited than in previous years. However, a number of public-facing assets, including community buildings and libraries, are either owned, leased, or operated by third parties and may fall outside the direct control of the local authority. The pace and extent of decarbonisation across these assets will therefore be influenced by ownership arrangements, governance structures, and the availability of external funding and partnership mechanisms.

Table 13.6: Summary of public estate buildings with estimated baseline electricity demand

Local Authority	Primary Use Type	Number	Total Energy demand Baseline (MWh/yr)
Chesterfield	Community Centre	27	1,818
	Primary School	156	22,231
	Public Administration Building	6	1,277
	Secondary School	3	413
North East Derbyshire	Community Centre	15	1761
	Primary School	179	16120
Bolsover	Community Centre	12	698
	Primary School	108	13,499
	Public Administration Building	3	422

13.4.2 Fuel poverty led social housing retrofit

Targeting fuel-poor households through social housing retrofit programmes, such as the Warm Homes Social Housing Fund, supports both climate and social equity objectives. These initiatives focus on areas of greatest need by improving building fabric and thermal efficiency. This intervention not only reduces emissions but also improves energy affordability, lowers household bills, and enhances health outcomes for vulnerable residents. Areas such as Chesterfield 010 - Central Chesterfield & Stonegravels, Bolsover 003 - Creswell & Hodthorpe, Bolsover 004 - Bolsover North & Shuttlewood, and Bolsover 007 - Langwith, Shirebrook South & Pleasley have the highest concentration of households at risk of fuel poverty. Notably, over 65% of buildings in the identified Chesterfield areas, 64% in North East Derbyshire and over 57% in the Bolsover areas are rated EPC D or below.

Table 13.7: Identified implementations of fuel poverty led social housing retrofit

MSOA	Number of social houses with EPCs below C	Light Retrofit CAPEX (,000 £)	Deep Retrofit CAPEX (Thousands £)	Annual Carbon Savings Light Retrofit (tCO2e)	Annual Carbon Savings Deep Retrofit (tCO2e)
010 - Central Chesterfield & Stonegravels	219	328.6	3,898	6.7	87
013 - Boythorpe & Birdholme	459	435	3,533	18.7	114.5
003 - New Whittington, Hollingwood & Barrow Hill	182	220	4,770	10	74
Chesterfield Total	**3,270**	**3,067**	**30,629**	**185.8**	**915**
012 - Clay Cross	662	706	2,385	36	35.5
013 - Stonebroom, Shirland & Wessington	392	557	1,209	44	21.9
014 - Eckington East & Renishaw	446	570	1,134	61.7	23.5
North East Derbyshire Total	**3,541**	**4,363**	**10,818**	**328**	**207.5**
004 - Bolsover North & Shuttlewood	152	70	4,893	4.7	67
003 - Creswell & Hodthorpe	175	419	948	51	25
007 - Langwith, Shirebrook South & Pleasley	191	230	1,805	17.6	39
Bolsover Total	**1,399**	1,923	12,527	174	256

13.4.3 Light retrofit measures

Light retrofit measures, including cavity wall insulation and loft insulation top-ups, represent low-cost, high-deliverability actions that can be implemented relatively quickly across the able-to-pay market. These measures improve energy efficiency, reduce running costs, and create immediate co-benefits such as improved comfort and lower energy bills. However, the speed of rollout depends on addressing common barriers such as homeowner awareness, upfront costs, and trust in installers. While these measures are technically straightforward, homeowners and landlords may choose not to invest without clear incentives or support.

To enable rapid uptake, the council can play a proactive role in creating an environment that encourages action. This could include launching targeted awareness campaigns to highlight the benefits of retrofit and the availability of funding or incentive schemes, as well as providing a centralised one-stop shop for advice and guidance on retrofit options, costs, and potential savings. Establishing and promoting a list of council-approved installers would help build

consumer confidence and reduce perceived risks associated with quality and reliability. In addition, signposting to financing options such as grants, low-interest loans, or national schemes can help overcome concerns about upfront costs.

Table 13.8: Estimated Light Retrofit Investment and Carbon Savings by Housing Tenure Type

Tenure Type	Count of Properties	Estimate CAPEX of light retrofits (Thousands £)	Annual Carbon Savings from light retrofits (tCO2e)
Chesterfield			
Housing Association	223	883	57
Local Authority	1,090	3,575	177
Owner Occupied	15,796	87,064	6,360
Privately Rented	2,011	8,985	658
North East Derbyshire			
Housing Association	561	2,127	155
Local Authority	916	3,423	217
Owner Occupied	16,931	98,327	7,099
Privately Rented	1,109	5,500	430
Bolsover			
Housing Association	221	1,007	57
Local Authority	475	2,095	173
Owner Occupied	10,913	55,232	3,122
Privately Rented	1,858	7,129	438

13.4.4 Small roof-mounted PV and Battery storage installs on suitable homes

Small roof-mounted PV installations on suitable homes offer a scalable solution for household-level renewable generation. We modelled the uptake and estimated costs of these systems alongside domestic battery storage, assessing their potential contribution to local energy generation and flexibility.

This measure empowers residents to participate in the energy transition, reducing reliance on fossil fuels and enhancing energy resilience. It performs strongly on system carbon impact and cost-effectiveness and deliverability. Co-benefits include increased energy independence and potential local economic gains through installation activity.

As with other homeowner-led measures, uptake depends on motivation and overcoming barriers such as upfront costs, lack of awareness, and trust in installers. The example enabling actions outlined in 13.4.3, including council-led awareness campaigns, a one-stop shop for retrofit advice, and maintaining a list of approved installers, are also relevant here. These can be complemented by PV-specific initiatives such as signposting funding schemes and exploring group-buying or community solar programs to reduce costs and increase participation.

