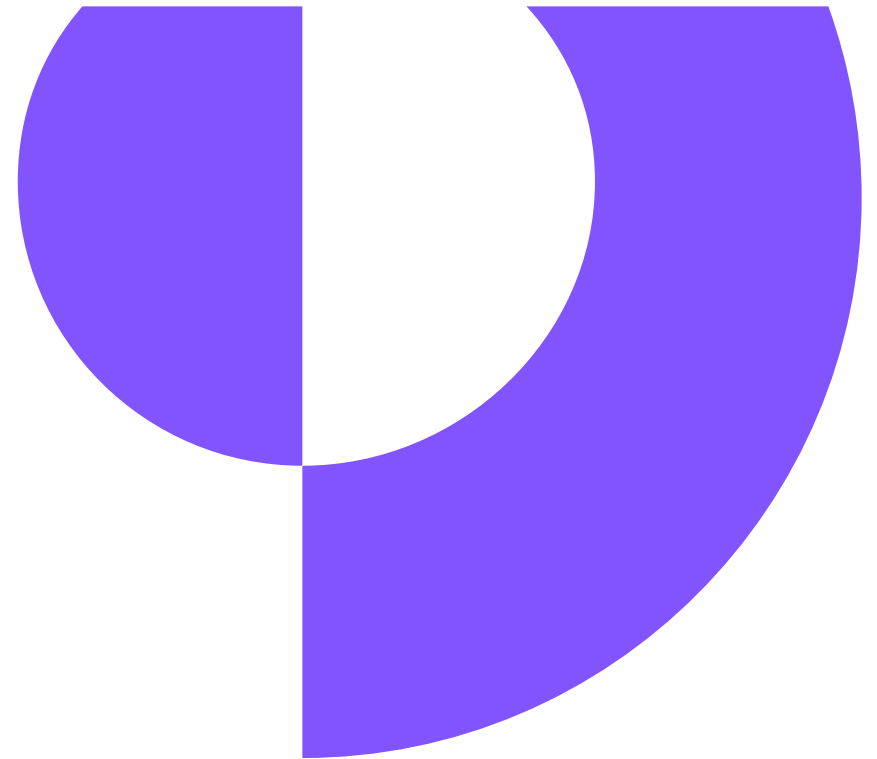




Cambridgeshire

Local Area Energy Plan

January 2026



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Executive summary

The Cambridgeshire Local Area Energy Plan (LAEP) sets out a strategic, energy evidence-based pathway to support economic growth, meet government decarbonisation obligations, and achieve local net zero carbon emission ambitions by 2045. Developed in partnership with local authorities, UK Power Networks, and the Greater south-east Net Zero Hub, the LAEP combines scenario modelling, spatial analysis, and stakeholder engagement to identify the most effective interventions across buildings, transport, industry, and local energy generation. The plan's four strategic goals are to: (1) promote inclusive economic growth, (2) reach net zero by 2045, (3) enable strategic investment, and (4) quantify and allocate costs.

Purpose and Scope:

The LAEP provides a strategic framework to identify the energy requirements needed to support the area's economic growth ambitions, while aligning with national and regional policy to ensure a sustainable, low-carbon, and resilient energy system. A central feature of the LAEP is its integration of projected housing, employment, and infrastructure growth to meet the area's economic growth ambitions. This ensures that Cambridgeshire's economic growth ambitions are aligned with national and local decarbonisation strategies, supporting sustainable growth and achieving net zero targets. The plan supports both existing communities and future development, ensuring energy planning is responsive to local needs, ambitions and energy security. The plan focuses on areas where local authorities and partners can exert meaningful influence such as buildings, personal transport, local generation, and industry connected to local networks while recognising that nationally controlled systems (e.g., strategic rail, aviation, grid-supply point generation, land use change, and agriculture) are outside the scope for direct intervention.

Approach:

The LAEP is underpinned by a comprehensive evidence base. Central to its approach is scenario modelling, using UK Power Networks' Distribution Future Energy Scenarios (modified to reflect local specifics) to quantitatively compare decarbonisation pathways. The LAEP models four scenarios to explore Cambridgeshire's potential pathways to net zero. The counterfactual scenario represents a "do nothing" baseline, assuming only current national policies and limited local action. Three net zero-aligned scenarios are assessed: Electric Engagement, which emphasises rapid electrification and high consumer uptake of technologies such as heat pumps and electric vehicles; Hydrogen Evolution, which explores the role of hydrogen in decarbonising hard-to-electrify sectors; and Holistic Transition, which combines widespread electrification with targeted system changes and a balanced mix of technologies. Comparing these scenarios enables the plan to assess the impacts, investment needs, and benefits of different technology and policy choices over time.

Using stakeholder input, literature in the industry, and the modelling results; barriers to the net zero transition were identified and potential projects / interventions were generated. These were shortlisted into priority projects and phased to provide a high-level roadmap. Spatial analysis has been used to identify priority zones for targeted projects, and for highlighting other priority areas: areas where the network may hit capacity quickest, and areas with high levels of fuel poverty.

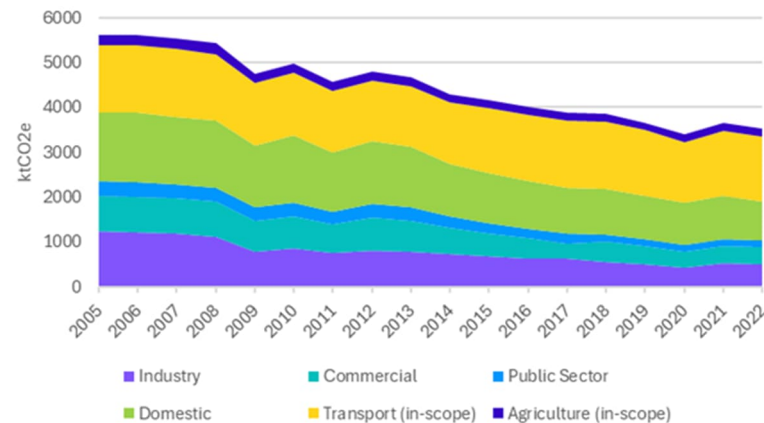
Economic appraisal underpins the plan's recommendations, with each pathway assessed for capital investment requirements, system benefits, and potential bill savings. This approach quantifies the scale of investment needed, while justifying the benefit to society brought by transitioning to net zero.

Finally, the LAEP has been shaped through extensive stakeholder engagement. Collaboration with local authorities, businesses, community groups, and institutional partners has helped the plan reflect local priorities and practical delivery considerations, strengthening its relevance, credibility, and local ownership.

Current Energy and Emissions Baseline

Cambridgeshire's in-scope emissions (which exclude land use, agriculture, and waste) have fallen by 35% since 2005, with the most significant reductions in the industrial, commercial, and public sectors driven primarily by electrical grid decarbonisation. However, sustained population and housing growth (12% over the same period), a slow uptake in electric vehicles (EVs), and the primary heating source being natural gas mean interventions are still needed to get to net zero. As shown below, county's emissions profile is dominated by transport, domestic and non-domestic energy use, and industry.

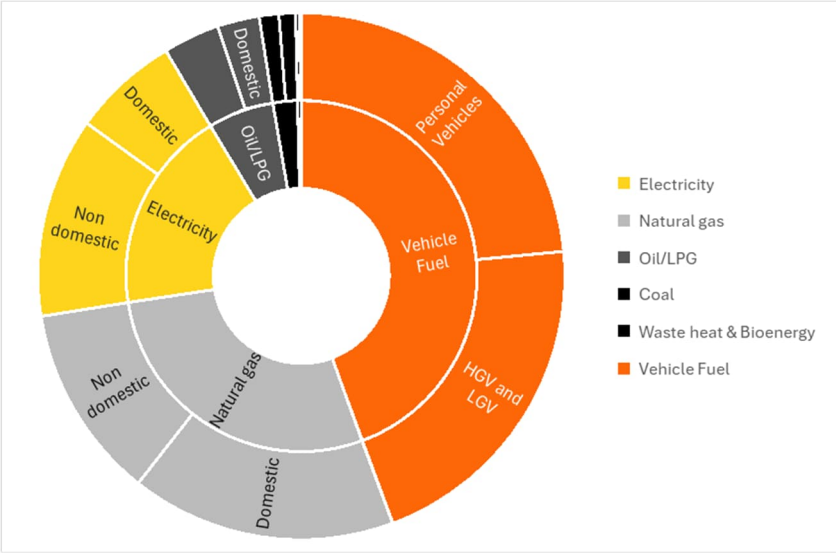
Historical county-wide In-Scope Emissions



Note: Refer to section 3 for details

The existing final energy consumption is shown below, which highlights how dominant transport and natural gas consumption are. As a result, significant focus in the LAEP is placed on transport, building fabric and low carbon heating.

2023 Fuel Consumption

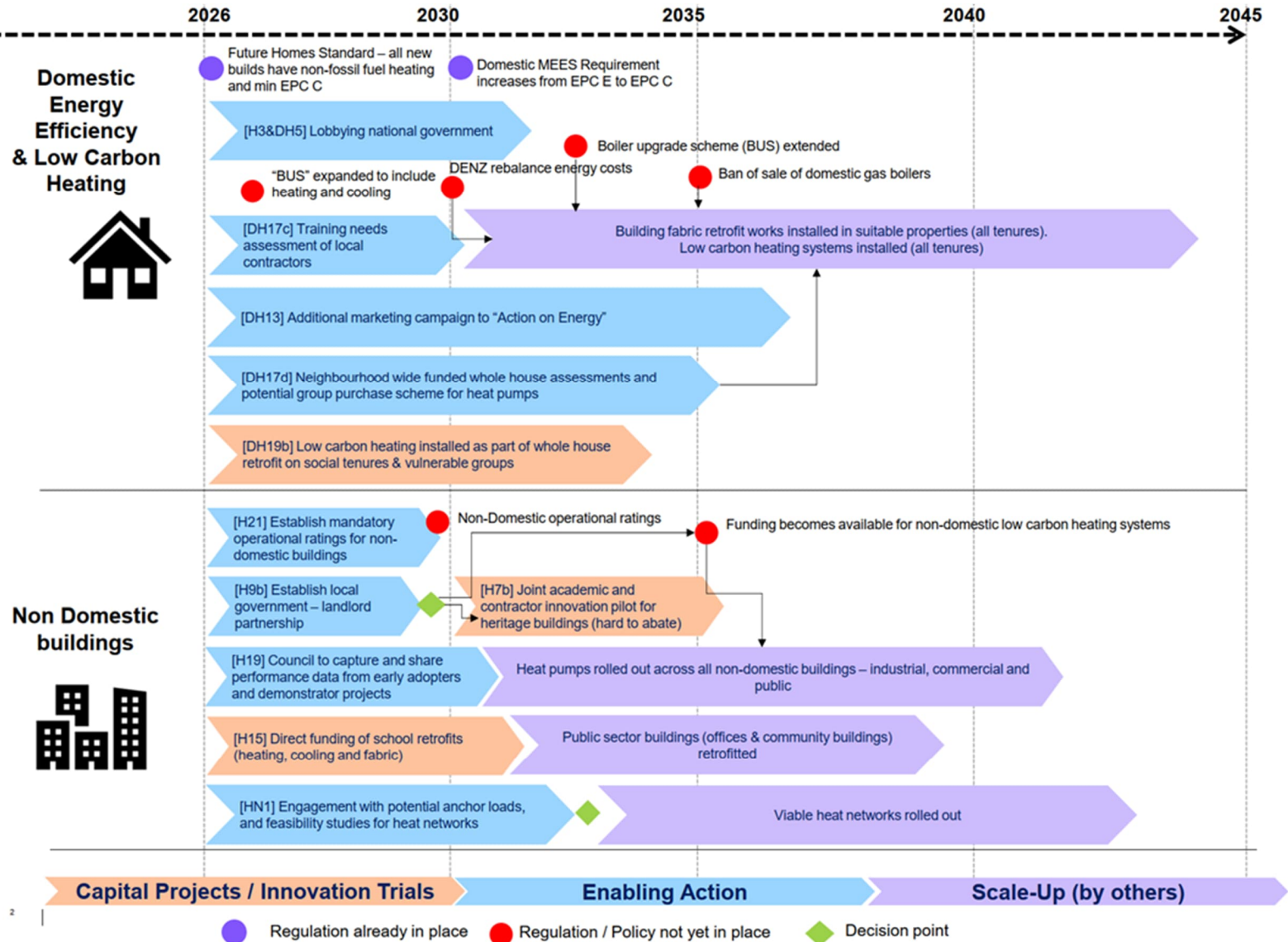


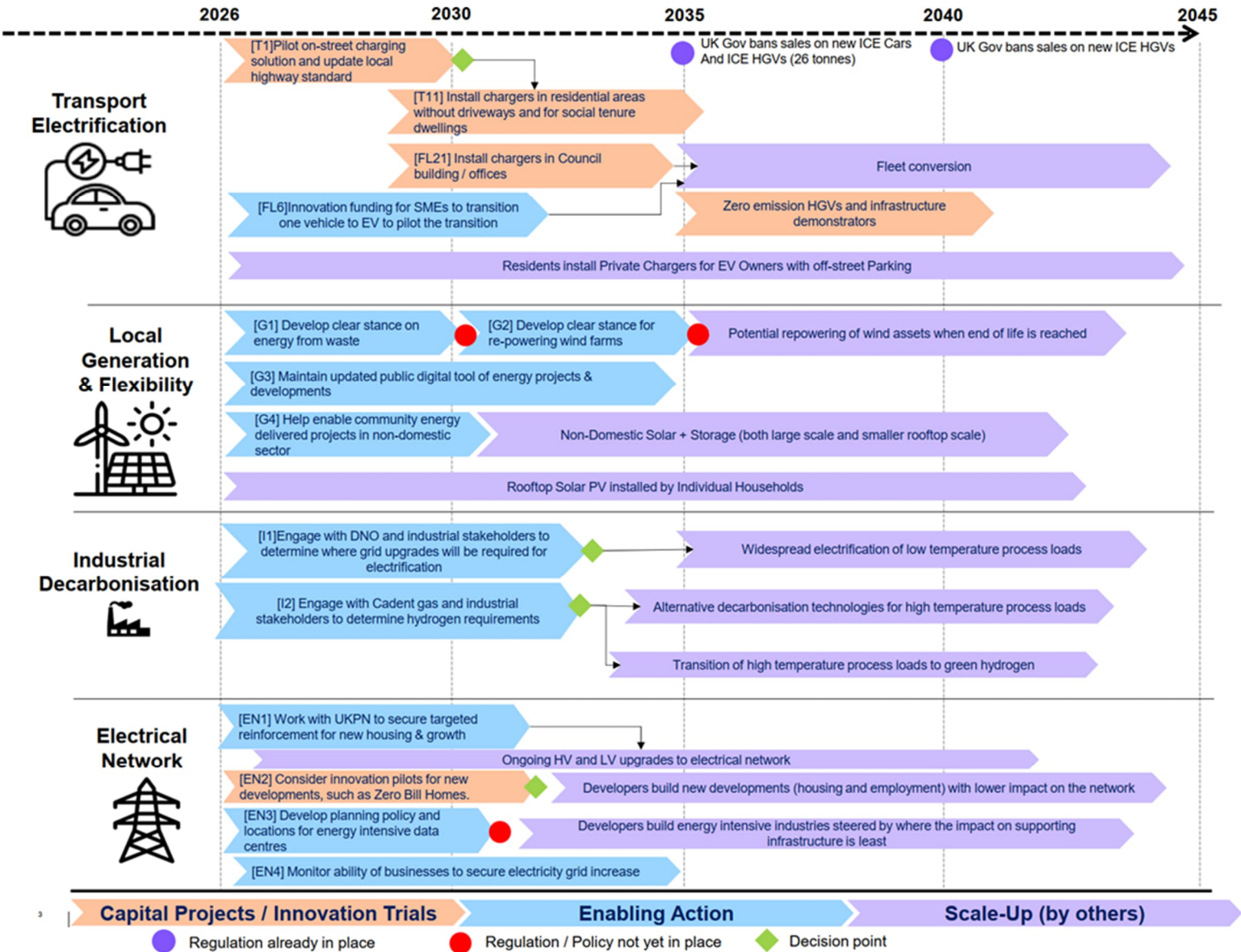
Note: Refer to Section 3 for details

Supporting Growth Locally and Achieving Net Zero

Following analysis of potential future scenarios and quantifying the number of interventions needed, a phased roadmap was produced providing projects and interventions that could be taken in the short, medium and long term. This roadmap is provided below, with a summary following.

Phased Decarbonisation pathway





Some notable results and recommended actions on the specific intervention areas include:

1. **Energy Efficiency & Low Carbon Heating.** In the domestic sector, directly fund or implement fabric and heating upgrades in social tenures and for vulnerable residents. In the non-domestic sector directly fund or enable school retrofits is also a priority. For the enabling environment, exploring neighbourhood-wide home assessments and group purchase schemes for heat pumps can help reduce the cost and knowledge barriers for residents, as well completing a training needs assessment with local contractors and expanding the marketing of Action on Energy. In the non-domestic sector, establishing mandatory operational ratings for non-domestic buildings, and establishing a local government – landlord partnership, may help identify specific barriers and interventions needed to unlock future retrofit and low carbon heating systems. The **District and City Councils** can also help share 'real' performance data from other commercial or industrial buildings that have installed low carbon heating and cooling systems, helping to enable other building owners to act.
2. **Heat Networks:** Launch pilot district heating projects in high heat-density clusters such as Cambridge and other urban centres, anchored by public sector buildings and major employers / energy users. Feasibility studies and engagement with anchor loads will inform future expansion, with consideration for integrating cooling systems to enhance climate resilience.
3. **Rollout of Public EV Charging in High-Demand Residential Zones:** Update the Highway Authority policy on cross-pavement charging solutions, or if required undertake a pilot on-street solution to enable the standard to be updated. Following this, prioritise areas with limited off-street parking and high vehicle ownership for rollout of publicly accessible on-street parking. Ensure equitable access to charging infrastructure, particularly for vulnerable groups, and consider financial support mechanisms for low-income households.
4. **Help enable local generation and community energy:** For the non-domestic sector, help enable community energy projects, possibly by linking in opportunities raised through the local

government – landlord partnership. Consider providing increased support to schools as a priority, due to their public visibility and operational needs.