Table 13.9:Estimated Solar PV Investment and Carbon Savings by Property Type

Property Type	Estimated Capex (Thousand£)	Annual Yield (MWh)	Estimated Annual Carbon Savings (tCO2e)
Chesterfield			
Multi Dwelling	£10,618	4,383	907
Single Dwelling	£163,422	67,107	13,891
Non-Domestic	£71,292	29,258	6,056
North East Derbyshire			
Multi Dwelling	£10,618	4,383	907
Single Dwelling	192,176	79,089	16,372
Non-Domestic	48,457	19,887	4,117
Bolsover			
Multi Dwelling	6,320	2,609	540
Single Dwelling	£139,536	57,281	11,857
Non-Domestic	£59,316	24,343	5,039

13.5 Enabling Actions

Enabling actions are interventions that do not deliver assets but are critical for unlocking future opportunities and accelerating the transition at scale. These actions create the foundational conditions required for the successful deployment at scale of the physical interventions.

Unlike quick wins, which focus on immediate and visible benefits, enablers are strategic investments in capability, infrastructure, and market readiness, or actions to address systemic barriers. By resolving these issues early, enabler projects reduce uncertainty and dependency risks for subsequent interventions, ensuring that future programmes can be delivered efficiently and cost-effectively.

These actions often require collaboration across multiple stakeholders, including local authorities, industry partners, and community organisations, to align priorities and secure long-term commitment. In many cases, enabler projects will require coordination with Distribution Network Operators (DNOs), regional authorities such as the East Midlands Combined County Authority, and private sector actors to ensure that technical, regulatory, and financial conditions are met.

13.5.1 Electricity grid capacity outlook

Targeted grid reinforcements are a fundamental enabler for the large-scale deployment of electrification technologies and distributed renewable generation. As electricity demand rises due to the adoption of heat pumps, electric vehicles, and rooftop solar PV, grid capacity constraints present a significant barrier to progress. Strategic reinforcement in areas with minimal existing constraints ensures that upgrades are delivered efficiently, cost-effectively, and in alignment with future demand growth.

In order to best approach this, the local authorities can play a convening role in ensuring stakeholders have access to the information required to manage current capacity and plan for the future. For the big picture, the local authorities should submit the LAEP to NGED and Northen Powergrid for consideration in both the next regulatory submission planning and longer-term forecasts.

For short-term projects, particularly in focus zones, a ‘Connections Surgery’ should be held with NGED in the immediate future in order to verify the feasibility of connections required for the identified interventions at the neighbourhood level. This could also be used as an opportunity to identify other areas of network capacity to identify next-stage implementations and neighbourhoods for targeted uptake offers of certain interventions.

13.5.2 Education and Demonstrator Projects

The successful delivery of the LAEP will depend on building public understanding and confidence in low-carbon technologies and retrofit measures. Education and demonstrator projects are essential to achieve this. The council can lead targeted educational initiatives that explain the benefits of energy efficiency, renewable generation, and electrification, while addressing common concerns about cost, disruption, and reliability.

One approach to this would be for each local authority to develop an online ‘hub’ for the LAEP and associated resources, which can become a single point of reference for local residents and businesses looking to benefit from the energy transition. This could also be coordinated at the regional level by EMCCA to drive consistency and scale. Noting the resource constraints of local authorities, this does not necessarily require the creation of significant content, but rather to leverage existing information and analysis already available from other trusted sources.

To supplement this, targeted education programmes may be required alongside rollout of measures in focus zones, in order to increase uptake and to maximise benefits to the recipients of interventions.

Alongside education, demonstrator projects will provide visible examples of best practice and allow residents to see successful implementations first-hand. These projects might include retrofit exemplars in council-owned housing, pilot schemes for technologies such as heat pumps and solar PV, and open-home events where early adopters share their experiences. Demonstrator projects not only help overcome scepticism but also provide valuable data and insights to inform wider rollout. Some wider initiatives, such as ‘Visit a heat pump’, can be leveraged here, reducing the level of resource required to provide access to such demonstrators.

13.5.3 Local bulk procurement frameworks

The establishment of local bulk procurement frameworks for retrofit measures, PV and heat pump installations is a strategic enabler that addresses cost, supply chain resilience, and delivery certainty. Aggregating demand across multiple projects and stakeholders unlocks economies of scale, reduces unit costs, and provides suppliers with greater confidence to invest in capacity.

This approach can also help to deliver consistent quality standards, with the right structure, and accelerates market readiness for low-carbon technologies by providing a pipeline of work that local business can use to justify investment in skills and job growth.

Bulk procurement frameworks should be set up to support smaller contractors by providing access to larger programmes, fostering local economic development and job creation. Delivery will require coordinated action between local authorities, housing providers, and private sector

partners to design procurement processes that are transparent, efficient, and aligned with long-term decarbonisation objectives.

These frameworks could also support the creation of a list of ‘approved’ suppliers, hosted on the online ‘hub’ that would help to build consumer confidence when making individual decisions. This could help to establish minimum quality standards and leverage learnings from the Nottingham Energy partnership on the required level of quality control and oversight required to ensure benefits are realised. Other benefits could be targeted through the ‘approvals’ process, such as entry-level jobs and social value delivery.

13.5.4 Workforce training programmes

Workforce training programmes are critical to ensuring that the transition to net zero is supported by a skilled and capable labour force. The scale of retrofit and low-carbon technology deployment required over the coming decade far exceeds current workforce capacity, creating a risk of delivery delays and cost escalation. Investing in training programmes now will build the necessary skills base for installing heat pumps, delivering high-quality retrofits, and integrating renewable energy systems.

These programmes should be developed in partnership with industry bodies, vocational training providers, and regional authorities to ensure alignment with market needs and future demand. Workforce development not only supports decarbonisation objectives but also delivers wider economic benefits through job creation and skills enhancement.

There is an opportunity to work with local training providers, such as Chesterfield College, which has already expressed interest in supporting wider upskilling efforts. This presents a strong basis for proactively engaging to establish a skills and local jobs pipeline. This could be kick-started through creating, or supporting an existing, skills forum between education institutions and local businesses.

13.5.5 Financing mechanisms for low-income households

A key consideration regarding funding mechanisms is starting by maximising uptake of existing central government schemes. Through keeping up to date with central government policy, such as the recent expansion of the Boiler Upgrade Scheme to include air-to-air ASHPs, and taking responsibility for sharing the appropriate information with relevant residents and businesses, uptake of supported interventions could be increased in the near future.

In addition to this, developing innovative financing mechanisms for low-income households is essential to ensure an equitable and inclusive transition. Many households face significant financial barriers to adopting energy efficiency measures or low-carbon technologies, even when long-term savings are substantial. Enabler actions in this area for the local authorities in partnership with other stakeholders include the creation of accessible loan schemes, targeted grant programmes, and blended finance models that reduce upfront costs and spread repayments over time. These mechanisms should complement existing national schemes while addressing local gaps in provision.

13.5.6 Funding opportunities

The suspension of the Public Sector Decarbonisation Scheme (PSDS) has created an urgent need to identify alternative funding streams for public sector organisations. Many local authorities and public institutions operate under severe financial constraints, limiting their ability to invest in energy efficiency and renewable energy projects. An alternative funding model is urgently needed to maintain momentum in public sector decarbonisation. These should prioritise projects that deliver high-impact carbon reductions and operational savings, such as building

retrofits, heat decarbonisation and renewable energy installations. Some suggested alternative funding routes have been outlined in Session 12.6.

13.5.7 Industrial Decarbonisation & Hydrogen Readiness

Industrial decarbonisation is essential for achieving Chesterfield, North East Derbyshire & Bolsover's net zero objectives while safeguarding productivity and competitiveness. As the level of data available for analysis in this area is significantly lower than for domestic and public properties, and since decarbonisation routes will vary depending on sector and scale, it is important that further attention is given to this area. There are several large emitters that have not been engaged in the LAEP process, despite invitation, which may provide more insight on the likely route forward for significant shares of industrial energy usage.

A starting point could be to establish an industrial electrification 'showcase', enabling local businesses to engage with electrification suppliers. There is a perception that electrification is likely to be more costly, but this is highly dependent on the process and technology. In addition, the British Industrial Supercharger may apply to businesses within the area and could change the short-term viability of electrification for those businesses. Ensuring that businesses are informed about their options and potential benefits will be key to the rate of uptake here. This measure complements a fabric-first and electrification-first approach by preserving optionality for processes that are best suited to low-carbon hydrogen in the medium to long term.

Where electrification is not feasible, hydrogen readiness is an enabling step for hard-to-abate industrial processes. Preparing demand, infrastructure, skills, governance, and finance in a coordinated manner reduces delivery risk, accelerates time to scale, and ensures that hydrogen deployment, when available at the right cost and carbon intensity, can be adopted efficiently.

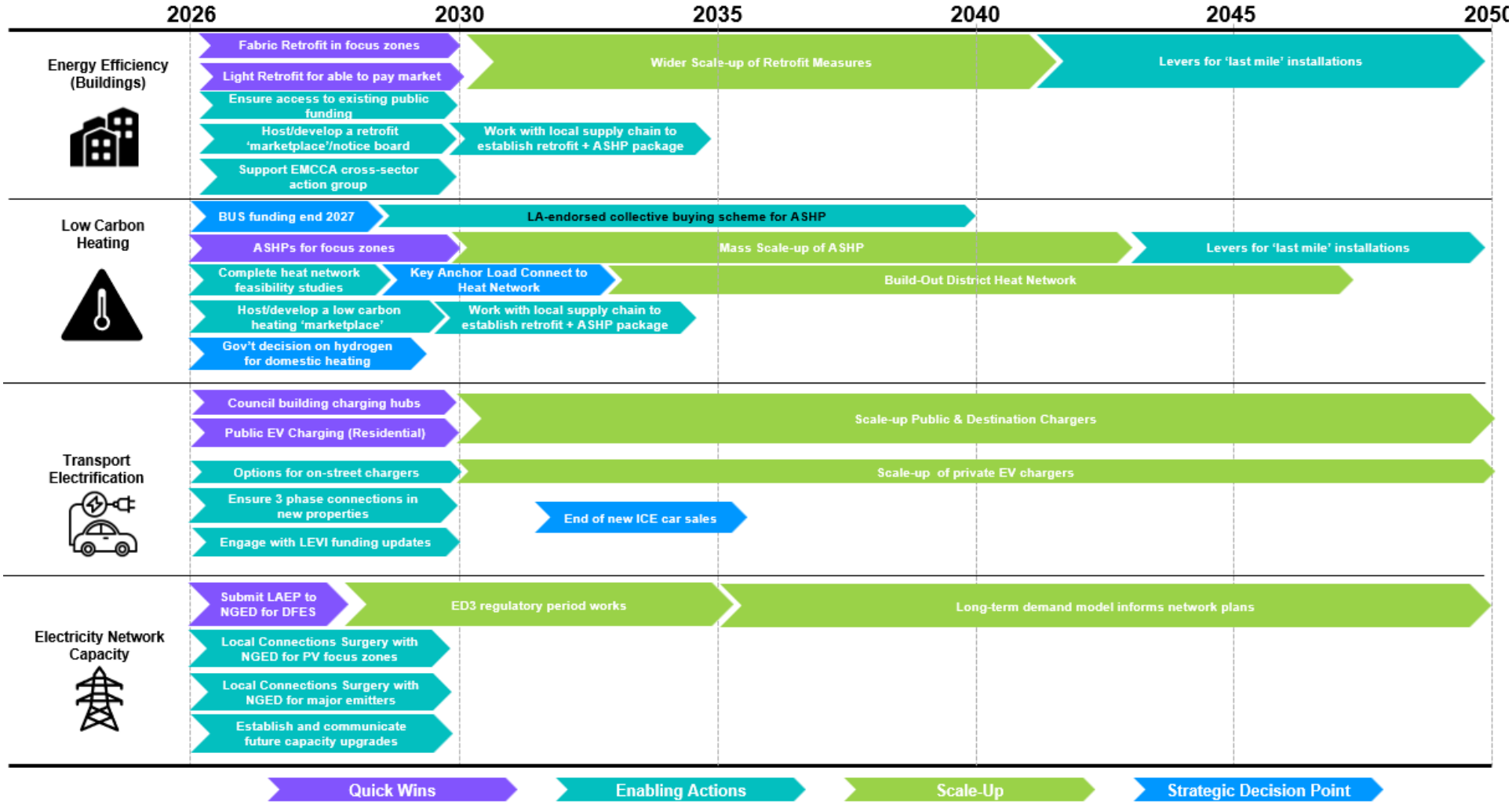
The GDN is pursuing the East Coast Hydrogen project, with a view to delivering hydrogen by pipeline into the area in the early-mid 2030s. This provides an anchoring timeline for developing a hydrogen transition plan for relevant businesses. This also complements Cadent Gas' ambition to increase the share of hydrogen and biomethane in the local natural gas network. Keeping up to date on these developments, and supporting the projects and industry initiatives, such as East Midlands Hydrogen, associated with the development of a local hydrogen economy, will help to further understand and detail the expected role of hydrogen in the area.