5. **Local generation is expanding rapidly:** Cambridgeshire's generation mix is decarbonising faster than the wider GB grid, with renewables, particularly solar and wind, dominating local generation. The pipeline of connections for solar PV and battery storage exceeds the requirements set out in the Clean Power 2030 Action Plan for the region, and by 2045, Cambridgeshire is projected to locally generate 65% of the energy it consumes. The plan highlights the importance of continued support for community energy groups, and notably that several of the existing wind farms will come to the end of their design life during the next 20 years, with the planning authorities needing to take a view on whether to re-power or find an alternative source of local green electricity.

Rooftop Solar at Hills Road Sixth Form College, Cambridge

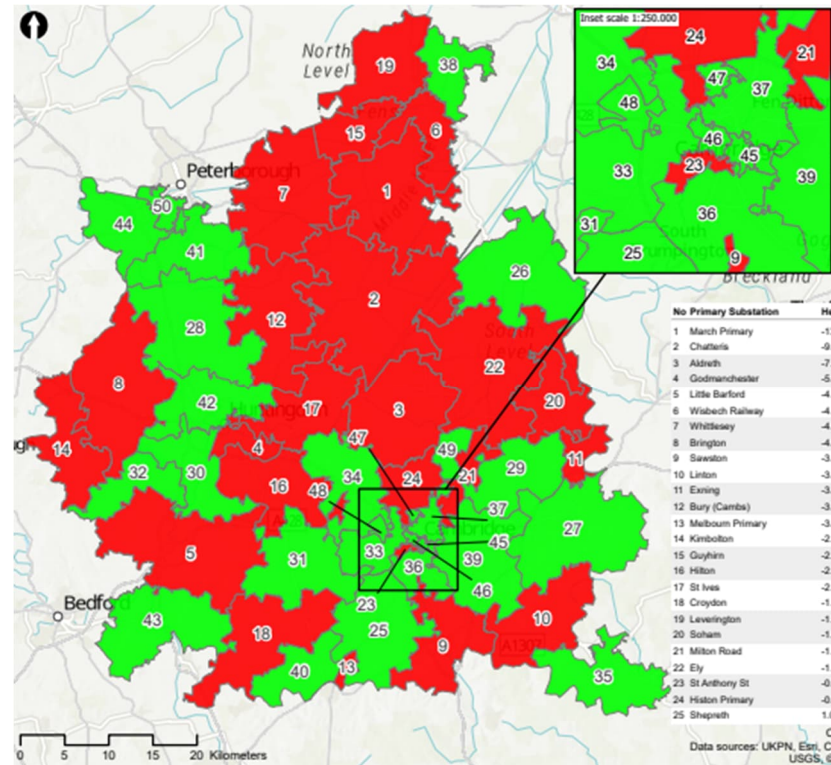


6. **Industrial Decarbonisation:** The majority of low temperature industrial process loads are assumed to be electrified, while high temperature loads will likely require a transition to hydrogen. The plan models an 89.8% reduction in industrial process load emissions by 2045, with the remaining emissions primarily from high temperature processes using green hydrogen. The importance of all industrial companies in Cambridgeshire having a decarbonisation plan is emphasised, and the need for ongoing innovation and support for fuel switching is highlighted. The county should engage with DNOs and industrial stakeholders to assess grid upgrade needs and hydrogen requirements.
7. **Electrical Network:** All net zero scenarios result in negative headroom at substations by the late 2030s, necessitating proactive upgrades and flexibility solutions to support continued connections and enable the deployment of low-carbon technologies. The Council should work with UKPN and NESO to identify proactive network investments needed to meet the growth and electrical demand increases. Furthermore, consider developing a planning policy for energy-intensive data centres, identifying preferred locations **alongside guidance on design principles that address not only energy requirements but also wider implications such as water usage for cooling and the potential role of data centres as anchor loads for heat networks.**
8. **Lobbying national stakeholders:** there are a number of enablers that fall outside the control of the local authorities: a) the price of electricity versus gas, and b) regulation around Minimum Energy Efficiency Standards (MEES); to name a few. Lobbying central government /stakeholders for changes that could have a large impact locally, is important to complete in the short term as it can dramatically influence later uptake of low carbon technologies.
9. **Organising local stakeholders:** Most of the transition to net zero, will depend on a multitude of stakeholders acting in synergy. During the stakeholder engagement workshops as part of the LAEP, one key idea recommended was the concept of a visible map or digital tool, where businesses and residents can see proposed energy projects in their area, allow synergies and partnerships to organically develop. By providing access to this information, independent actors

can collaborate directly without the need for the local authorities to manage centrally. Equally important will be developing landlord / business / local authority partnerships, to help breakthrough some of the transition needed in the non-domestic sector: for example heating and building fabric upgrades.

10. **Prioritise reducing inequality and fuel poverty:** a common thread throughout all intervention areas is prioritising interventions and capital projects that target vulnerable groups and areas with higher prevalence of fuel poverty. Implemented correctly, the LAEP can help improve the well-being and livelihoods of all of Cambridgeshire's residents.

Overview of substation spare capacity ("headroom") in 2035 under a Holistic Transition scenario



Note: Refer to Section 10 for details

The investment needed:

In the production of the LAEP, we have assumed a counterfactual scenario: a scenario in which limited consumer engagement and system changes occur – the energy system changes with “business as usual” trends, eventually not reaching net zero by 2045. This would include for example, residents naturally transitioning to EVs over existing internal combustion engine (ICE) vehicles and installing private chargers on their homes as required. Another example is the significant amount of ground mounted solar proposed in the County, already within the connections queue process.

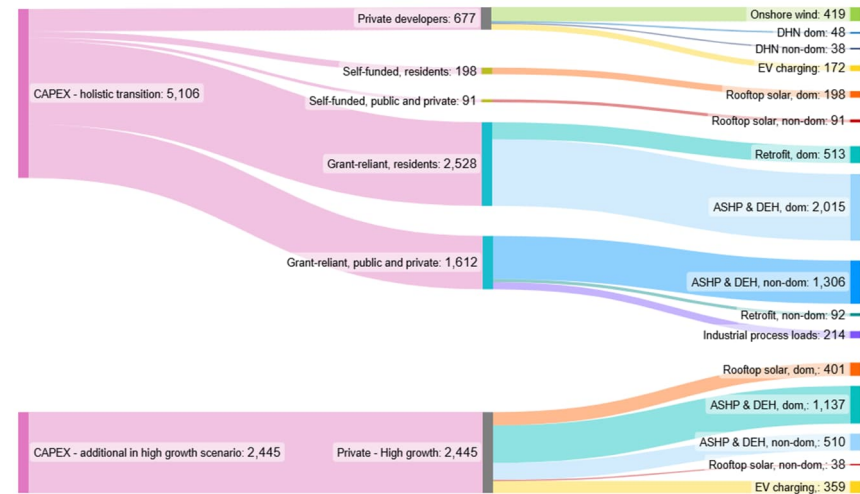
This discounted capital expenditure (CAPEX) spend calculated in the counterfactual scenario is approximately **£3.4 billion**, of which **£2.9 billion** relates to ground mount solar and EV infrastructure that is assumed to occur under any scenario.

The CAPEX above this, required to achieve net zero in present value terms, ranges between **£2.7 billion** and **£3.4 billion**. Under the most likely scenario, the Holistic Transition, this could deliver benefits that exceed the capital outlay, including **£3.5 billion** of carbon benefits, **£1.2 billion** of bill savings, and an aggregate economic contribution to the overall economy by 2045 of **£5.7 billion**.

The value of CAPEX in real terms without the impact of discounting, for the preferred scenario, is **£5.1 billion**. **Under a high growth scenario, private developers might need to incorporate low carbon infrastructure and assets with a possible value of 2.4 billion.** This provides an estimate of the total potential outlay in today’s prices. This value is categorised by intervention according to who might pay, and whether the intervention requires government grant for investment to be made under current market conditions where there is not a clear financial payback.

While the investment requirement is significant, the benefits to society are far reaching, providing carbon benefits, air quality benefits, bill savings and economic growth. With direction, the investment will help reduce inequality and fuel poverty within the region.

Undiscounted CAPEX, real 2025, categorised by who might pay and intervention type (£ million)



Note: Acronyms applied in the chart are as follows: EV: Electric Vehicle; DHN: district heat network; dom: domestic property; non-dom: non-domestic property, including public and private sector; ASHP: air source heat pump; DEH: direct electric heating

Conclusions

Cambridgeshire faces significant energy challenges as it plans for future growth, with significant network upgrades likely required in 2035 and beyond, and for some specific locations even earlier. These issues must be addressed to ensure the system can support both economic development and the transition away from fossil fuels. This LAEP demonstrates that achieving net zero by 2045 is technically feasible, but only with coordinated action across all sectors and sustained investment. Critically, coordinated effort between the local authorities and UKPN will be required, as well as proactive investment in the electrical network to keep pace with growth and the transition away from fossil fuels.

Despite these challenges, achieving net zero brings substantial benefits. It creates significant employment opportunities, improves air quality, and provides a real chance to reduce fuel poverty and income inequality in the region. By maintaining an agile approach and engaging continually with stakeholders, Cambridgeshire can lead the way in local energy transformation, delivering environmental, economic, and social benefits for current and future generations.

1 Introduction & background

Mott MacDonald, in partnership with CAG Consultants, has been appointed by Cambridgeshire County Council and its local authority partners, to lead the development of the Local Area Energy Plan (LAEP) for Cambridgeshire to support its journey toward achieving sustainable growth and net zero carbon emissions by 2045. This report presents the outcomes of that work, following a comprehensive process of data acquisition, scenario modelling, stakeholder collaboration, and spatial analysis. The LAEP has been developed in partnership with Cambridgeshire County Council, the district councils of Huntingdonshire, South Cambridgeshire, Cambridge City, East Cambridgeshire, and the Cambridgeshire and Peterborough Combined Authority, alongside UK Power Networks and the Greater South-East Net Zero Hub.

1.1 Purpose of the LAEP

The Cambridgeshire LAEP provides a strategic, data-driven framework to **meet the demands of economic growth and enable the transition to a more sustainable, low-carbon, and resilient energy system**, guiding the county's pathway to net zero carbon emissions by 2045. The plan's primary purpose is to identify the most effective and locally tailored interventions that can accelerate decarbonisation across key sectors such as buildings, transport, industry, and energy generation, **while ensuring the right energy infrastructure is in the right place to support economic growth**. It combines spatial analysis, scenario modelling, and continuous stakeholder engagement to assess the current energy landscape and explore future pathways.

A central feature of the LAEP is its integration of projected housing, employment, and infrastructure growth. This ensures that decarbonisation strategies are aligned with Cambridgeshire's development trajectory, enabling sustainable growth while meeting net zero targets. The plan supports both existing communities and future development, ensuring energy planning is responsive to local needs,

ambitions and energy security. It supports both existing communities and future development, reinforcing the area's commitment to long-term sustainability

Designed to be dynamic, the LAEP informs grid-scale infrastructure planning, supports community-led energy initiatives and provides a clear understanding of the scale and sequencing required for energy project delivery across Cambridgeshire. Also, given much of the transition to net zero involves the existing building stock, a large portion of the LAEP is informing retrofit strategies for the domestic and non-domestic sector. It acknowledges the diversity of communities and demographics across the county and incorporates sufficient flexibility to ensure the plan remains responsive and locally relevant.

The LAEP has four strategic goals:

- Identify a plan to reach net zero by 2045, taking into account growth: Deliver a faster transition than the national 2050 target, recognising Cambridgeshire's ambition and urgency, while ensuring a secure and reliable energy supply to support local needs.
- Promote inclusive growth: Ensure the transition reduces inequality and delivers social benefits across communities.
- Enable strategic investment: Identify barriers to growth in the energy sector and make the case for proactive infrastructure investment.
- Quantify and allocate costs: Assess the investment required and outline potential funding responsibilities to support decarbonisation.

The LAEP serves as a key evidence base for Cambridgeshire's local authorities, informing Local Plans, land use planning for energy infrastructure, and delivery of the Local Growth Plan. It also provides a bottom-up input to the local Distribution Network Operator (DNO) for network planning, as well as the National Energy System Operator (NESO), meeting the data standards and LAEP compliance requirements set by the DNO. The plan supports ongoing decision-making, policy development, and investment alignment at both local and regional levels.

By aligning national policy targets with locally specific priorities and insights gathered during development, the LAEP sets out **pathways** for

Cambridgeshire's transition to net zero that is technically robust, socially inclusive and economically viable. It is underpinned by established national and regional grid balancing and system operation processes which ensure a secure, resilient and reliable energy system.

1.2 Boundary of the LAEP

1.2.1 Geographical boundary

Cambridgeshire is a county located in the East of England, encompassing a diverse landscape that includes the low-lying Fens in the north and west, the historic city of Cambridge in the south, and a mix of market towns, villages, and expanding urban centres. The county is bordered by Peterborough, Lincolnshire, Norfolk, Suffolk, Essex, Hertfordshire, Bedfordshire, and Northamptonshire, and forms part of the Cambridgeshire and Peterborough Combined Authority area.

Figure 1.1: LAEP geographical boundary



1.2.2 Emissions boundary

While the Cambridgeshire LAEP provides a strategic framework for guiding the county'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 following areas are considered out of scope for emissions accounting and intervention planning:

Table 1.1: Emissions boundary

Emission Source	Justification
National and Strategic Transport Infrastructure	Emissions from vehicles transiting through Cambridgeshire on national motorways, is 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 connected at the Grid Supply Point (GSP) level 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.
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

Emission Source	Justification
	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.

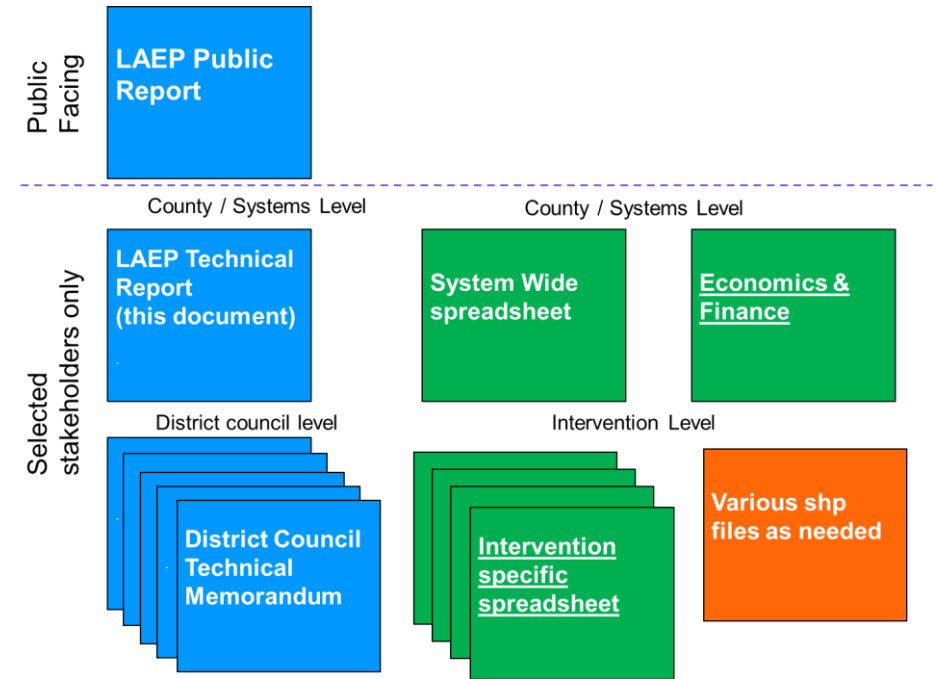
These exclusions reflect the standard practice in LAEP development, which typically omits non-energy sources of greenhouse gas emissions and aspects of the energy system expected to be overseen by central government. **Excluded sectors interface with the LAEP delivery through complementary strategies such as Local Nature Recovery Strategies and Local Plans, which address land use, biodiversity, and planning considerations.** This ensures that the LAEP remains focused on areas where local authorities can exert meaningful influence, including buildings, personal transport, local energy generation and industrial emissions within the distribution network footprint. This approach supports targeted, actionable planning while maintaining alignment with national decarbonisation strategies.

1.3 How the LAEP is structured

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 to decarbonise across sectors and help meet Cambridgeshire's transition to net zero by 2045. The LAEP also functions as an evolving evidence framework, with supporting analysis and datasets designed to be updated over time as new data, technologies, and policy directions emerge.

To communicate a LAEP to such a wide range of stakeholders - from a resident in the area, to a government decision maker, to the energy system operator needing to plan infrastructure - a collection of documents is needed. Figure 1.2 below presents the approach of the LAEP.

Figure 1.2: LAEP structure



1.4 Technical report structure

This document supports a wide range of decision-makers by summarising the technical evidence base within each chapter, complemented by a detailed annex for those seeking deeper analytical insights.

This document is organised into the following key chapters:

- **Chapter 1 Introduction & background:** establishes the purpose, scope, and collaborative development process of the LAEP.
- **Chapter 2 Policy context:** reviews the national, regional, and local policy frameworks shaping the energy transition, including recent legislation, strategic initiatives, and local authority commitments.