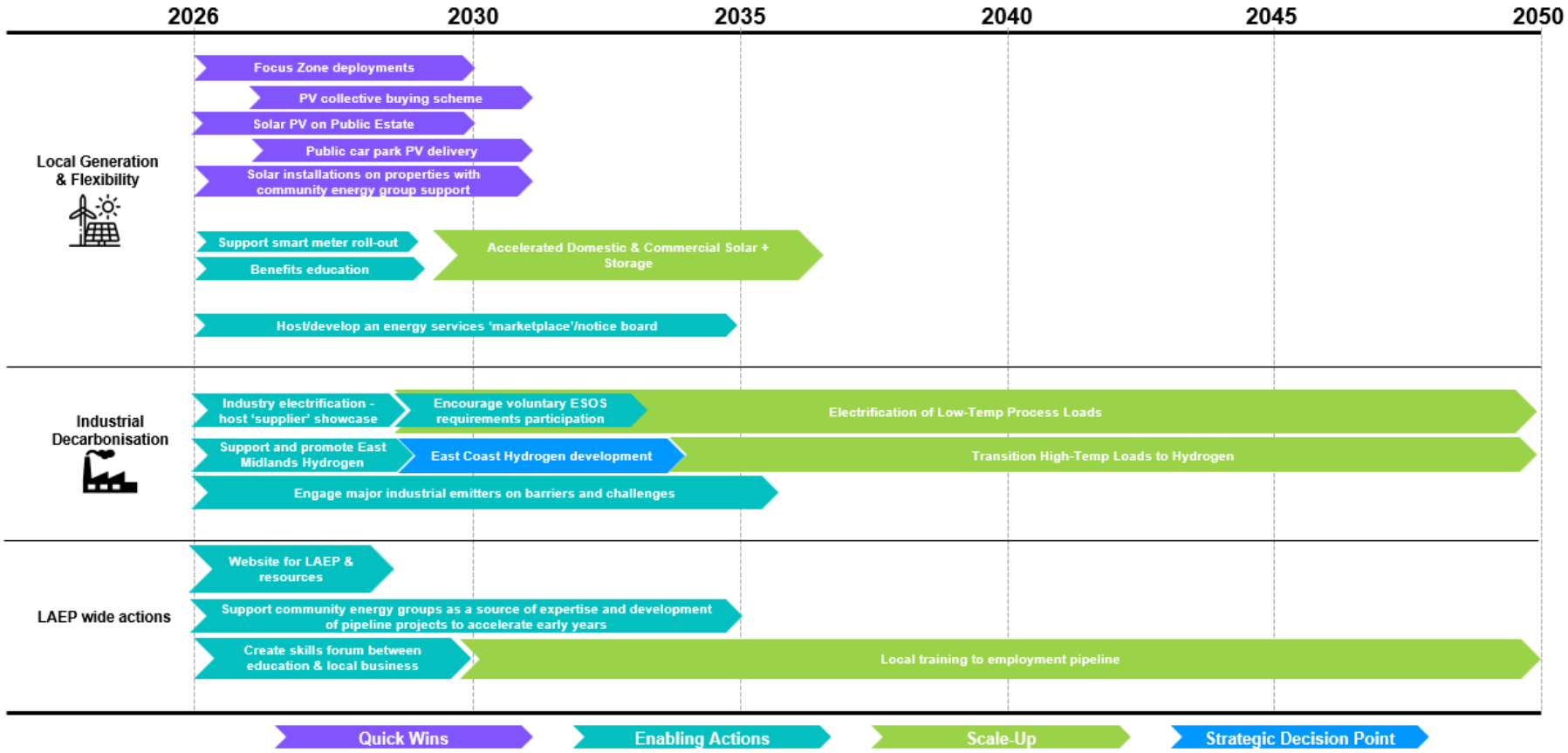
13.6 Phased Pathway

Figure 13.3 sets out a sequence for Chesterfield, North East Derbyshire & Bolsover's net zero interventions and enabling actions, in line with the analysis set out in Section 13. The level of detail is necessarily higher in the short term, with longer-term actions referring to wider scaling of the identified interventions.