- **Chapter 3 Emissions & energy baseline:** provides a detailed assessment of current energy consumption and greenhouse gas emissions across Cambridgeshire, segmented by sector and local authority. This is kept at a county level, with detailed sector breakdowns in Chapters 5 to 10.
- **Chapter 4 Future scenarios:** explores a range of potential energy futures using the Distributed Future Energy Scenarios (DFES), aligned with National Energy System Operator (NESO) Future Energy Scenarios Pathways (FESP). This includes a counterfactual 'do nothing' case and three net-zero aligned pathways. The chapter outlines the modelling approach, keys datasets, and assumptions.
- **Chapters 5–10 Sector-specific interventions:** Each chapter focuses on a critical component of the energy system, presenting the current state, modelled interventions, and preferred scenarios. These chapters also estimate the capital investment requirements for implementation. These sector-specific interventions include Energy Efficiency in Buildings (Chapter 5), Low Carbon Heating (Chapter 6), Industrial Decarbonisation (Chapter 7), Transport (Chapter 8), Local Energy Generation (Chapter 9) and Networks, Storage, and Flexibility (Chapter 10).
- **Chapter 11: System level results:** presenting the aggregated view of energy demand, future energy consumption, and resulting carbon emissions.
- **Chapter 12: Economic assessment:** presents the estimate cost to delivering this plan, quantified benefits, and which stakeholders are likely to meet that cost.
- **Chapter 13: Implementing the plan:** sets out the implementation strategy, presenting a detailed pipeline of priority projects along with their phasing to support strategic planning and investment.
- **Appendices:** Generally, one appendix per main report section, providing technical detail, data sources, modelling assumptions, and supporting analysis.

Input from local stakeholders is embedded across the plan, ensuring alignment with local priorities and practical delivery considerations.

1.5 Stakeholder engagement approach

The development of the Cambridgeshire LAEP has been underpinned by a stakeholder engagement programme, designed and delivered by CAG Consultants. This process was central to ensuring that the perspectives, priorities, and ambitions of communities and businesses across the area were embedded throughout the LAEP's development.

The approach began with stakeholder mapping and the development of an engagement plan, overseen by a clear governance structure through a Steering Group and Project Board. Stakeholders, including businesses, community groups, and institutional partners, were identified and prioritised based on their influence, interest, and relevance to the energy transition.

Engagement activities included:

- **Surveys** tailored to local audiences, developed in collaboration with If Not Now Digital, and promoted via a dedicated LAEP landing page, targeted social media (primarily LinkedIn), email outreach, media coverage, and webinars.
- **Briefings** to inform and align key decision-makers.
- **Workshops** to facilitate cross-sector dialogue and provide an opportunity to share early versions of the LAEP and gather further input.
- **Targeted engagements** to validate technical assumptions and refine modelling outputs.

The results from the stakeholder engagement are provided in a separate report produced by CAG Consultants. However, stakeholder contributions have directly informed intervention design, and implementation planning, strengthening this plan's relevance, credibility, and local ownership.

2 Policy context

This section provides an overview of key national, regional, and local policies that influence Cambridgeshire's emissions and progress towards net zero. The review focuses on policies adopted at the time of LAEP development. As the LAEP is intended to be a live document that evolves with new policies and changing local priorities, a future policy review is recommended.

2.1 National policies

2.1.1 Overview

The UK Climate Change Act 2008¹, as amended in 2019, provides the legal foundation for the UK's climate action, setting a binding target of net zero greenhouse gas emissions by 2050. This target is based on emissions measured on a territorial basis, meaning it includes all greenhouse gas emissions produced within the UK's borders, but excludes emissions embedded in imported goods and services. This commitment is supported by a suite of strategies and legislation, including the Net Zero Strategy: Build Back Greener², originally published in 2021 and updated in 2022, which outlines policies to decarbonise all sectors of the UK economy. Interim targets include a 68% reduction in emissions by 2030 and 78% by 2035, compared to 1990 levels. The strategy also aims for the UK to be powered entirely by clean electricity by 2035, subject to security of supply, and recognises that 82% of emissions are within the scope of influence of local authorities.

In July 2024, the Climate Change Committee (CCC) issued updated recommendations for achieving the 2030 targets³. These include tripling

offshore wind capacity, doubling onshore wind, and increasing solar capacity fivefold. The CCC also called for 10% of UK homes to be heated by heat pumps (up from around 1%) and for nearly all new cars sold to be electric, up from 16.5% at the time⁴.

Following the 2024 general election, the new UK Government reaffirmed its commitment to net zero in the King's Speech. A key legislative development was the introduction of the Great British Energy Bill⁵, which has now been passed. This legislation establishes Great British Energy (GBE), a publicly owned clean power company headquartered in Scotland. GBE is tasked with accelerating investment in renewable energy, including doubling onshore wind, trebling solar, and quadrupling offshore wind capacity by 2030. The company will work in partnership with the private sector and is backed by £8.3 billion in capital investment, partly funded by a time-limited windfall tax on oil and gas companies.

The government has committed to introducing an Energy Independence Act, aimed at reducing reliance on fossil fuels and enhancing energy security. While the full Act has not yet been passed, its core commitments were announced in the King's Speech and supporting government statements. The proposed legislation includes a ban on new oil and gas exploration licences in the North Sea, while allowing existing licences to continue. It also outlines a major programme to improve energy efficiency in homes, including expanded support for insulation, low-carbon heating systems such as heat pumps, and integration with the Warm Homes Plan and Future Homes Standard⁶.

In terms of infrastructure, the Act supports the modernisation of the UK's energy system through a record £24 billion investment programme approved by Ofgem. This includes:

- Upgrading over 4,400 km of overhead electricity lines and building 3,500 km of new circuits

¹ [The Climate Change Act 2008 \(2050 Target Amendment\) Order 2019](#)

² [Net Zero Strategy: Build Back Greener](#)

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

⁴ [CCC News](#)

⁵ [Great British Energy Bill 2024-25](#)

⁶ [Great British Energy update](#)

- Expanding grid capacity to connect up to 126 GW of clean power by 2030
- Enhancing gas transmission and distribution networks to maintain safety and resilience
- Accelerating deployment of flexible technologies like storage and smart grid systems

These measures are designed to enable a more resilient, decentralised, and low-carbon energy system, aligned with the UK's Clean Power 2030 and net zero targets.

2.1.2 UK 7th Carbon Budget (2025)

The Seventh Carbon Budget, published by the Climate Change Committee (CCC) in February 2025, sets a proposed limit on greenhouse gas emissions for the period 2038 to 2042, in accordance with the Climate Change Act 2008. While the CCC recommends the budget, it only becomes legally binding once it is approved by Parliament through secondary legislation. Under the Act, this legislation must be enacted at least 12 years before the start of the budget period, meaning the Seventh Carbon Budget must be legislated by 2026 to take legal effect. The proposed total emission limit for this five-year period is 535 million tonnes of carbon dioxide equivalent (MtCO₂e), including emissions from international aviation and shipping. The budget also includes an interim target of an 87% reduction in emissions by 2040 compared to 1990 levels.

As of 2023, UK emissions were approximately 50% below 1990 levels, with reductions driven primarily by the phase-out of coal power and the expansion of renewable electricity generation.

The budget outlines sector-specific targets:

- Surface transport emissions are expected to fall by 86% by 2038-2042 relative to 2023.
- Aviation emissions are targeted to fall by 17%.

- In the energy sector, 60% of emissions reductions by 2040 are expected from electrification and decarbonisation of electricity supply, requiring expansion of renewable infrastructure, grid upgrades, and local energy storage.
- In land use and agriculture, over half of emissions reductions are expected from land use change, with peatland restoration increasing from 26% in 2023 to 55% by 2040.

The budget highlights key priorities for local area energy planning, including the expansion of electric vehicle charging networks, increased local renewable energy generation, grid reinforcement, and the widespread deployment of heat pumps. Local planning frameworks should incorporate carbon budget targets, align with national climate policy, and support industrial decarbonisation, community engagement, and emissions tracking.

2.1.3 Clean Power Action Plan (2024)

The UK Government's Clean Power Mission has been a foundational pledge, first made by the Labour Party in advance of the 2024 General Election. The Clean Power Action Plan⁷, published in December 2024, by the Department for Energy Security and Net Zero (DESNZ), sets out how the government proposes to achieve its target of 95% clean power provided through the electricity grid.

The plan covers the expected mix of generation technologies, as well as the role of consumer flexibility and storage in the grid by 2030. This is helpful for understanding the trajectory of grid electricity emissions intensity, as well as the connection priorities of grid-scale generation technologies in each region of Great Britain.

The Clean Power Action Plan, and analysis by NESO which informed the plan's development, are central guiding documents for the energy sector in the UK and are already proving to have significant influence. In particular, the Connections Reform Update Annex⁸ sets a cap on the quantity of onshore wind, solar and battery storage which is required in Central England of:

⁷ Clean Power Action Plan

⁸ Clean Power 2030 Action Plan: connections reform annex (updated April 2025)

- 500MW of transmission-connected battery storage by 2030, with no more additions before 2035
- 2.1GW of transmission-connected solar PV by 2030
- A total of 9.5GW of solar PV across both distribution and transmission by 2035

Whilst Central England covers a larger region than Cambridgeshire, this is a good proxy for the absolute maximum amount of generation the local authorities could see connected in this region.

2.1.4 NESO Pathways to Net Zero

The National Grid Future Energy Scenarios (FES) 2025⁹, now titled NESO Future Energy Scenarios Pathways to Net Zero, outlines strategic and credible pathways for the UK to achieve net zero emissions by 2050. While not a policy document, it plays a critical role in informing and supporting policy decisions and strategic investments across the UK energy landscape. Originally launched in 2011 by National Grid Electricity System Operator, FES has evolved from scenario-based forecasting to a tool for strategic network planning. The 2024 edition marks a significant shift toward more focused and actionable pathways, highlighting the urgent need for rapid decarbonisation across all sectors, improved energy efficiency, and a greater share of renewables in the energy mix¹⁰. Although NESO Pathways to Net Zero provides a long-term outlook to 2050, it does not fully align with the UK government's Clean Power 2030 target, which aims for a fully clean electricity system by the end of this decade. To address this gap, NESO published a separate analysis titled Clean Power 2030¹¹, commissioned by the Department for Energy Security and Net Zero (DESNZ) in August 2024, which provides short-term pathways, grid reform proposals, and spatial planning insights to support the 2030 goal. The upcoming NESO Pathways 2025, expected in July 2025, is anticipated to incorporate this alignment more explicitly.

⁹ [Future Energy Scenarios 2024](#)

¹⁰ [FES Regionalisation Report](#)

¹¹ [Bridging the Gap to Net Zero 2023 – National Grid ESO](#)

2.1.5 Connections reform

Ofgem has authorised a package of changes to the existing grid connections process with the purpose prioritising projects with the highest strategic value, rather than the “first come, first serve” queue which currently exists¹². A one-off process is taking place known as “Gate 2 to Whole Queue” which requires all existing customers with a connection agreement to connect to the electricity transmission network, and customers which are connecting to the distribution network but which were subject to a Transmission Impact Assessment (TIA) when they applied to the distribution network to provide additional evidence of project status.

This includes demonstration of land rights or progress on planning permission; and in the case of onshore wind, solar, battery storage and Long Duration Energy Storage, to demonstrate their strategic alignment with the needs of the 2030 pathway identified by NESO. Part of the re-sequencing will reflect the cap discussed in Section 2.1.3.

The purpose of the connection reform is to re-sequence the queue to favour projects which can demonstrate rights to sufficient land to build the plant; and can demonstrate revenue contracts.

The consequence is that the local authorities may not see solar and battery storage projects in the region connected in either the order in which they have applied for planning permission, or the order in which they secured a grid connection and possibly leading to some attrition in projects. **This is particularly significant for Cambridgeshire given rapid connection demand from solar, batteries, and data centre proposals.**

2.1.6 Great British Energy Act 2025

A central pillar of the UK Government's Clean Power Mission¹³ is the creation of Great British Energy (GBE), a publicly owned energy company established to accelerate investment in clean power. The Great British Energy Bill was introduced to Parliament in July

¹² [Decision on Connections Reform Package \(TM04+\) | Ofgem](#)

¹³ [Clean power targets](#)

2024 and received Royal Assent on 15 May 2025, becoming the Great British Energy Act 2025¹⁴.

The Act establishes GBE as a company limited by shares, wholly owned by the Secretary of State for Energy Security and Net Zero but operating independently of the Crown. Its primary purpose is to invest in, develop, and operate low-carbon energy infrastructure across the UK. This includes technologies such as offshore and onshore wind, solar, nuclear, hydrogen, and carbon capture and storage (CCS).

GBE is also empowered to:

- Partner with the private sector to co-invest in clean energy projects
- Support local and community energy schemes
- Promote innovation and supply chain development
- Contribute to energy security, affordability, and the UK's net zero targets

The company is backed by an initial £8.3 billion in public capital, with the aim of leveraging further private investment. It is required to publish strategic plans, annual reports, and undergo regular reviews of its effectiveness. GBE is expected to play a key role in delivering the government's target of a fully clean electricity system by 2030.

2.1.7 Planning & Infrastructure Bill 2025

The Planning and Infrastructure Bill¹⁵ was first introduced to parliament in March 2025. The Bill is aimed at streamlining the delivery of new homes and critical infrastructure, including energy infrastructure required to support the government's Clean Power Mission.

The government has set out five objectives of the Bill, which summaries the areas of reform it contains.

- Delivering a faster and more certain consenting process for critical infrastructure, with regards to the Nationally Significant Infrastructure Projects (NSIPs) framework

¹⁴ [Great British Energy Act 2025](#)

¹⁵ [Guide to the Planning and Infrastructure Bill - GOV.UK](#)

- Introducing a more strategic approach to nature recovery, through the introduction of the Nature Restoration Fund (NRF) and Environmental Delivery Plans (EDP)
- Improving certainty and decision-making in the planning system, through clarifying the expectations of and ensuring capacity for planning committees
- Unlocking land and securing public value for large scale investment, in particular through strengthening the position of development corporations
- Introducing effective new mechanisms for cross-boundary strategic planning through the introduction of Spatial Development Strategies.

The Bill has now passed and became the Planning and Infrastructure Act 2025 following Royal Assent on 18 December 2025. As with many Acts of Parliament, several provisions will come into force through phased commencement regulations during 2026.

2.1.8 Heat and Buildings Strategy (2021)

The Heat and Buildings Strategy¹⁶, published in 2021 under a previous UK government, set out a comprehensive plan to decarbonise buildings and transition to low carbon heating systems. It focuses on reducing emissions from buildings, which account for approximately 25% of the UK's total greenhouse gas emissions. The strategy includes measures to improve energy efficiency and promote the adoption of low-carbon heating technologies, such as heat pumps and, potentially, hydrogen-ready boilers, while ensuring the transition is affordable and fair. Some key commitments include phasing out the installation of new natural gas boilers by 2035, promoting the adoption of heat pumps with a target of 600,000 heat pump installations per year by 2028, ensuring all new buildings in England are ready for net zero from 2025, through the introduction of the Future Homes and Buildings Standards.

¹⁶ [Heat and buildings strategy](#)

2.1.9 Future Homes and Buildings Standard (2025)

The Future Homes and Buildings Standards (FHBS)¹⁷ is set to be implemented sometime in 2025. Its primary aim is to ensure that all new homes and non-domestic buildings in England are constructed to be highly energy efficient, zero-carbon ready, and resilient to climate change. The FHBS are part of the government's broader strategy to reduce emissions from buildings and build on the interim uplift to Building Regulations introduced in 2021 and are informed by extensive consultation with industry and stakeholders.

Under the Future Homes Standard (FHS)¹⁸, all new homes will be built without fossil fuel heating systems, such as gas and oil boilers. Instead, they will be equipped for low-carbon heating technologies, such as heat pumps, and constructed to high fabric efficiency standards to minimise heat loss. These homes must be zero-carbon ready and designed so they will not require retrofitting in the future to meet net zero targets. It is expected that new homes built to the Future Homes Standard will produce 75-80% fewer carbon emissions **associated with regulated energy** compared to homes constructed under current building regulations.

The Future Buildings Standard¹⁹ applies similar principles to new non-domestic buildings. It mandates the use of low-carbon heating, improved ventilation systems, and measures to reduce overheating risks, particularly in residential settings like care homes and student accommodation. Updated regulations, specifically Part L (conservation of fuel and power) and Part F (ventilation), will underpin these changes. Part L sets out minimum energy efficiency performance targets for buildings, airtightness requirements and improved minimum insulation standards, while Part F introduces new standards for ventilation.

¹⁷ [Future Homes and Buildings Standard](#)

¹⁸ [Future Homes Hub](#)

¹⁹ [Future Buildings Standard](#)

2.1.10 Warm Homes Plan (2025)

The Warm Homes Plan²⁰ is a flagship UK government initiative designed to combat fuel poverty and accelerate the country's shift to clean, homegrown energy. With an ambitious goal to lift over one million households out of fuel poverty by 2030, the plan also supports the broader national vision of making Britain a clean energy superpower.

Over the next five years, the plan aims to upgrade five million homes, focusing on those with poor energy efficiency, specifically properties rated D to G on the Energy Performance Certificate (EPC) scale. Priority is given to low-income households, pensioners, and vulnerable residents. By supporting the installation of insulation, solar panels, and heat pumps, the plan will make homes both cheaper to heat and cleaner to run. Homeowners can access grants of up to £7,500 to install heat pumps, helping them transition away from oil, gas, or LPG boilers.

To ensure support reaches all segments of the housing market, the plan includes targeted programmes such as the Warm Homes: Social Housing Fund and the Warm Homes: Local Grant. Under the Warm Homes: Local Grant, local authorities play a central role. They are responsible for identifying eligible homes using data such as EPC ratings and deprivation indices, coordinating retrofit projects, and ensuring high-quality delivery. Councils are also tasked with engaging local communities, managing contractors, and aligning retrofit efforts with broader local climate and housing strategies. **The full Warm Homes Plan, originally expected to be published in late 2025, has been delayed and is now scheduled for publication in 2026.**

2.1.11 Integrated National Transport Strategy

The Integrated National Transport Strategy (INTS)²¹, launched in November 2024, sets out a unified vision for England's transport system. Developed by the Department for Transport, it aims to improve integration across transport modes, support decarbonisation, and

²⁰ [Warm Homes Plan](#)

²¹ [Integrated National Transport Strategy for England](#)

enhance accessibility. The INTS outlines several long-term priorities, including improving integration between different modes of transport, supporting the UK's net zero targets through decarbonisation, and ensuring that transport systems are inclusive and accessible to all users. It also highlights the importance of using data and technology to improve journey planning and system efficiency. The strategy is being shaped through public consultation and regional engagement, with a final version expected in late 2025. It will guide transport policy and investment decisions over the next decade, aligning with national goals for sustainability, economic growth, and social inclusion²².

2.1.12 UK Transport Decarbonisation Plan (2021)

The UK Transport Decarbonisation Plan (2021)²³ was developed under the 2019–2022 Johnson government and outlines the national strategy to achieve net zero emissions in the transport sector by 2050. It sets out measures to reduce emissions across all modes of transport while supporting economic growth and public health. Key elements include ending the sale of new petrol and diesel cars and vans by 2030, requiring all new cars and vans to be zero emission by 2035, increasing investment in public transport, cycling, and walking, encouraging a shift to rail and zero-emission road freight, supporting the development of sustainable aviation fuels, and accelerating the decarbonisation of the maritime and aviation sectors. The plan also includes the development of supporting infrastructure such as electric vehicle charging points and hydrogen refuelling stations.

Subsequent governments have introduced further measures building on this plan. These include the Zero Emission Vehicle mandate, which sets annual targets for manufacturers to sell a minimum percentage of zero-emission vehicles, and the introduction of a Sustainable Aviation Fuel mandate from 2025²⁴. The Renewable Transport Fuel Obligation²⁵ has

also been expanded to include recycled carbon fuels and is under review to align more closely with greenhouse gas reduction targets.

The Rapid Charing Fund (RCF) previously proposed and which aimed to provide a minimum level of access nationwide to EV fast charging on the strategic road network is no longer progressing, following a pilot which did not lead to any awards to Motorway Service Area (MSA) operators²⁶.

2.1.13 UK's Modern Industrial Strategy (2025)

The UK's Modern Industrial Strategy²⁷ was published in June 2025, following open consultation. The strategy covers the period of 2025–2035, looking to provide some policy 'certainty' for businesses and investors. It is a collection of sector plans, covering what the government has identified as 'high growth sectors', which it is calling the IS-8. These are advanced manufacturing, creative industries, clean energy industries, defence, digital and technologies, financial services, life sciences, and professional and business services. To date, five of the eight sector plans have been published.

Across the sectors, the strategy sets out government's plan to:

- “make it easier and simpler for companies to do business, giving them the stability to make long-term investments”
- “enable investment and growth in city regions and clusters across the UK where the IS-8 are based”
- “transform our highest-potential sectors over the next decade”
- “create an enduring partnership between business and a stronger, more capable, and more agile state”

While many of the sector plans will be relevant to Cambridgeshire more broadly, the Clean Energy Industries Sector Plan²⁸ will be most relevant

²² [DPTAC Main Committee meeting minutes March 2025](#)

²³ [Transport decarbonisation plan](#)

²⁴ [Renewable transport fuel obligation: addressing multiple incentives](#)

²⁵ [RTFO statutory review and future of the scheme](#)

²⁶ [Electric vehicle charging infrastructure on the strategic road network](#)

²⁷ [The UK's Modern Industrial Strategy 2025 - GOV.UK](#)

²⁸ [Clean Energy Industries Sector Plan - GOV.UK](#)

to the LAEP development and implementation, focussing on the supply chain and skills challenges of the energy transition.

2.2 Regional and local policies

2.2.1 Cambridgeshire and Peterborough Local Growth Plan

The Cambridgeshire and Peterborough Combined Authority (CPCA) **has adopted** a new Local Growth Plan (LGP)²⁹ to guide economic development and infrastructure investment across the region over the next decade, with a strategic outlook extending to 2050. The plan is designed to be locally owned and responsive to the region's unique opportunities and challenges, while aligning with national priorities such as the UK Industrial Strategy and the Comprehensive Spending Review.

The LGP sets out a vision for inclusive and sustainable growth, aiming to improve productivity, create good jobs, and unlock development in all parts of the region. It is structured around several core workstreams, including economic analysis and forecasting, infrastructure planning, investment pipeline development, employment and skills, and stakeholder engagement. A working group of senior representatives from constituent authorities was established in mid-2024 to oversee its development and ensure alignment with local and national policy.

Cambridgeshire's sectoral strengths, particularly in life sciences, agritech, clean energy, and advanced manufacturing, are central to the plan. The LGP also identifies key constraints to growth, including electricity grid capacity, water scarcity, flood risk, transport connectivity, and housing affordability.

Three growth scenarios are being developed: a baseline (business-as-usual), a net zero 2045 pathway, and low/high growth variants. These scenarios are designed to be spatially visual and resilient to future

changes in governance structures, such as potential local government reorganisation.

The LGP will include a prioritised investment pipeline covering strategic transport schemes, energy infrastructure, water and flood resilience projects and digital connectivity. It will also propose mechanisms to unlock public and private investment, including business cases and funding bids aligned with national spending priorities. It will serve as a key tool for regional coordination, investment planning, and engagement with government departments and local stakeholders.

The CPCA will develop a Resilience Plan that will address the strategic risks for our **natural** environment, infrastructure, water and energy supply in the face of our current infrastructure needs but also our future ambition of the Local Growth Plan for this region.

2.2.2 Cambridgeshire and Peterborough Combined Authority Infrastructure Delivery Framework

The Infrastructure Delivery Framework (IDF), commissioned by the Cambridgeshire and Peterborough Combined Authority (CPCA) and delivered by Stantec UK Ltd, provides a comprehensive assessment of the infrastructure barriers that could constrain the delivery of housing and employment growth across the region. It serves as a foundational evidence base to support both the LAEP process and the CPCA's Local Growth Plan (LGP). The IDF focuses on four critical infrastructure themes:

- Energy infrastructure
- Water supply and flood risk
- Blue/green infrastructure, and
- Transport connectivity

The study outlines both existing and emerging infrastructure constraints and barriers across the county, categorising them by sector and assessing their potential to delay or prevent planned development. The energy sector, particularly the electricity grid, emerges as a key area of

²⁹ [CPCA Local Growth Plan](#)

concern for the LAEP. Many areas identified for growth in emerging Local Plans are not currently reflected in UK Power Networks' (UKPN) infrastructure investment pipeline. This misalignment presents a significant barrier to long-term growth, especially given UKPN's regulatory requirement for a high degree of certainty before committing to infrastructure upgrades.

To address this, the IDF recommends a coordinated approach involving the CPCA, local planning authorities, national government, regulators, and UKPN. This includes building sufficient headroom into the electricity network to accommodate future demand and ensuring early and ongoing engagement with UKPN during the development and review of Local Plans. The completion and regular updating of Local Area Energy Plans are also identified as essential tools for aligning infrastructure planning with spatial growth strategies.

The IDF also highlights developments, housing and employment, already allocated in the Local Plans and spatially where these are expected to be delivered. This information helped inform the underlying assumptions around population and employment growth in the LAEP, albeit modified with more recent forecasts.

Beyond energy and growth, the IDF identifies water scarcity as an immediate and region-wide constraint, particularly in Greater Cambridge. Strategic solutions such as the Fens Reservoir and water credit schemes are urgently needed to unlock development. Flood risk, while more localised, also poses a significant challenge, particularly in low-lying areas where maintenance of existing defences is critical. Meanwhile, blue/green infrastructure, though not yet a barrier, is under increasing pressure and will require a strategic framework to ensure it supports biodiversity, climate resilience, and quality of life as growth continues.

It also captures transport infrastructure as a critical enabler of spatial growth, identifying numerous needs already captured in adopted Local Plans. The IDF notes that while many infrastructure needs have been identified in adopted Local Plans, delivery is often delayed by funding gaps, governance complexity, and statutory processes. Strategic interventions such as East West Rail, the A141 upgrade, and enhanced

public transport networks are essential to support inclusive and sustainable growth

Overall, the IDF provides a robust foundation for infrastructure planning across the CPCA area. It is particularly relevant to this LAEP as it identifies energy infrastructure as a critical constraint to growth and decarbonisation. The IDF highlights the need for proactive, collaborative, and forward-looking strategies to overcome barriers such as grid capacity limitations and energy supply constraints, which directly affect the feasibility and timing of local energy interventions. Addressing these challenges is essential to ensure that infrastructure provision keeps pace with the region's ambitious growth and net zero goals.

2.2.3 Local Plans

Cambridge City Council, South Cambridgeshire District Council, East Cambridgeshire District Council, Huntingdonshire District Council, and Fenland District Council each have their own local plan, with some areas currently in the process of updating them. Cambridgeshire County Council also has the Minerals and Waste Local Plan. These Local Plans sets out the local policies and regulations governing land use and the types of developments permitted or encouraged in specific areas within each council's jurisdiction. In terms of the LAEP, these local plans primarily influence the feasibility of renewable generation projects, by identifying where such developments are likely to be supported or face planning constraint. Additionally, the plans often include requirements related to electric vehicle (EV) charging infrastructure and renewable energy standards for new buildings and, in some cases, for major refurbishments. **Local Plans also allocate sites for development, which makes their review critical for the LAEP as these allocations will drive the need for new or upgraded grid infrastructure to support future growth.**

All 5 local plans have specific policies for renewable energy developments, which have some broad similarities. They all support renewable energy development in principle, with favourable weighting towards community led projects, provided that any adverse impacts in any of the following categories are appropriately minimised, or outweighed by wider environmental, economic, or social benefits:

- Air quality
- Noise pollution
- Visual impacts
- Loss of high-quality agricultural land
- Adverse impact on heritage sites or historic assets
- Reduction in land for biodiversity and net gain sites
- Highway safety
- Flood risk
- Geodiversity
- Negative impacts on local community

The main difference between the 5 plans regarding renewable energy developments regards wind energy. The position of each plan is outlined in the table below.

Table 2.1: Wind Energy Local Plan Policy Differences

District Council	Wind Energy Local Plan Policy
Cambridge	Renewable policy does not apply to wind energy. Wind resource highly constrained due to urban nature of council area. Local plan does not allocate land as suitable for turbines.
South Cambridgeshire	Wind is generally permitted if the development site is identified as being suitable in a neighbourhood plan and if any planning impacted identified by local communities have been addressed.
East Cambridgeshire	No specific mention of wind energy. Renewable development not permitted if in view of Ely cathedral.
Huntingdonshire	Generally permitted if development is in an area already identified as suitable, with any adverse impacts identified by the local community being fully addressed.
Fenland	Smaller scale wind turbines (shorter than 11 meters and no blade length longer than 3.8 meters) are permitted throughout authority. Any wind turbines not meeting this criterion must go through planning permission.

The district councils have provided geolocated data layers and local policy constraints that have informed the LAEP Future Scenarios. This data has been used to explore the theoretical potential contributions for ground mounted solar or onshore wind across the county, taking into account planning considerations and land use restrictions. The outputs do not imply suitability or endorsement of specific sites for development.

2.2.4 Greater Cambridge Local Plan – Policy CC/NZ: Net Zero Carbon New Buildings

Policy CC/NZ is a proposed policy within the emerging of the Greater Cambridge Local Plan, being jointly developed by Cambridge City Council and South Cambridgeshire District Council. This joint plan reflects the formation of the Greater Cambridge Shared Planning Service in 2018, when the two councils combined their planning functions to create a unified planning authority. It sets out future requirements for all new buildings to support the area's net zero carbon objectives.

Under this proposed policy all new homes and non-domestic buildings must be designed for exceptionally low energy demand and powered entirely by low-carbon energy sources. Fossil fuel-based heating systems, including gas connections, are explicitly prohibited. Developments must meet strict energy use intensity (EUI) targets, such as 35 kWh/m²/year for residential buildings, with tailored thresholds for various non-residential uses including offices, schools, and research facilities.

On-site renewable energy generation must match annual energy consumption. Where this is not feasible, a carbon offset mechanism may be used to support additional renewable energy projects elsewhere.

The policy also encourages developers to assess and minimise carbon emissions from construction materials and processes, and to adopt assured performance methods that reduce the gap between predicted and actual energy use.

Informed by the Net Zero Carbon Study (2021), Policy CC/NZ aligns with the broader objectives of the LAEP process and reinforces the

region's commitment to delivering sustainable, resilient, and future-proofed communities.

3 Understanding the current emissions & energy baseline

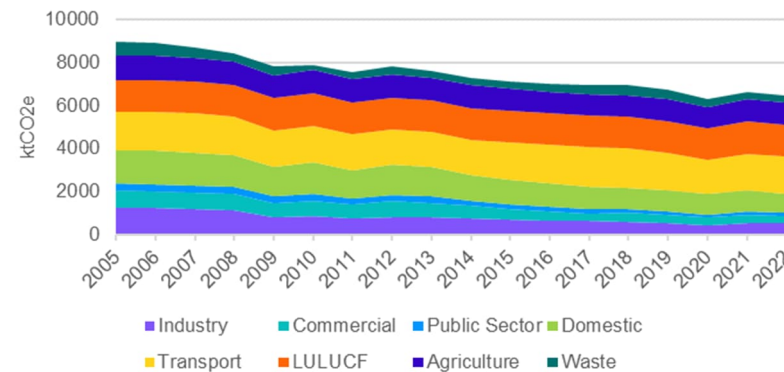
This section presents an overview of the existing Emissions and Energy in the county. This is intended to give a high-level overview, county wide, of the emissions and energy profile. A detailed breakdown of existing emissions is covered in the subsequent intervention areas (e.g. heating, transport, etc).

3.1 Historical emissions

The emissions inventory for Cambridgeshire provides a detailed account of historical greenhouse gas emissions across the county, focusing on key emitting sectors and progress towards decarbonisation. Between 2005 and 2022, total territorial emissions fell from approximately 9,000 ktCO₂e to 6,500 ktCO₂e a 28% reduction (Figure 3.1). Isolating emissions within the LAEP scope, which excludes land use, land use change and forestry (LULUCF), non-energy-related agricultural emissions, and waste, the reduction is even more substantial falling by 35% to 3,700 ktCO₂e (Figure 3.2).

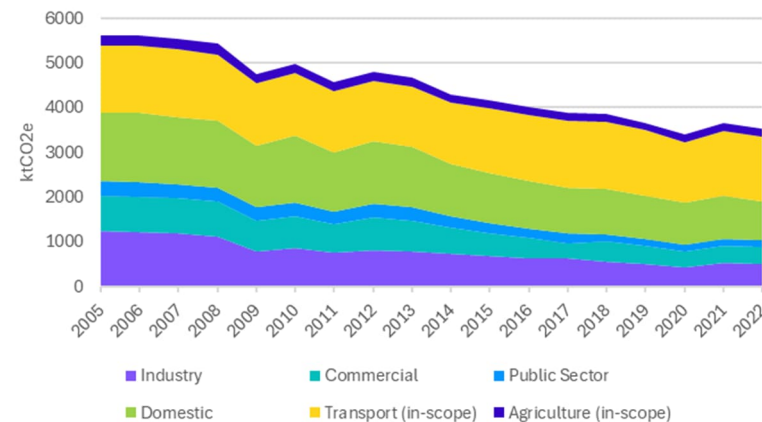
Sectoral analysis reveals that the most significant emissions reductions have occurred in the industrial, commercial, and public sectors, each of which has reduced emissions by more than 50% over the period. This is attributed to a combination of energy efficiency measures, fuel switching, and grid decarbonisation. The domestic sector has achieved a 43% reduction in emissions, largely due to the decarbonisation of the electricity supply. It's worth noting that for most district councils, this reduction has been greater than what would be expected from grid decarbonisation alone. This suggests that additional measures such as improved controls, LED lighting, and general energy efficiency have been applied. In contrast, transport emissions have remained largely static, underlining the continued reliance on fossil fuel vehicles and limited uptake of electric vehicles in both urban and rural areas.

Figure 3.1: Historical county-wide total emissions



Source: [UK local authority and regional greenhouse gas emissions statistics - GOV.UK](#)

Figure 3.2: Historical county-wide In-Scope Emissions



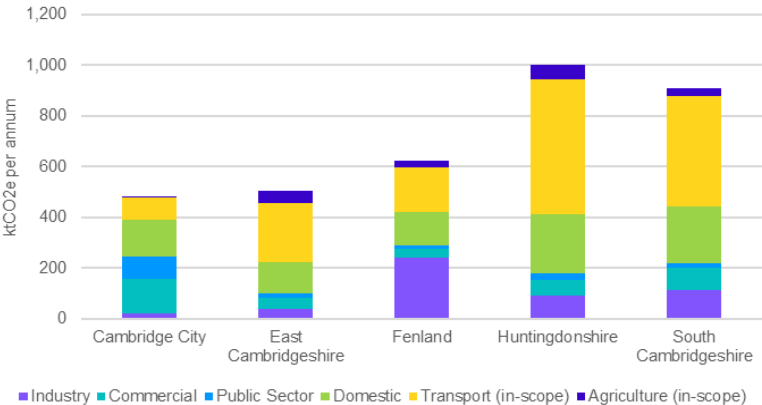
Source: [UK local authority and regional greenhouse gas emissions statistics - GOV.UK](#)

It is important to note that, while Cambridgeshire's emissions have fallen broadly in line with UK trends since 2005, sustained population and housing growth have kept absolute emissions relatively high compared with other areas. As a result, continued progress will require strategies that account for ongoing demographic change.

3.2 Emission breakdown by local authorities

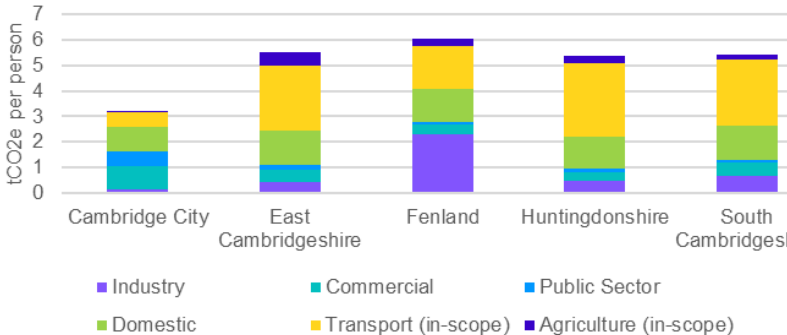
When analysing emissions at the local authority level, emissions vary considerably by local authority (Figure 3.3). While Cambridge City has a higher share of commercial and public sector emissions, it has the lowest in-scope emissions per capita (Figure 3.4), likely attributable to its high population density. Fenland, in contrast, has a greater share of industrial emissions reflecting a more carbon-intensive industrial base. Emissions from transport are particularly high in Huntingdonshire and South Cambridgeshire, primarily due to these areas having more motorways and A roads.