In general, the actions set out in this phased pathway can be undertaken, or initiated, by the local authorities but will draw on the input of many stakeholders. By establishing a Chesterfield, North East Derbyshire & Bolsover LAEP Delivery Partnership, the local authorities can bring together the relevant parties and take a proactive role in driving the pace of delivery.

Figure 13.3: Chesterfield, North East Derbyshire and Bolsover Phased Pathway




2026
2030
2035
2040
2045
2050
Local Generation & Flexibility
Focus Zone deployments
PV collective buying scheme
Solar PV on Public Estate
Public car park PV delivery
Solar installations on properties with community energy group support
Support smart meter roll-out
Benefits education
Accelerated Domestic & Commercial Solar + Storage
Host/develop an energy services 'marketplace'/notice board
Industrial Decarbonisation
Industry electrification - host 'supplier' showcase
Encourage voluntary ESOS requirements participation
Electrification of Low-Temp Process Loads
Support and promote East Midlands Hydrogen
East Coast Hydrogen development
Transition High-Temp Loads to Hydrogen
Engage major industrial emitters on barriers and challenges
LAEP wide actions
Website for LAEP & resources
Support community energy groups as a source of expertise and development of pipeline projects to accelerate early years
Create skills forum between education & local business
Local training to employment pipeline
Quick Wins
Enabling Actions
Scale-Up
Strategic Decision Point

14 Conclusions and Next steps

The Chesterfield, North East Derbyshire & Bolsover Local Area Energy Plan provides a robust, data-driven, and spatially informed framework for delivering an equitable and economically efficient transition to net zero. It aligns Chesterfield, North East Derbyshire & Bolsover's local ambitions with regional and national policy objectives while tailoring interventions to the area's unique socioeconomic, infrastructural, and industrial characteristics.

The analysis presented throughout this plan confirms that Chesterfield, North East Derbyshire & Bolsover can significantly decarbonise its energy system by accelerating progress on energy efficiency, heat decarbonisation, and transport electrification while expanding local generation and enhancing system flexibility. The modelling outcomes demonstrate that these interventions, when coordinated effectively, deliver measurable benefits in emissions reductions, cost efficiency, and community well-being.

14.1 Key Outcomes

The modelling and analysis confirm that Chesterfield, North East Derbyshire & Bolsover can achieve substantial emission reductions across buildings, transport, and industry by following a sequenced and place-based approach. The emissions reductions are supported by strong co-benefits in fuel poverty alleviation and energy resilience.

Energy efficiency forms the cornerstone of the transition. Retrofit measures particularly in pre-1929 solid-wall homes and poorly insulated estates can significantly reduce space heating demand and operational costs while improving indoor comfort. A fabric-first approach is not only the most immediate means of reducing carbon emissions but also the foundation for cost-effective heat decarbonisation and grid stability. Targeting deep retrofit in focus zones with high fuel poverty risk ensures that the social benefits of net zero are distributed fairly.

Heating system transformation is equally central. The deployment of air-source heat pumps, heat networks, and supporting controls will replace the area's reliance on natural gas. Ensuring access to available funding and appropriate education for residents will be key to realising the benefits, alongside working with local business and skills institutions to establish the supply chain to keep the economic benefits of the installation pipeline in the local area.

Transport electrification presents the single largest emissions reduction potential. The LAEP scenario requires approximately 147,000 electric vehicles by 2050, supported by an accessible charging network. Starting from a low level of charging infrastructure, the area needs to progress this at a fast pace in the early years to avoid long-term impacts from a delayed start. Smart charging integration and uptake of time-of-use tariffs are essential for minimising strain on the grid and unlocking flexibility as well.

Local renewable generation, particularly rooftop solar, serves as an economic driver. The rollout will need to be planned in conjunction with the local electricity distribution network (NGED) in order to deliver in line with changes to network capacity. Integration with storage and smart systems enables households and organisations to participate actively in a flexible, low-carbon energy market.

Economic appraisal indicates that the 2050 Net Zero scenario requires approximately £4.9 billion in additional capital investment. Although this represents a substantial commitment, the system-wide benefits, including around £510 million in bill savings, improved health outcomes, job creation, and reduced fuel poverty, position the transition as an economically rational long-term investment.

14.2 Strategic Implications

Delivering the LAEP will require coordinated action, stable policy support, and institutional readiness. The plan identifies the need for a dedicated Chesterfield, North East Derbyshire & Bolsover LAEP Delivery Partnership comprising Chesterfield Borough Council, North East Derbyshire District Council, Bolsover District Council, EMCCA, the Distribution Network Operator, local housing providers, industry representatives, and community organisations. This governance structure would ensure that delivery is sequenced, resourced, and monitored effectively across multiple actors.

Funding and finance remain critical enablers. Leveraging national mechanisms such as the Warm Homes Plan, and Great British Energy programmes will be essential. However, innovative local financing models, including community energy investment, public–private partnerships, and aggregated purchase schemes, will also be needed to bridge funding gaps.

Skills and supply chain development represent both a challenge and an opportunity. The transition will require a significant expansion of the local workforce trained in retrofit, and heat pump installation. Collaboration between regional universities, local colleges, and industry partners can help build a resilient regional skills pipeline, ensuring that the economic benefits of the transition remain within the local economy.

Integration with spatial planning and infrastructure investment is also key. Embedding LAEP outputs into the councils' Local Plans and infrastructure pipeline will help ensure that energy considerations shape new housing developments, regeneration projects, and industrial growth corridors. In addition, the LAEP can support development management functions by providing a consistent evidence base for considering energy, carbon and infrastructure requirements within planning applications and at pre-application stage. This will help ensure that low-carbon energy solutions and network constraints are addressed early in the design process and applied consistently across new development. Similarly, early engagement with the DNO will be necessary to align reinforcement schedules with the forecast growth of low-carbon technologies.