Figure 3.3: In scope emissions breakdown by Local Authority



Source: [UK local authority and regional greenhouse gas emissions statistics - GOV.UK](#)

Figure 3.4: In-scope emissions breakdown by Local Authority by person



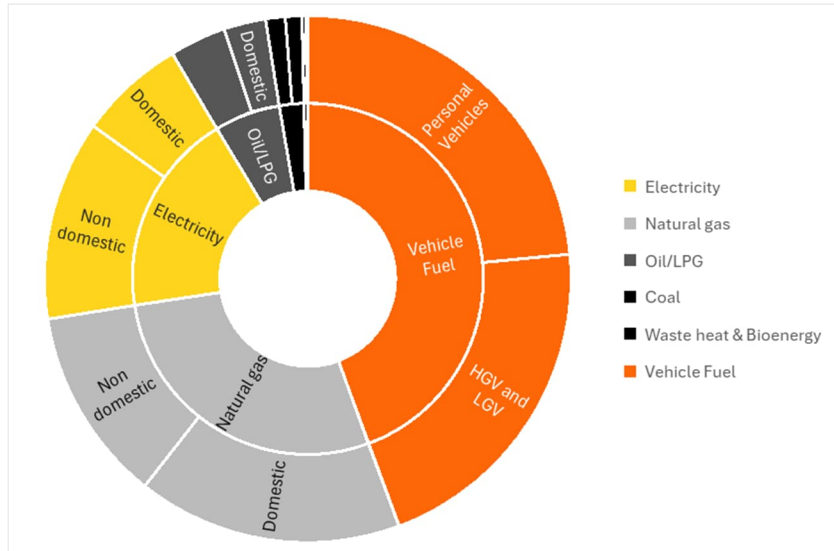
Source: Mott MacDonald analysis of [UK local authority and regional greenhouse gas emissions statistics - GOV.UK](#)

3.3 County-wide energy profiles

Cambridgeshire energy profile provides a good understanding of how energy is consumed across its domestic, industrial, commercial, and public sectors. This section explores the distribution and magnitude of electricity and gas demand, uncovering the unique consumption patterns across the county's five participating local authorities.

The 2023 energy consumption for the county is shown in Figure 3.5. As can be seen, the majority of energy use is from liquid fossil fuels in the transport sector, followed by natural gas (primarily domestic sector), followed by electricity (primarily non-domestic sector). This emphasises the need to focus on transportation interventions, as well as building fabric and heating interventions to reduce natural gas.

Figure 3.5: 2023 Fuel Consumption



Source: [UK Government subnational consumption data](#)

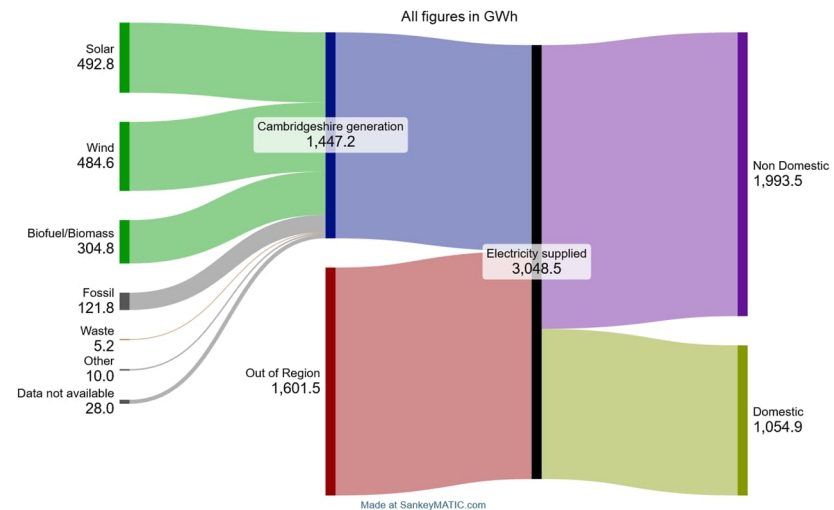
In terms of electricity, Cambridgeshire's estimated total annual electricity consumption for 2023 was approximately 3,048.5 GWh (Figure 3.6). The left side of the Sankey diagram illustrates the contribution of electricity generated from sources located within the region, alongside the proportion of supply provided by generation located outside Cambridgeshire. Although electricity flows through the national grid and is not necessarily consumed where it is produced, all generated electricity, whether local or external, enters a shared network that distributes energy based on demand across the country. However, the Sankey diagram helps to visualise the regional energy balance, even if the physical flow of electricity does not align with geographic boundaries.

Within Cambridgeshire, approximately 45% of the electricity associated with consumption in the area is matched by generation within the region, most of which is from low-carbon sources. The remaining supply is represented by electricity imported via the transmission network,

which has been progressively decarbonising as the UK transitions to a higher share of renewable energy. Further detail on the location and composition of local generation is provided in Section 9.

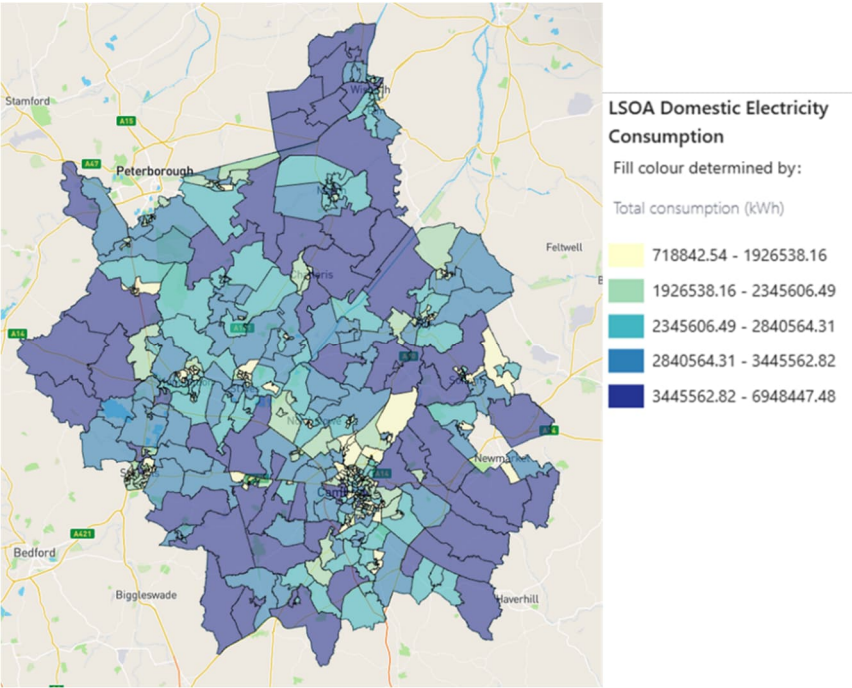
On the right of the Sankey diagram, we can see how electricity is consumed currently. In 2023, the domestic sector accounted for around 1,054.9 GWh (35%), while the non-domestic sector, including commercial, industrial, and public sectors, accounted for the remaining 1,993.5 GWh (65%). Electrical consumption as a whole is shown spatially in Figure 3.7, and a further breakdown of consumption is provided in the next section

Figure 3.6: 2023 Electricity Sankey Diagram (GWh/year)



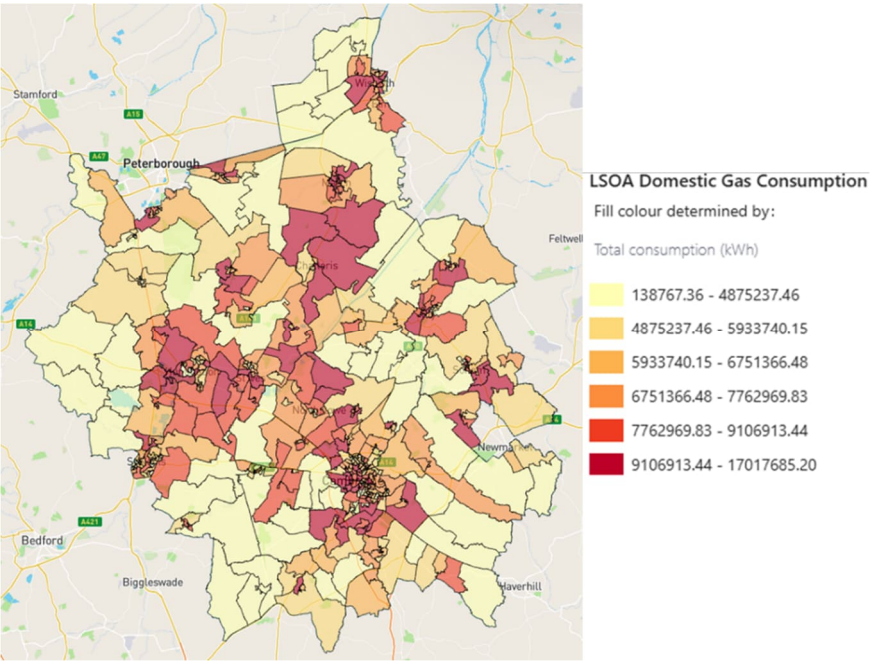
Source: [Lower and Middle Super Output Areas electricity consumption - GOV.UK](#) and [Digest of UK Energy Statistics \(DUKES\) - GOV.UK](#)

Figure 3.7: Local Authority Electricity Usage



Source: LAEP+ Tool showing the Lower Super Output Area (LSOA) Domestic Electricity Consumption across the region

Figure 3.8: Local Authority Gas Consumption (2023)



Source: LAEP+ Tool showing the Lower Super Output Area (LSOA) Domestic Gas Consumption across the region

While electricity consumption patterns are important, gas remains a critical component of energy demand across the local authorities (Figure 3.8), particularly for heating and industrial processes. The spatial distribution of gas demand, illustrated in the map, highlights areas of high gas use: industrial clusters in Fenland, Huntingdon and South Cambridgeshire drive higher consumption. Further analysis of energy consumption within local authority and sectors, is discussed in the next section.

3.4 Energy profiles across local authorities

From the analysis of the energy consumption, we observe the following trend. When looking at the energy profile for both electricity and natural

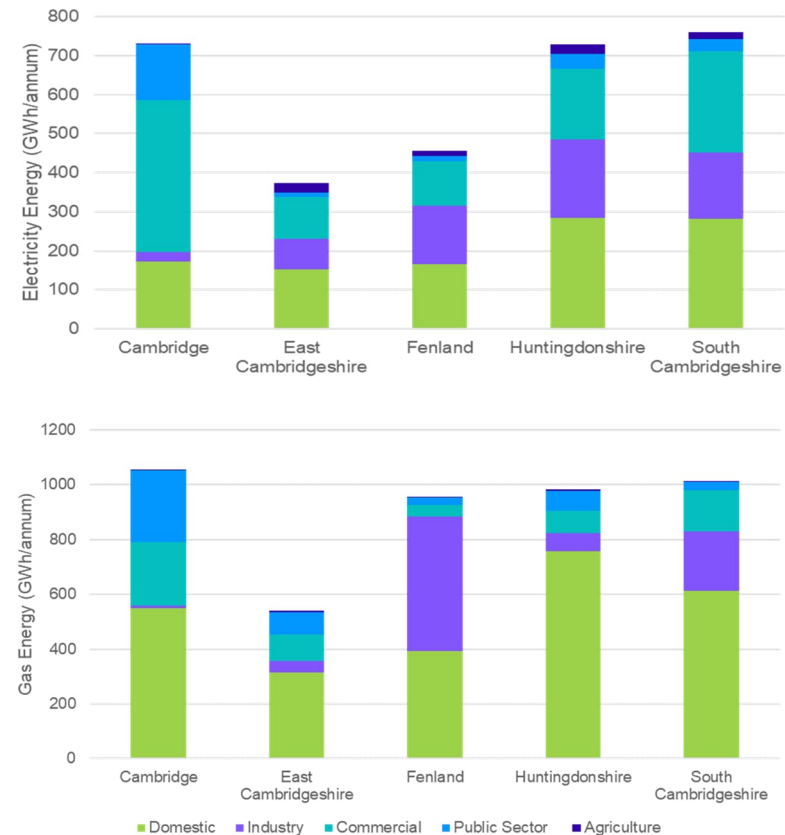
gas (Figure 3.9), we see that gas consumption, remains the dominant form of energy use, especially for space heating and industrial processes. It is notable that gas consumption exceeds electricity usage in all districts.

Comparing across districts, Cambridge City, Huntingdonshire and South Cambridgeshire emerge as the highest energy consumers, each exceeding 1,660GWh/annum for combined gas and electricity use. Per capita, only Cambridge and Fenland stand out consuming roughly 20% to 30% more than the other districts. However, this likely reflects the fact that many people in the surrounding area commute to Cambridge for work, increasing the non-domestic energy demand in the city while their residential population remains recorded in the surrounding districts. In Fenland, the higher per capita consumption is likely attributed to the strong industrial sector (discussed more below).

Domestic heating is the primary driver of gas demand in most areas, indicating that building fabric retrofits and heating decarbonisation technologies are significant levers in emission reduction. The exception to this is Fenland, which stands out with the highest non-domestic gas demand, driven largely by industrial activity.

Notably 64% of electricity consumption across the local authorities originates from the non-domestic sector. This underscores the need to prioritise energy efficiency and on-site generation, particularly in the commercial and industrial sectors, as many existing energy efficiency campaigns and incentives still focus predominantly on domestic energy use.

Figure 3.9: 2023 Electricity (top) and Gas (bottom) Consumption by Sectors (GWh/yr)



Source: Estimated from the [emissions statistics data breakdown](#) per Local Authority published by the Department for Energy Security and Net Zero

The non-domestic split in energy consumption (both gas and electricity) across the local authorities highlights the differing sector profiles that characterise economic activity in each area.

- **Cambridge City's** energy profile is dominated by the Commercial and Public sectors, which together account for 59% of non-domestic energy use. This reflects the city's concentration of high-value commercial activity, as well as its globally recognised research and public service institutions. Notable examples include the University of Cambridge, which hosts world-leading centres such as the MRC Laboratory of Molecular Biology, Babraham Institute, and Cancer Research UK Cambridge Institute. The city is also home to major public service facilities like Addenbrooke's Hospital, part of the Cambridge Biomedical Campus, which integrates NHS services with cutting-edge medical research.
- **East Cambridgeshire's** non-domestic energy use is shaped by a mix of commercial, industrial, and agricultural activities, with commercial as the primary sector, constituting 45% of all non-domestic energy use. Key contributors include food and crop processing facilities, light manufacturing units, retail and hospitality businesses, and energy demands from schools, healthcare centres, and agricultural infrastructure.
- In **Fenland**, non-domestic energy consumption and emissions are primarily driven by industrial activity, totalling 75% of non-domestic energy. The region's industry is known for food processing, agriculture-related manufacturing, and logistics. The district's economy is closely tied to its rural character and agricultural base, with major employers involved in crop processing, packaging, and distribution. Towns like Wisbech also support port-related activities and light manufacturing, contributing to the area's industrial energy demand. Fenland's rural character not only shapes its industrial energy profile but also contributes to higher car dependency, an important factor that will be explored further in the transport chapter when considering place-specific mobility interventions.
- **Huntingdonshire** features a more diverse industrial and commercial base accounting for 79% of local non-domestic energy, with significant energy use stemming from advanced manufacturing, engineering, and logistics. The district is home to companies operating in sectors such as automotive, aerospace, and medical technology, supported by a skilled workforce and excellent transport links. Industrial estates and business parks in areas like St Neots

and Huntingdon host a mix of high-tech firms and traditional manufacturers.

- **South Cambridgeshire** also exhibits high energy use and emissions from both Industrial and Commercial sectors, both together as 91% of local non-domestic consumption. This is largely attributable to its concentration of business parks, such as those in Cambourne and near the Cambridge Science Park, which host firms specialising in manufacturing, software development, and clean technologies. The district is a key part of the "Silicon Fen" innovation corridor, with strong links to Cambridge's research ecosystem. Additionally, warehousing and logistics operations contribute to the commercial energy footprint, particularly in areas with strategic transport access.

Further information on non-domestic heating decarbonisation can be found in Sections 5 and 6, while Section 7 explores pathways for industrial decarbonisation.

While this LAEP focuses on Cambridgeshire, it is important to recognise that the county is not an isolated energy system. There are significant cross-boundary energy flows, including electricity imports and exports via the UK Power Networks (UKPN) distribution network and reliance on neighbouring counties for some generation capacity. These interdependencies are relevant in future network planning and resilience assessments undertaken by the distribution network operator.

4 Assessing options for the future

4.1 Future scenarios selection

Selecting future scenarios is a key step in Local Area Energy Planning, helping to explore how different social, technological, and policy developments could shape the local energy system over time.

Following extensive discussion with the steering group, **a top-down approach, based on the 2025 UKPN DFES forecasts was selected as the scenario approach.** A brief rationale of the benefits and disbenefits of this approach, is provided in Appendix B.

UKPN creates the detailed scenario forecasts to inform the network planning and make the assumptions on technology uptake projections available to the local planners and organisations. DFES provides a localised version of Future Energy Scenarios Pathways, breaking down the technology projections by Lower Layer Super Output Area (LSOA)/ Middle Layer Super Output Area (MSOA) or Local Authority boundary, depending on the technology type. UKPN DFES, for example, models “different drivers of change” - including uptake in low carbon heating, energy generation, including renewable energy technologies, electric vehicles in addition to changes in consumer behaviours. These scenarios illustrate the ways in which energy system can change within the region under different technology adoption trends and policy drivers.

2025 UKPN DFES have also integrated local authority input on decarbonisation data and plans aligning regional decarbonisation initiatives with planning strategies. DFES also incorporate the outlined plans and incorporated targets for generation and storage capacities within the area.

The LAEP scenarios modelled in this LAEP are summarised below:

- **Counterfactual:** a scenario in which limited consumer engagement and system changes occur – the energy system changes with “business as usual” trends, eventually not reaching net zero by 2045. The low carbon technology adoption still grows as national policies and market trends roll out based on the momentum, but overall much slower compared with the net zero compliant scenarios
- **Electric Engagement:** a future energy system characterised by high levels of consumer engagement and electrification. The scenario sees society embrace more rapid deployment of renewables and heat pumps, rapid EV adoption, reflecting a world where decarbonisation is driven by widespread adoption of low carbon technologies and behaviour change.
- **Hydrogen Evolution:** a future where decarbonisation relies on system changes, including increase in hydrogen and electrification. The scenario expects lower levels of consumer engagement, but strong development of hydrogen for sectors that are challenging to electrify. The scenario assumes hydrogen is only used for hard to abate industrial processes, and potentially some hard to abate ground transport. Notably, hydrogen for home heating is omitted, which is justified further below.
- **Holistic Transition:** a balanced scenario that achieves net zero with a mix of widespread electrification and system changes. It relies both on strong consumer engagement as well as favourable policy environment for system changes. **This scenario diverges from the DFES scenario, which includes hydrogen for space heating; our version does not incorporate hydrogen for heating.** It is characterised by quickest net zero target hit.

Of note, is that currently the industry view on hydrogen as a replacement for natural gas in the gas grid to help decarbonise home heating, is very unlikely³⁰. It is generally recognised that to produce green or blue hydrogen requires vast amounts of renewable electricity and comes at a cost premium to fossil fuel-based feedstocks.

³⁰ Source: CCC (2025) 7th Carbon Budget. <https://www.theccc.org.uk/wp-content/uploads/2025/02/The-Seventh-Carbon-Budget.pdf> Page 14.

Therefore, there is a growing consensus in the industry, that green hydrogen should be reserved for hard to abate sectors, such as industrial processes which have no electric alternative, rather than for home heating for which there is a mature electric technology. While the government (DESNZ) is yet to conclude on this ongoing debate, the LAEP has not factored in hydrogen as decarbonisation intervention for home heating. This is discussed further in Section 6.

Finally, as with any top-down approach, the data granularity can be incomplete or too coarse to capture local variations or assumptions. Where detailed datasets were accessible, projections have been developed at the LSOA and MSOA levels to capture localised patterns of energy demand and technology uptake. Furthermore, without conducting detailed analysis on a building-by-building basis, it is not always possible to capture local spatial constraints (such as heritage protections in Cambridge, flood risk areas in Fenland). The LAEP maps spatially where decarbonisation and energy infrastructure interventions are needed, which can then be later cross-checked during feasibility stage against local constraints. The details of dataset granularity are provided in Appendix B.

4.2 Counterfactual modelling

As described above, the Counterfactual scenario is commonly referred to as a 'do nothing' scenario or 'business as usual' approach. It 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 counterfactual scenario represents the most probable outcome, if nothing additional was done beyond what is already committed to. It serves solely as a comparison baseline and is not presented as a viable pathway to net zero. The counterfactual reflects the most probable outcome if no further action is taken and acts as the reference point from which carbon reductions and the cost implications 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 counterfactual scenario, the energy system emissions are reduced, but the scenario does not result in reaching net zero.

Each intervention area in the subsequent sections, provides specific detailed counterfactual assumptions and exclusions relevant to the technological solution. The table below (Table 4.1) provides a high-level summary.

Table 4.1: Counterfactual modelling assumptions on technology uptake

Technology Area	Policy landscape and Market Trends
Heating Decarbonisation	Progress towards heating decarbonisation is limited, as the majority of consumers are still relying on gas networks as their primary heating fuel for existing consumers while new consumers are connecting to low carbon heating. District heating rollout is low.
Building Thermal Energy Efficiency (Fabric Improvements)	Energy efficiency improvements in domestic and non-domestic properties are low. As a result, buildings' thermal demand remains high, which has direct implications for the sizing of heat decarbonisation technologies. Systems such as heat pumps, district heating networks, and thermal storage must be sized to meet high peak loads.
Energy Generation	There has been a modest but steady increase in solar generation over time, reflecting gradual investment in renewable capacity. Rooftop solar also shows a slow upward trend, indicating incremental adoption at the household and community level. In contrast, biomass remains constant throughout the period, suggesting no significant expansion in this technology. Onshore wind is likely to remain constant or decline as existing installations reach end of life, as repowering with current, larger turbines would require active support.
Transport	There is a considerable uptake of EVs by 2045, and all modes of road transport make progress towards electrification. However, ICE-based passenger vehicles are not phased out due to supply chain constraints.
Consumer Behaviour Shifts	Limited Consumer engagement with system flexibility via demand side response or time of use tariffs.

4.3 Growth assumptions

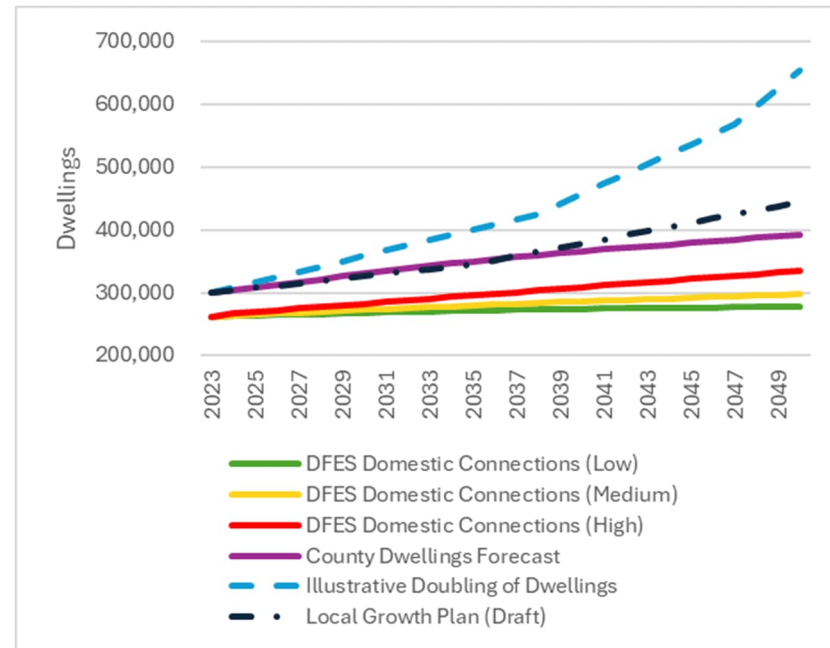
A critical assumption underpinning all scenarios is how much Cambridgeshire plans to grow between now and 2045. Cambridgeshire is recognised as a high-growth area, and there are a multitude of forecasts for future population, employment space, and public infrastructure. For this study, Cambridgeshire County Council provided a population and dwelling forecast (labelled “County Dwellings Forecast”), which forecasts a higher degree of growth than the UKPN DFES. These forecasts are the 2023-based population and dwelling stock forecasts available publicly³¹. **These 2023-based forecasts are based on policy and growth as set out in current Local Plans.**

It should be stressed however, that this LAEP was developed prior to the publication of the Local Growth Plan, so dwelling forecasts for the area are likely to be even higher. Indeed, some estimates made within the public discourse suggests that dwellings could double or even triple **by 2050**, compared with the 31% increase estimated in the 2023-based population and dwelling stock forecasts.

For this iteration, the analysis used the “County Dwellings Forecast” for transport and electrical network impacts, and the forecasts provided by the DFES Medium for the building stock (domestic and non-domestic) and rooftop solar. For the impact on electrical networks, a high growth sensitivity analysis was also completed utilising the draft Local Growth Plan forecast. Future updates of the LAEP should incorporate the final Local Growth Plan figures to ensure alignment with current planning policy.

These forecasts are shown in Figure 4.1. **For comparison, dwelling growth in the year 2045 relative to 2023, is as follows: 11% for the DFES Medium forecast, 26% for the County Dwellings Forecast, 37% for the Local Growth Plan forecast.**

Figure 4.1: Forecasts of dwelling stock and domestic connections



There are several key points on growth:

- There is a minor discrepancy between the 2023 Cambridgeshire population figures as provided by Cambridgeshire County Council and those reported on the Cambridgeshire and Peterborough Combined Authority (CPCA) State of the Region Dashboard³², with the latter showing 1,892 fewer. This difference arises from the use of different data sources: the CPCA dashboard uses the Office for National Statistics (ONS) Mid-Year Estimate for 2023, whereas the Cambridgeshire County Council forecasts are based on locally produced mid-2023 population estimate as the starting point for the 2023-based forecasts. For consistency in applying population

³¹ Cambridgeshire & Peterborough Insight – Population – Local Population Estimates and Forecasts

³² State of the Region 2025

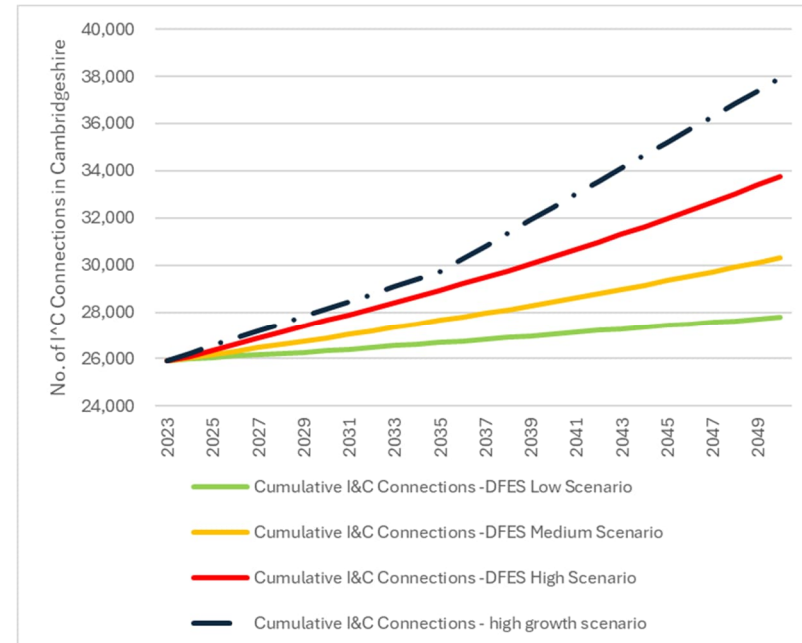
projections, we have adopted the figures supplied by Cambridgeshire County Council.

- There is, however, a greater difference in the 2023 Cambridgeshire dwellings (County Dwellings line), and those reported in DFES as domestic connections. Namely there are 38,133 less dwellings in the DFES datasets than reported by Cambridgeshire County Council.
- Cambridgeshire County Council forecasts extend from 2023 to 2041, and thus extrapolation of population and dwelling projections to 2050 has been colour coded as grey.

This population forecast indicates a rate of growth proportional to the DFES high scenario but is less than the forecast set out by some literature for Greater Cambridge area indicating a near doubling of housing being needed. This suggests a potential mismatch between expected growth forecasting and energy infrastructure planning, particularly in terms of residential energy demand. If network infrastructure does not keep pace with population growth, it could lead to underestimation of future energy needs, placing pressure on local networks and potentially hindering decarbonisation efforts. This highlights the importance of aligning energy scenario modelling with up-to-date local growth forecasts to ensure that infrastructure development supports both population growth and sustainability goals.

Figure 4.2 shows the growth assumed for employment areas. The counterfactual **and net zero scenarios modelled** assumes the DFES Medium scenario. As per the domestic sector, for the impact on the electrical network analysis (Section 10) a high growth sensitivity analysis was completed using the draft Local Growth Plan forecast. As is the case for population increases, these industrial and commercial connections forecasts should be reviewed and updated with Local Growth Plan estimates, upon the next iteration of the LAEP. Of note, the County Forecast was not used in the network impact section for commercial and industrial connections as it only forecasts dwellings, not commercial or industrial floorspace. This is discussed further in Section 10, but as the high growth sensitivity was analysed it provides an adequate range of impacts on existing infrastructure from which to make decisions.

Figure 4.2: Growth of Industrial and Commercial connections across Cambridgeshire for three DFES growth scenario and draft Local Growth Plan



Source: DFES data 2025 and Draft Local Growth Plan

5 Energy efficiency in buildings

This section deals with energy efficiency in buildings, both domestic and non-domestic. The primary focus is on building fabric improvements, with other aspects of energy efficiency such as demand side response (DSR) or more efficient appliances being discussed in Section 10. This section begins with the domestic sector, followed by the non-domestic. Detailed assumptions are provided in Appendix C.

5.1 Domestic sector

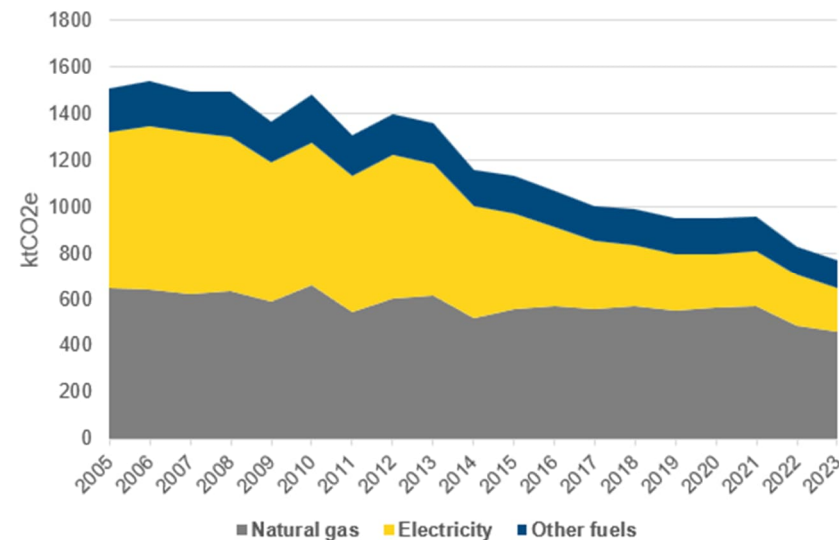
Reducing the thermal demand of homes through improving fabrics and other energy efficiency measures is important for reducing energy use and carbon emissions but also brings wider benefits such improved air quality due to a reduction in the burning of fossil fuels, resultant health improvements, and a reduction in the risk of fuel poverty through reduced spending on energy bills of homeowners and tenants. The UK Government is encouraging the improvement of housing stock via policies and incentives, as outlined in section 5.1.2. Homeowners and landlords should be encouraged to improve the energy efficiency of their homes, where cost-effective.

5.1.1 Existing system

Figure 5.1 outlines the historical carbon emissions breakdown for domestic buildings in Cambridgeshire, between contributions from the consumption of natural gas, electricity and other fuels, which includes oil, LPG, coal, wood etc. It can be seen that there have been significant reductions since 2005, predominantly from electricity use. This is in large part due to the decarbonisation of the grid, however emissions from electricity use in Cambridgeshire have reduced at a quicker rate than the grid has decarbonised, indicating some additional reductions from measures such as more efficient appliances, lower energy lighting etc. There has been a less noticeable reduction in emissions from natural gas and other fuels, however both have reduced by around a third since 2005, predominantly due to fabric improvements of the

existing buildings stock. The recent increases in gas prices may also have contributed to the relatively sharp reduction in gas consumption shown in the last couple of years in the graph below.

Figure 5.1: Domestic historical carbon emissions breakdown (ktCO₂e)



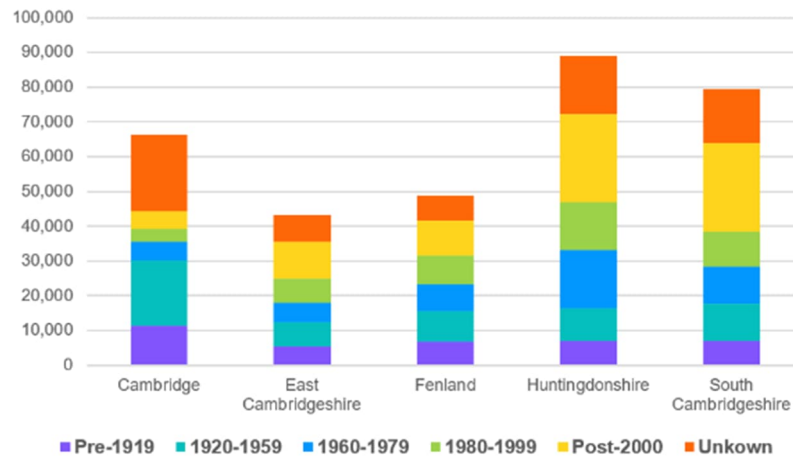
Source: [UK local authority and regional greenhouse gas emissions statistics](#)

Analysing the housing stock in greater detail, Figure 5.2 below outlines the breakdown of the construction date of the domestic properties across each district council in Cambridgeshire. Cambridgeshire has a large proportion of older hard-to-treat homes, which can increase retrofit costs and limit uptake rates.

Cambridge has the highest proportion of older domestic building stock, with 68% of the properties with known age bands being constructed before 1960, in comparison to the other districts where this value ranges between 28% and 35%. It may be difficult to achieve the target EPC rating of C for older properties, and some fabric improvements and insulation measures may incur additional costs. Homes constructed

before the 1920s typically have solid walls, which require external or internal wall insulation to insulate, which can be costly and disruptive. South Cambridgeshire has the highest proportion of properties constructed post-2000, which generally will already have insulated cavity walls and double-glazed windows. Homes constructed in this period should only require minimal upgrades, if any, to reach the EPC rating C target.