Chesterfield, North East Derbyshire & Bolsover's transition to net zero is both an environmental necessity and an opportunity to create a fairer, healthier, and more prosperous area. The LAEP demonstrates that with clear priorities, place-based planning, and coordinated governance, it is possible to achieve deep decarbonisation while delivering tangible local benefits. Delivery will also take place within the context of planned local government reorganisation across Derbyshire, which introduces some uncertainty in governance arrangements but also presents an opportunity to strengthen strategic coordination of energy planning at a larger spatial scale.

The next decade will be decisive. By acting early on energy efficiency, low-carbon heat, and electrified transport, Chesterfield, North East Derbyshire & Bolsover can capture the economic and social advantages of the transition ahead of national timelines. Regular monitoring, transparent reporting, and adaptive management will ensure that progress remains on track and that interventions continue to deliver value for money, including ensuring alignment between planning outcomes, infrastructure delivery and carbon reduction objectives.

14.3 Next Steps

To ensure the timely and effective delivery of the LAEP, the following immediate and critical steps are recommended:

- Establish a Chesterfield, North East Derbyshire & Bolsover LAEP Delivery Partnership: Create a cross-sector partnership chaired by Chesterfield Borough Council, North East Derbyshire District Council, Bolsover District Council and supported by EMCCA, the Distribution Network Operator, local businesses, housing associations, and community

representatives. This body should oversee programme coordination, track progress, and identify funding opportunities

- Launch Public Uptake and Engagement Programme with online ‘hub’: Implement the recommended community engagement and communication strategy with urgency. This programme is vital to build public confidence, share good news stories, and drive the necessary adoption of low-carbon technologies like heat pumps. Priority should be given to demonstration and pilot projects that showcase best practice and real-world results.
- Develop a Delivery Roadmap and Investment Plan: Prioritise the short-, medium-, and long-term interventions identified in Chapter 13, including both quick wins and enabling actions.
- Secure Early-Stage Funding and Demonstrator Projects: Identify and secure initial funding mechanisms (local, regional, and national) to kick-start demonstrator projects in focus zones that can showcase tangible early benefits and build public support.
- Hydrogen: Initiate detailed engagement with key regional hydrogen stakeholders, such as East Midlands Hydrogen and GDN, to better advise on Chesterfield, North East Derbyshire & Bolsover’s specific industrial demand and the infrastructure development timeline. This will allow for informed decision-making regarding long-term solutions for high-temperature, hard-to-treat loads.
- Monitor, Review, and Update: Establish a monitoring framework with key performance indicators (KPIs) aligned to emissions reduction, energy demand, and social outcomes. The LAEP should be reviewed on a five-year cycle to reflect policy developments, technological advances, and local progress.

A. Data Types and Validation

A.1 Energy Savings Trust building attributes

Table 14.1: List of attributes available from Energy Savings Trust for domestic and non-domestic buildings

Attribute	Domestic	Non-domestic
UPRN	✓	✓
Council Ward	✓	✓
LSOA	✓	×
Postcode	✓	✓
Address	✓	✓
Property Type	✓	×
Property Tenure	✓	×
Property Age band	✓	×
Number of Storeys	✓	×
Property Class	×	✓
Primary Use	×	✓
Mixed Use	×	✓
Building storey height	×	✓
Asset rating band	×	✓
Listed Building	✓	×
Wall Construction Type	✓	×
Wall Insulated	✓	×
In Conservation Area	✓	×
Flood Risk	✓	×
Floor Construction	✓	×
Floor Insulated	✓	×
Loft Insulation Prediction	✓	×
Glazing Type Prediction	✓	×
Heating System	✓	×
Fuel Type	✓	✓
EPC Rating	✓	×
SAP Score	✓	×
Roof Orientation	✓	×
Off gas grid	✓	×
Probability of fuel poverty	✓	×
ECO funding eligibility	✓	×
LAD funding eligibility	✓	×

B. EV Modelling Datasets

B.1 Datasets

Modelling has been undertaken using the following publicly available statistics and datasets:

B.1.1 ONS Middle layer Super Output Area population estimates (supporting information)[74]

B.1.2 Research on East Midland cars[75] and people[76] per household

B.1.3 CCC 7th Carbon Budget[77]

B.1.4 Midlands Connect 'Supercharging the Midlands' report[78]

B.1.5 ZapMap[79] and government private charger research[80]

B.2 Socioeconomic Parameters

To perform modelling, socioeconomic parameters have been retrieved from available statistics and datasets:

B.2.1 Population of Chesterfield = 103,600 (ONS, 2021)

B.2.2 Population of North East Derbyshire = 102,000 (ONS, 2021)

B.2.3 Population of Bolsover = 80,300 (ONS, 2021)

B.2.4 Average number of cars per household in the East Midlands (2023) = 1.23

B.2.5 Average number of people in an East Midlands household, (2023) = 2.4

B.3 Assumptions and Exclusions

B.3.1 Not all ICE vehicles are decommissioned within the 2040 and 2050 scenarios.

B.3.2 The CCC EV uptake projection is assumed proportionate across the UK.

B.3.3 The model only includes the uptake of Battery Electric Vehicles (BEVs) and therefore does not account for Plug-in Hybrids (PHEVs), Hybrid Electric Vehicles (HEVs), Fuel Cell Electric Vehicles (FCEVs), Range-Extended EVs (REEVs), biofuel/biodiesel or other transitional technologies, which are assumed negligible by 2050

B.3.4 The model only considers private transport and therefore does not account for public transport, freight transport, or heavy-duty vehicles.

B.3.5 Motorcycles, mopeds, and other forms of micro-mobility are excluded.