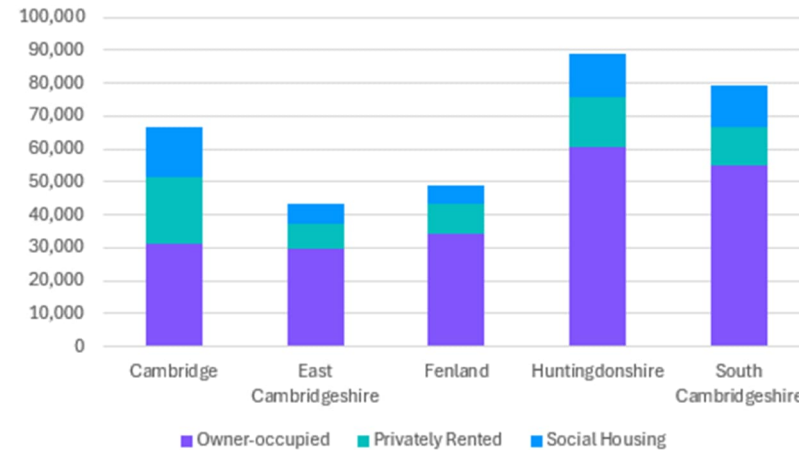
Figure 5.2: Property age-band breakdown



Source: Mott MacDonald GIS imputation data based on EPC data

Figure 5.3 below highlights the tenure type breakdown across the district councils. Cambridge has the highest proportion of rented homes, with just over half of its domestic properties being social or private rentals. The other four districts housing stock is predominantly owner occupied, with each of the council areas having only 30-32% of their properties as rentals. Although the percentage of homes that are rented in East Cambridgeshire and Fenland is similar to Huntingdonshire and South Cambridgeshire, East Cambridgeshire and Fenland have the lowest total number of rental properties. This may result in fewer homes requiring upgrades for Minimum Energy Efficiency Standards (MEES) compliance, depending on the proportion of those properties currently below the relevant EPC threshold.

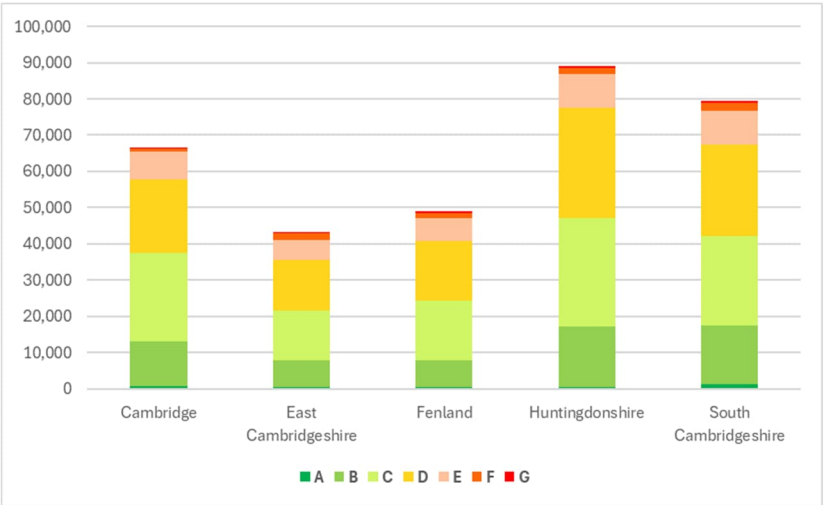
Figure 5.3: Property tenure type breakdown



Source: Mott MacDonald GIS imputation data based on EPC and Census data

Figure 5.4 outlines the EPC rating breakdown across the five council areas. Each of them has a broadly similar distribution of ratings, with very few properties rated an A, F or G and the vast majority being in the B-E range. On average, county-wide, just less than a half of all homes are missing the EPC C target, and will likely require fabric retrofits, or other energy efficiency improvements, to reach it. Huntingdonshire and South Cambridgeshire have the highest total number of properties currently below EPC C, 42,000 and 37,000 respectively.

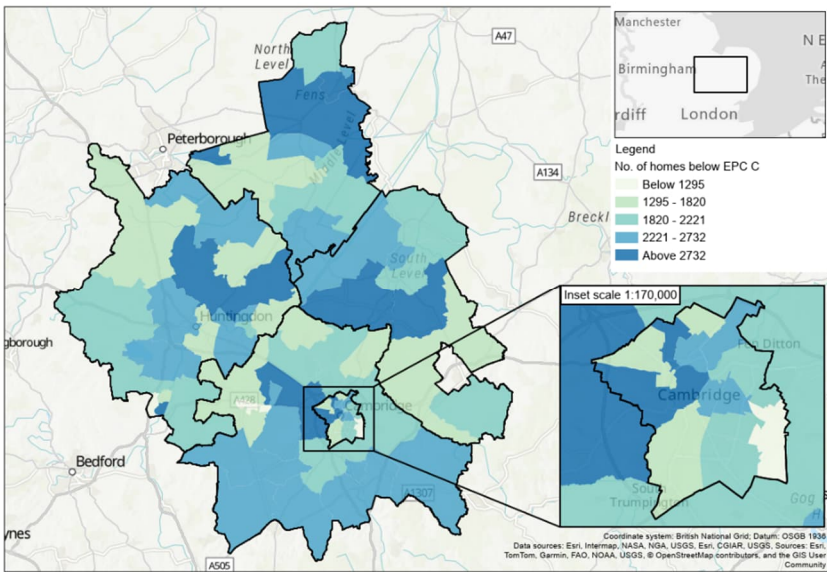
Figure 5.4: EPC rating breakdown



Source: Mott MacDonald GIS imputation data based on EPC data

Figure 5.5 outlines the number of homes per MSOA that are currently below EPC C and may require fabric upgrades. All 5 local authorities have MSOAs that may require a significant number of energy efficiency improvements in homes. Rural MSOAs are slightly more likely to have a larger number of properties with low EPC C ratings.

Figure 5.5: Homes below EPC C per MSOA



Source: Mott MacDonald GIS imputation data based on EPC data

Current levels of fuel poverty in the local authorities in Cambridgeshire, based on 2023 data³³, are shown in Table 5.1. These are determined using the Low-Income Low Energy Efficiency (LILEE) indicator, which defines a household as being fuel poor if it has a Fuel Poverty Energy Efficiency Rating (FPEER) of D or lower, and the household income falls below the poverty line after spending the necessary amount to heat their home to an adequate level. All five local authorities are below the national average of 11.4%, with East Cambridgeshire and Fenland having the highest proportion of households considered as fuel poor.

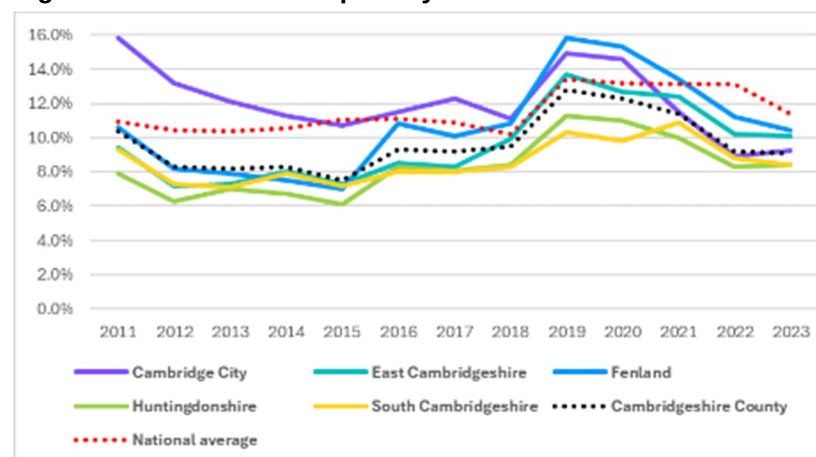
³³ Sub-regional fuel poverty data 2025 (2023 data) – GOV.UK

Table 5.1: Fuel poverty rates in Cambridgeshire

Local Authority	Number of households	Number of households in fuel poverty	Proportion of households' fuel poor (%)
Cambridge	54,689	5,051	9.2
East Cambridgeshire	38,607	3,889	10.1
Fenland	45,651	4,758	10.4
Huntingdonshire	79,914	6,729	8.4
South Cambridgeshire	69,645	5,849	8.4
Cambridgeshire Total	288,506	26,276	9.1

Figure 5.6 outlines the historical fuel poverty rates of the five local authorities in Cambridgeshire, compared to the average for Cambridgeshire County and England as a whole. Note that the LILEE indicator was introduced in 2019. Prior to this, the Low-Income High Costs (LIHC) indicator was used, which classified a household as fuel poor if it had required fuel costs above the national median and, if those costs were met, the household would be left with a residual income below the poverty line. The increase in each of the lines shown in 2019 can be attributed to this change in definition. It can be seen that prior to 2019, Cambridge City had the highest fuel poverty rates in the County, being above the national average in every year before 2020 except 2015. Since 2020, fuel poverty rates have dropped significantly in Cambridge. Fuel poverty in Fenland increased at a quicker rate than the national average in the mid to late 2010s, rising above it in 2018 and returning below in 2021.

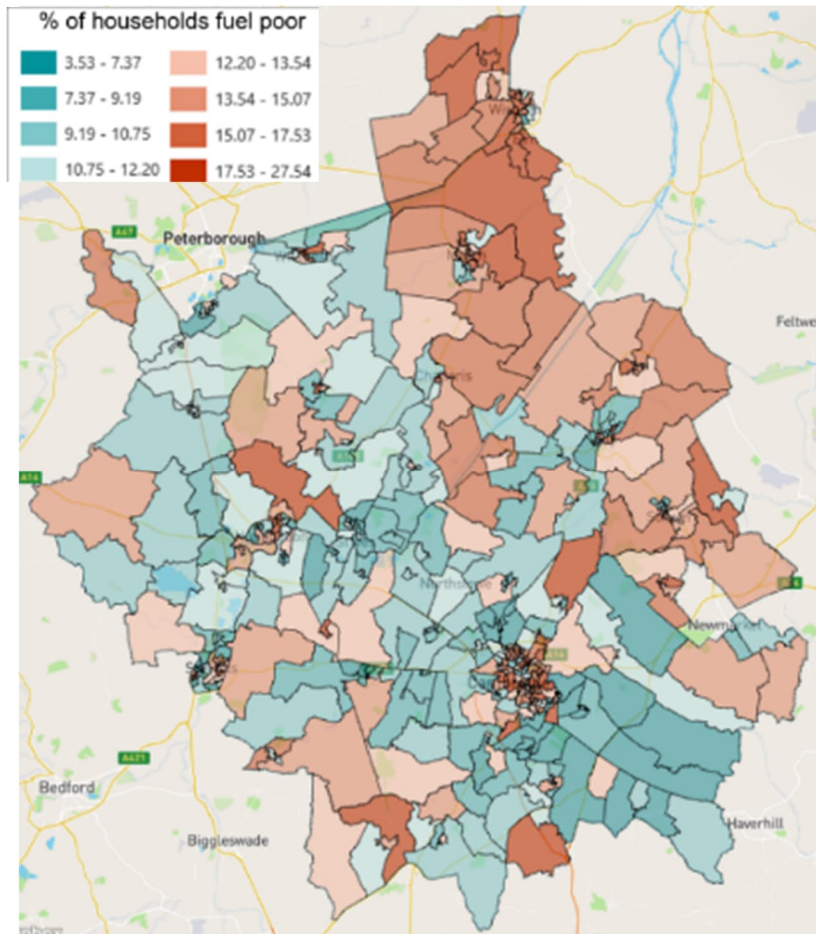
Figure 5.6: Historical fuel poverty rates



Source: UK Government Fuel Poverty Data

Rates of fuel poverty throughout Cambridgeshire can be seen below in Figure 5.7, mapped at LSOA level. Here it can be seen that despite improvements in recent years, there are still several areas with high levels of fuel poverty in Cambridge City. Generally, the areas with the highest levels of fuel poverty in the county are located in the rural parts of Fenland and East Cambridgeshire, as can be seen by the large areas showing in red to the North and East of the map below.

Figure 5.7: Fuel poverty rates per LSOA



Source: LAEP+ Tool

5.1.2 Counterfactual

As stated in Section 4, the counterfactual scenario represents the best estimate of a 'do nothing' scenario, before the LAEP is implemented. It

therefore assumes that all existing national legislation is implemented, specifically:

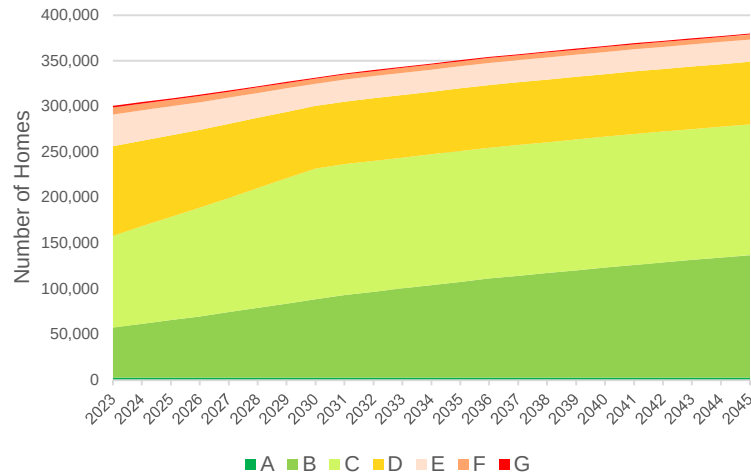
- The UK Governments Minimum Energy Efficiency Standards (MEES) regulations³⁴, which only apply to rented properties not owner occupied, currently states that a property cannot be rented unless it has an EPC rating of E or higher. This will be increased to EPC C or higher by 2030.
- Future Homes and Buildings Standard (2025) (summarised in section 2.1.8), which 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.
- Warm Homes Plan (2025) (Summarised in section 2.1.10) – Currently scheduled to run to 2030 and looks to improve energy efficiency and reduce fuel poverty through providing grant funding for insulation and low carbon heating to homes in low-income areas. The scheme aims to lift 5 million homes out of fuel poverty, nationwide by 2030. The counterfactual assumes this scheme is implemented until then, with no replacement funding thereafter.

Figure 5.8 shows the total Cambridgeshire housing stock broken down by EPC rating, from now until 2050 using the above assumptions. The significant projected population growth as outlined in section 4.3 is responsible for the steady significant increase in EPC rating B properties. The sharp increase in EPC C rated properties from the baseline year until 2030 is due to the impact of MEES legislation and the Warm Homes scheme. It would be difficult for Cambridgeshire to reach its net zero target with only the fabric retrofits projected by the counterfactual being installed. Many of the owner-occupied homes remaining below EPC C would face challenges in trying to install a heat

³⁴ [Improving the energy performance of privately rented homes: 2025 update](#)

pump, due to increased capital and operational costs when installing them in a property with poor thermal efficiency.

Figure 5.8: Counterfactual EPC rating projection



Source: Mott MacDonald Modelling

What we see from Figure 5.8 is that as per the population growth assumptions in Section 4, more homes are added but their effect on emissions and energy consumption is mitigated as they are built to higher standards. The impact of the MEES is significant, and as previously shown in Figure 5.3, will have a greater effect in Cambridge City where the proportion of homes that are rented and below the relevant EPC level is higher.

The resulting carbon emission reduction from these measures is shown later in Section 6 where low carbon heating is discussed.

5.1.3 Intervention Methodology

UKPN's DFES projections for thermal demand efficiency improvements for domestic building in Cambridgeshire were used to determine consumption changes. This was to align with the scenario-based energy

and carbon savings from other interventions, such as heat decarbonisation and renewables, which are also using the DFES scenarios.

The DFES projections only give a high-level indication of how they expect thermal demand to change over time however, not an indication of the specific individual fabric measures that will be required to be installed in households to reach net zero or national policy targets. Therefore, estimates were also modelled to determine the number of different types of fabric improvements that will be required in domestic buildings throughout Cambridgeshire, i.e. cavity wall insulation, roof insulation etc. which were also used to inform costing for this intervention area.

The likely EPC ratings and fabric conditions for homes currently without an EPC report, were imputed geographically to determine the most likely EPC rating and fabrics based on similar properties in the surrounding area.

5.1.4 Scenarios Overview

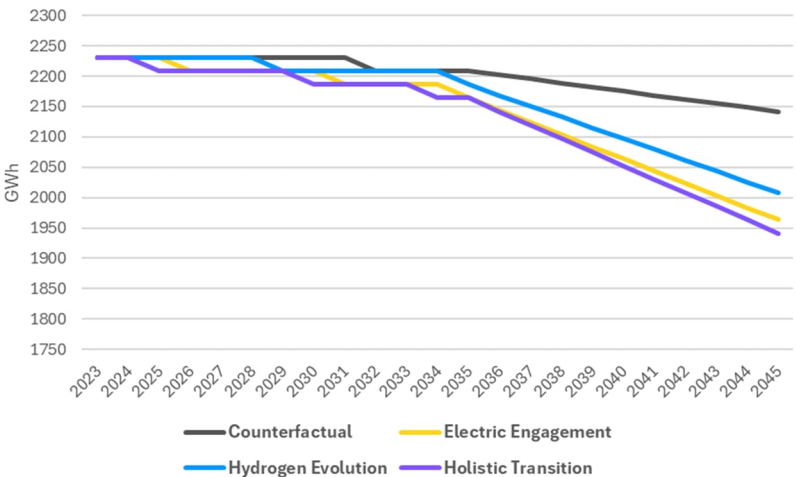
The thermal demand projections for domestic housing in Cambridgeshire are shown in Figure 5.9, based on UKPN's four DFES scenarios. As would be expected, the counterfactual has significantly lower thermal demand improvements compared to the three net-zero compliant scenarios. The absolute values presented from DFES are revised further in this section based on EPC imputation work.

It should be noted that the hydrogen evolution scenario has less improvement than the electric engagement scenario. This is likely due to the original DFES hydrogen evolution scenario assuming that some homes will change to a hybrid heating system, with a hydrogen boiler and an air source heat pump. However, as the stakeholder engagement informed that it is unlikely that any homes in Cambridgeshire will use hydrogen for space heating, it is likely that any net zero compliant scenario will require demand reductions closer to that of the electric engagement or holistic transition scenario.

There are many challenges and barriers to the mass uptake of fabric retrofits and energy efficiency improvements in the domestic sector, that

need to be overcome to reach the levels of uptake projected in the net zero compliant scenarios. These include affordability and funding availability, supply chain limitations, lack of engagement from some landlords, high levels of disruption for some measures, and high technical complexity in some homes which need a specific tailored approach. These are discussed in further detail in Section 6, where the barriers to fabric upgrades and heat pump installation are discussed together.