B.3.6 Behavioural changes such as modal shift, car-sharing, or reductions in private car ownership are assumed to match the relative increase in population resulting in an equal volume of private cars in 2050 compared to today

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[74] Middle layer Super Output Area population estimates (supporting information) - Office for National Statistics

[75] https://www.nimblefins.co.uk/cheap-car-insurance/number-cars-great-britain

[76] https://www.statista.com/topics/12526/families-in-the-uk/#topicOverview

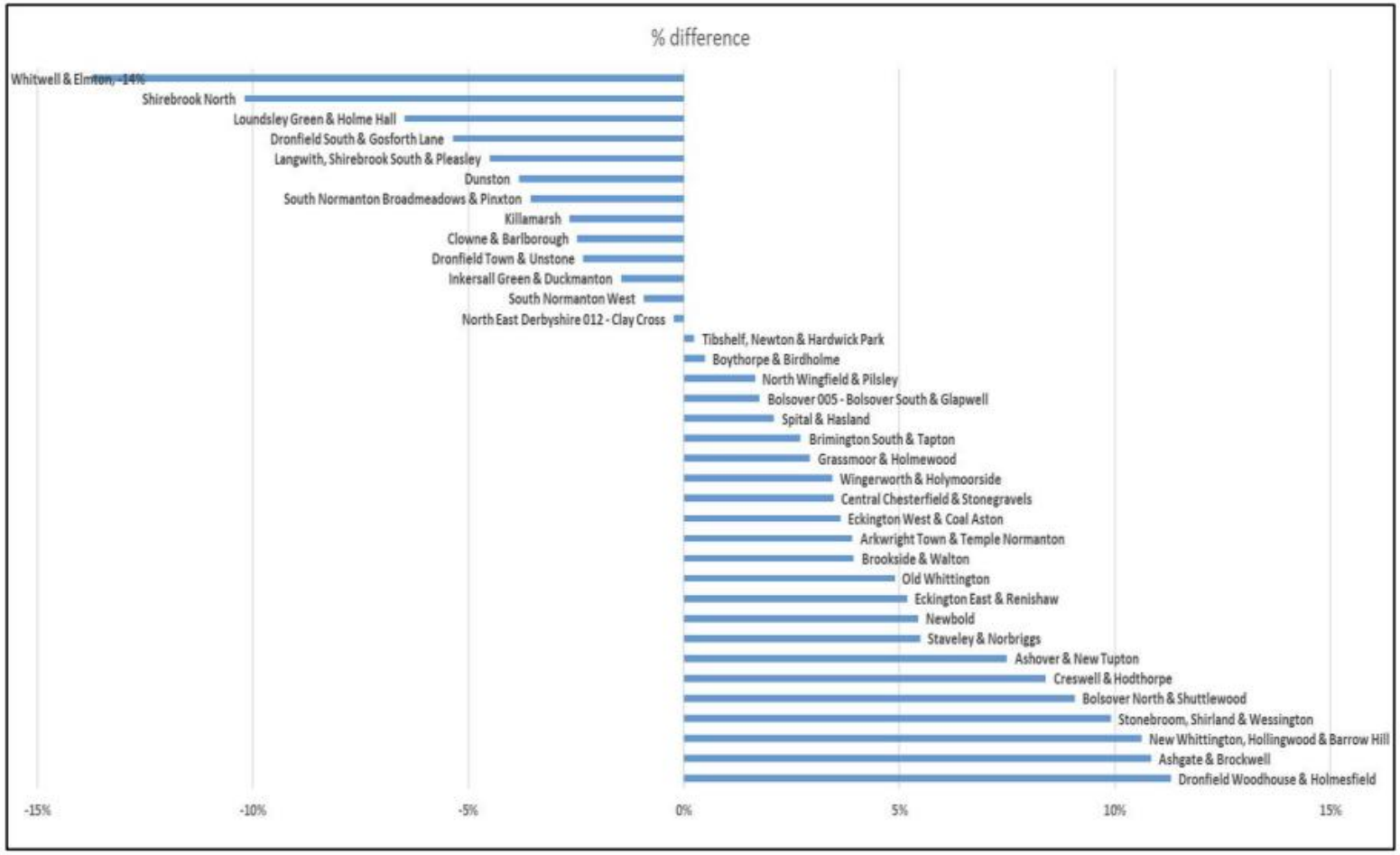
[77] https://www.theccc.org.uk/wp-content/uploads/2025/02/The-Seventh-Carbon-Budget.pdf

[78] https://www.midlandsconnect.uk/media/i1spcsr1/mc-supercharging-the-midlands-document.pdf

[79] https://www.theccc.org.uk/wp-content/uploads/2025/02/The-Seventh-Carbon-Budget.pdf

[80] https://www.gov.uk/government/publications/electric-vehicle-drivers-attitudes-and-behaviours

C. Baseline Validation by MSOA



D. Carbon emissions and energy use by local authority

Figure D.1: Bolsover Historical Emission

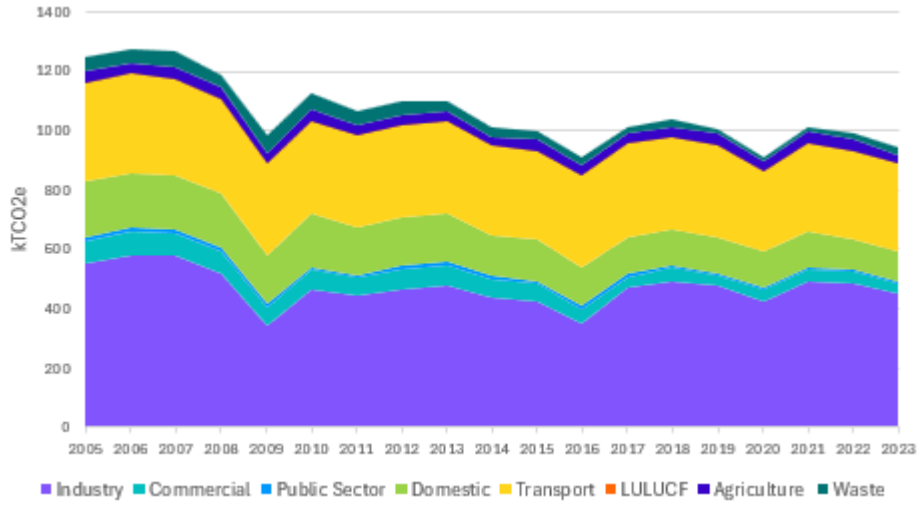


Figure D.2: Chesterfield Historical Emissions (ktCO2e)

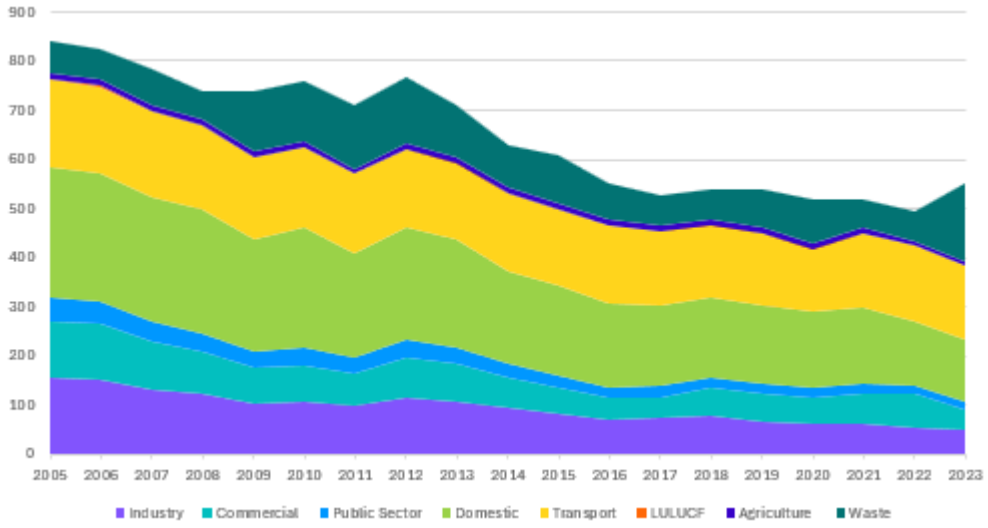


Figure D.3: North East Derbyshire Historical Emissions (ktCO2e)

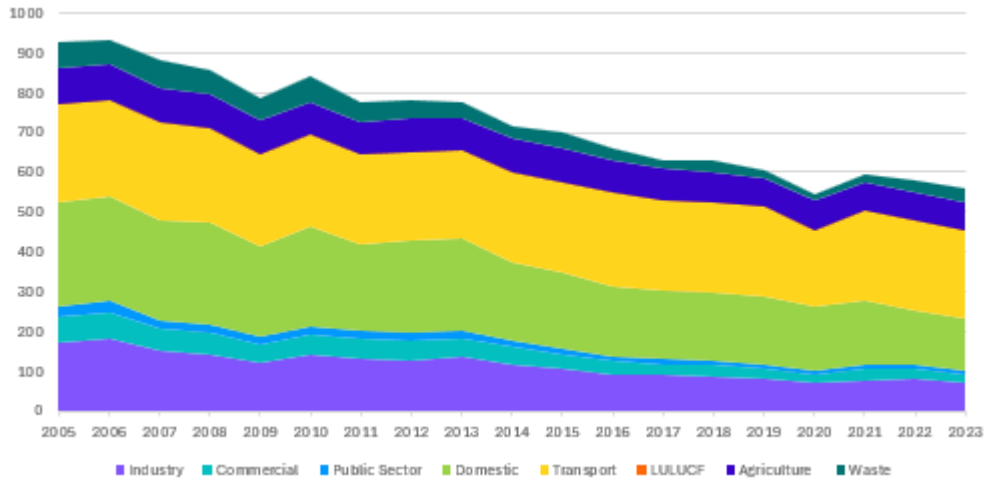
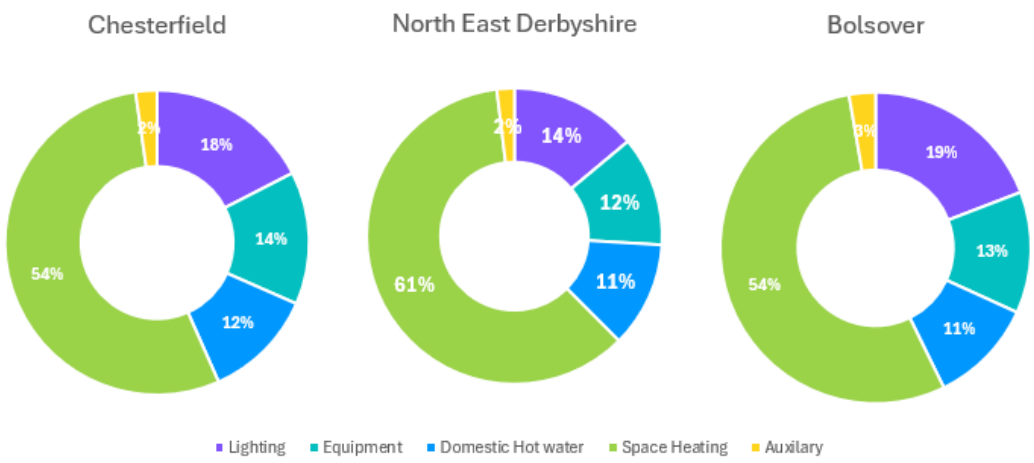


Figure 14.1: Building Energy Use Breakdown by Local Authority (GWh)



D.1 Non-domestic top gas users

Local Authority	Annual Gas consumption (MWh)	Electricity Consumption for Building Use (MWh)	Total Carbon Emission (Tonnes)
Chesterfield	195,215	37,717	46,852
North East Derbyshire	70,659	14,509	17,134