Figure 5.9: Scenario domestic thermal demand projection



Source: Mott MacDonald modelling based off DFES data
Note: the future net zero scenarios include a 14% increase in houses from 2023

5.1.5 Modelled Interventions

The minimum amount of fabric retrofits required in the county will be to upgrade homes that are currently not compliant with MEES regulations. This means that all privately or socially rented homes not at EPC C, will need to be upgraded by 2030.

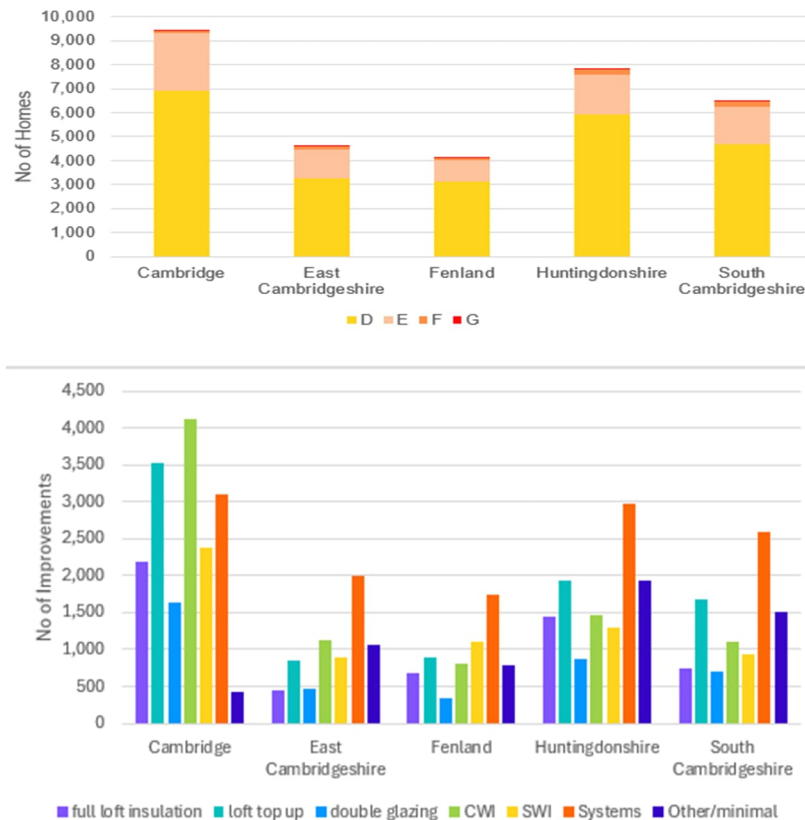
Figure 5.10 below shows a breakdown of the EPC rating of the non MEES compliant homes by local authority. It can be seen that Cambridge has the highest number of homes that will need to be

upgraded, due its high proportion of rented properties. The majority of homes throughout the county that need upgraded are currently EPC D, so are more likely to be able to meet the target without requiring deep retrofit, such as solid wall insulation.

The specific number of energy efficiency improvements estimated to be required to reach MEES compliance is shown in Figure 5.10. The categories shown in this chart are summarised as follows:

- **Full loft insulation:** indicates a home that likely requires full insulation of the loft or roof, and is likely to have either no insulation, or very low amounts of insulation, or older insulation that has failed.
- **Loft top up:** A home where there is some existing insulation, that does not need ripped out and replaced, but could be topped up to improve energy efficiency.
- **Double glazing:** A home where an installation of new double glazing could provide significant energy efficiency improvements, likely to currently have single glazing, or poor quality older double glazing. Note that in listed buildings there can be additional barriers and costs when installing new glazing.
- **Cavity wall insulation (CWI):** A home with either an uninsulated cavity wall, or a poorly insulated cavity wall
- **Solid wall insulation (SWI):** A home with uninsulated solid walls, note that these homes may get an exemption from requiring any SWI works to meet MEES compliance, due to the high costs and payback periods.
- **Systems:** A home where a systems efficiency improvement may be enough to reach EPC C without any fabric upgrades. This could include a new system for space heating or domestic hot water (DHW) or new lights.
- **Other/minimal:** These represent homes that are currently not MEES compliant, but which have fabrics and systems that have relatively good energy efficiency. These homes are typically EPC rating D and could likely reach to required C rating through smaller, cheaper upgrades such as draft proofing.

**Figure 5.10: EPC rating of non-MEES compliant homes (Top).
Specific interventions for MEES compliance (bottom)**



Source: Mott MacDonald GIS imputation data based on EPC data

As can be seen in Figure 5.10, Cambridge has the highest number of installations required across all energy efficiency improvement categories, except “other/minimal”. To meet MEES compliance across its rented homes Cambridge City Council require more cavity wall insulation installations than any other fabric intervention, followed by loft-top up and systems improvements.

Proportionally less fabric improvements are required in the other four district areas, even when accounting for them having less total rental properties - with systems improvements being the most common improvements required for rental properties to reach EPC C in the each of the other four district councils.

The Whole Domestic Sector

Looking beyond rented tenures implicated by MEES, existing EPC data, geographically imputed to fill in the gaps was used to estimate the total number of likely fabric measures to be installed in the net-zero compliant scenarios. A medium uptake and high uptake case for fabric improvements were modelled.

The medium uptake case broadly follows the UK Government’s target of as many homes as possible to be EPC C by 2035. In addition to the interventions required for MEES, the medium uptake case assumes that any owner-occupied property with an EPC rating below C improves any specific fabric that has an energy efficiency rating of “very poor” or “poor”. This medium uptake assumption has been applied to the hydrogen evolution scenario. The estimated figures for each fabric intervention type are shown below in the upper part of Figure 5.11, for all tenure types.

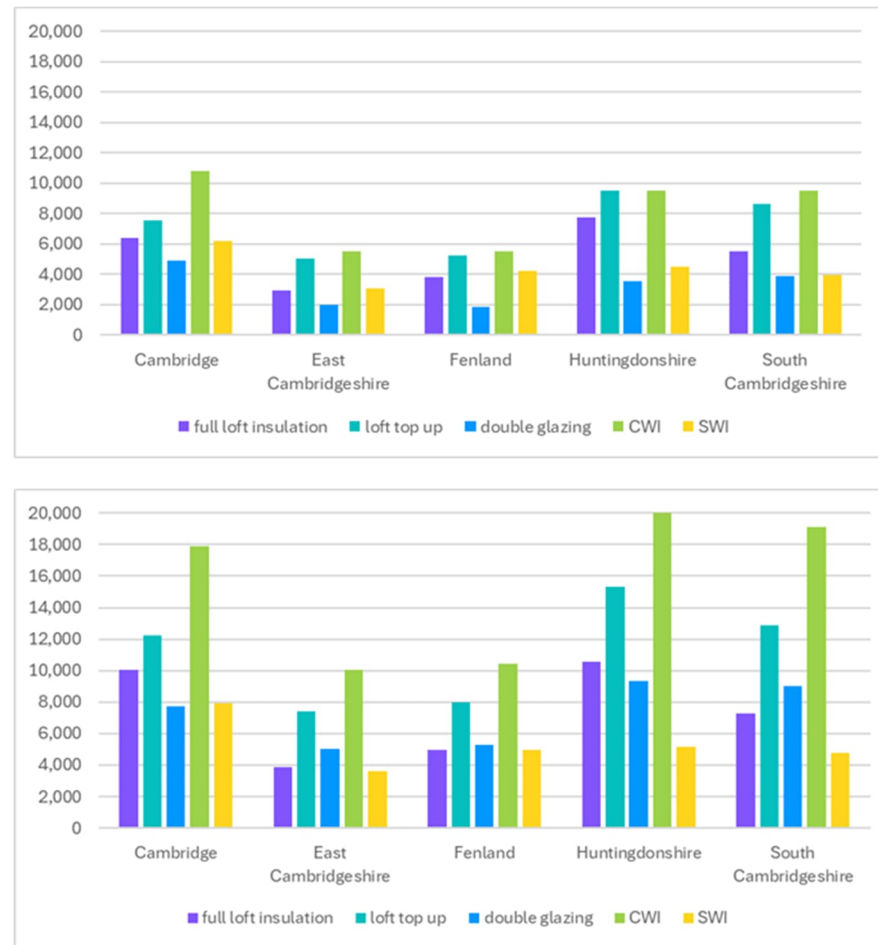
Cavity wall installation is the most common fabric intervention required in each of the district councils, followed by loft-top up installation. It should be noted that these numbers for cavity wall installations include cavity walls with existing installation that is either at end of life, or is poor quality, and likely needs to be re-installed. This is material, as the cost to remove cavity wall insulation prior to installing new insulation, can nearly double the capital cost presenting a large cost barrier to undertaking the work.

Double glazing is the intervention with the least amount of installations required, likely due to the low prevalence of single glazing throughout the county. It is likely that the solid wall installations will not be implemented, unless there are significant changes to available funding or construction costs. The figures shown for solid wall insulation represent all solid walls below EPC C in need of insulation, however in practice it is most likely that not all of these walls will receive retrofits.

The high uptake fabric insulation case has the same assumptions as the medium uptake case, but with “poor” or “very poor” rated fabrics in any home (not just those below EPC C) getting an upgrade, and any “average” rated fabric for energy efficiency in homes below EPC C getting an upgrade, other than double glazing where “average” rated windows were only upgraded if it was likely to be the only work suitable to bring the property to EPC C.

The number of required fabric installations in the high uptake case is shown in the lower part of Figure 5.11. It follows a broadly similar pattern to the medium uptake however, there are proportionally less solid wall installations in this case, as most of them are already picked up in the medium uptake case. Of note however is that the high uptake case increases the total number of interventions by about 60% compared to the medium uptake case (~230,000 vs ~140,000). This case represents the maximum amount of domestic fabric improvements that could be installed throughout Cambridgeshire.

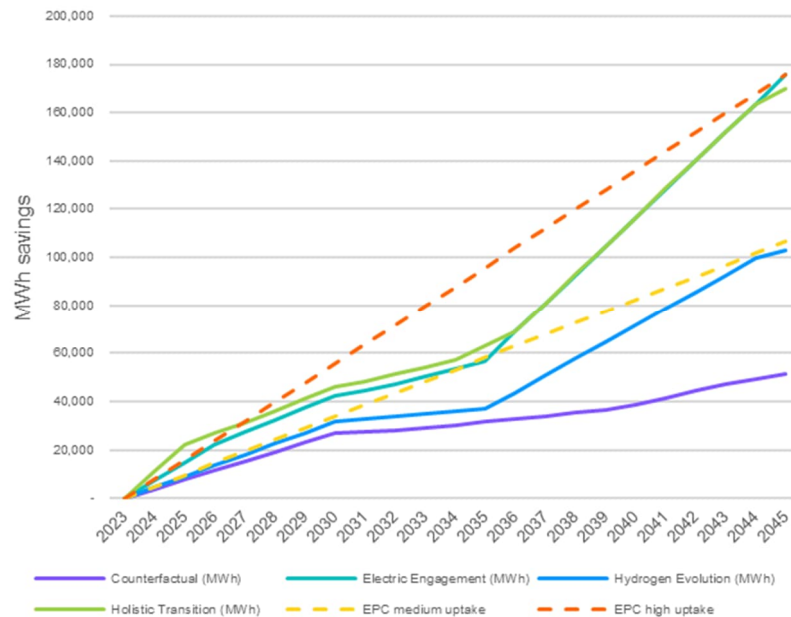
Figure 5.11: Medium Uptake and High Uptake estimated fabric improvements



Source: Mott MacDonald modelling based on GIS EPC imputation data

The final energy saving profile from domestic retrofit has been modelled using the above EPC analysis and is represented in Figure 5.12 below.

Figure 5.12: Projected yearly energy savings from domestic retrofits



Source: Mott MacDonald modelling based on GIS EPC imputation data, and DFES thermal efficiency data

The four scenarios use the uptake curve presented by DFES however the maximum values have been capped based on the modelled high and medium uptake in retrofits by 2045, which have been shown in Figure 5.12. This energy saving value was calculated from the volume of each type of retrofit and typical savings values from the National Domestic Energy Efficiency Data Framework (ND-NEED) and online sources. Electric Engagement and Holistic Transition used the High uptake cap, Hydrogen Evolution used the medium uptake cap, and the counterfactual was reduced by the average reduction from the net zero scenarios. All four scenarios were also uplifted to meet minimum MEES compliance up till 2030 as shown by the data analysis in Figure 5.10.

5.1.6 Potential projects – Domestic sector

As stated earlier in this section, it's very important to retrofit homes up to a minimum standard prior to switching heating sources to an ASHP or other low carbon heating solution, being 'heat pump ready'. As is recognised, this leads to smaller equipment, lower demands on electrical power, higher efficiency and lower operating costs, and improved comfort.

As stated earlier in this section, the barriers towards building fabric improvements overlap significantly with installation of low carbon heating. Furthermore, as is widely recognised in stakeholder input, investments in improving building fabric measures are seldom done as standalone investments and instead are often paired with either home extensions / amenity projects or triggered when a change in heating system is occurring. Because of this, identifying next steps and potential projects for building fabric improvements is explored in Section 6.

5.2 Non-domestic sector

5.2.1 Existing system

Compared to the domestic building stock, there is limited data available on the condition and energy efficiency of fabric types in non-domestic buildings. There is generally good coverage in terms of EPC ratings of non-domestic properties in the county (roughly 65%), however unlike residential buildings, these EPC reports do not contain any information on specific fabric condition and construction types. There are also less strict policy drivers regarding the uptake, however all rented commercial properties in the UK must have a minimum EPC rating of E.

Data on the EPC ratings of non-domestic properties in each local authority was collated to obtain a high-level indication of the number of buildings requiring fabric and energy efficiency improvements.

Figure 5.13 below shows a breakdown of the lodged non-domestic EPC ratings in each local authority. It can be seen that the proportion of buildings currently rated below EPC C is relatively consistent between the five local authorities, with each having around half below this rating.

Figure 5.13: Non-domestic EPC rating breakdown by local authority

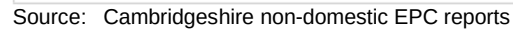


Figure 5.14 below maps the number of non-domestic properties currently below EPC C by MSOA. “Central and West” Cambridge is the MSOA with the highest number of non-domestic buildings currently below EPC C (863), so should be a priority area for improving the energy efficiency of non-domestic buildings. This MSOA is followed by “Wisbech South and Peckover” in Fenland, “Huntingdon Central & West” in Huntingdonshire, and “South Ely” in East Cambridgeshire.

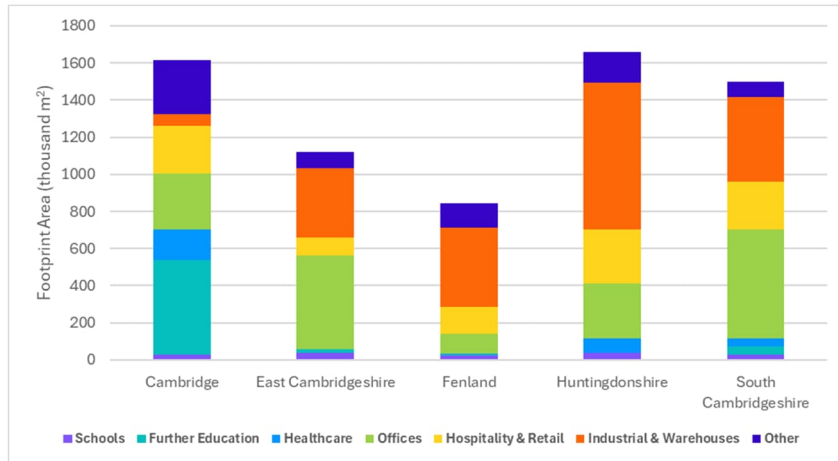
Source: Cambridgeshire non-domestic EPC reports

The fabric and energy efficiency measures most appropriate for each non-domestic building will vary heavily by primary use. As different uses will have significantly different building fabrics, equipment type and profiles, occupancy patterns etc. which will affect which measures are most suitable for each building. Different primary uses will also have different funding mechanisms for how to implement these improvements, with i.e. public sector buildings likely to receive more UK Government grants than private office buildings.

A breakdown of the primary use of the non-domestic buildings for each local authority is shown in Figure 5.15 below, split by footprint area. Here it can be seen that Cambridge has significantly more non-domestic floor area used for further education buildings, and less warehouse and industrial, compared to the other local authorities. Fenland and Huntingdonshire both have a significant proportion of non-domestic floor area made up from industrial and warehouse buildings.

Fenland has the lowest proportion of office space, with East Cambridgeshire and South Cambridgeshire have among the highest.

Figure 5.15: Non-domestic primary use type by local authority



Source: Ordnance Survey Address base and Mott Macdonald GIS processing

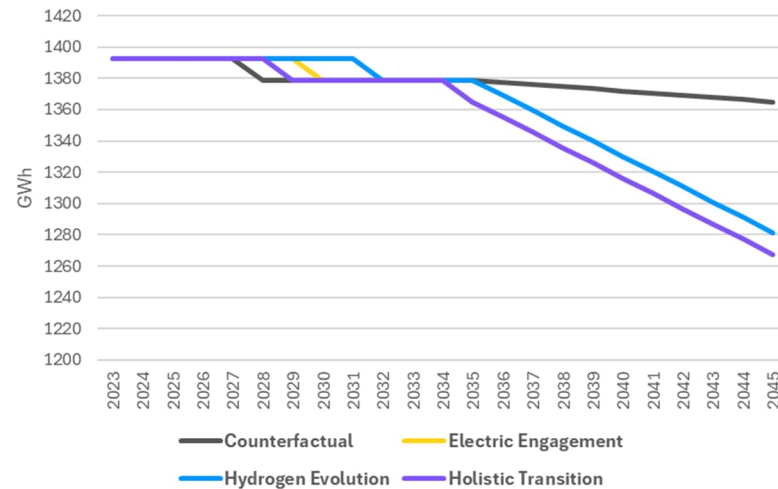
5.2.2 Scenarios overview

Due to a lack of data (EPC records largely do not contain fabric information), the number of specific fabric improvement measures required across the non-domestic buildings stock could not be modelled and costed, as they were for domestic buildings. Display Energy Certificates (DECs) were not used because they are only mandatory for certain public buildings and are not consistently available across the wider non-domestic stock. DFES projections on expected improvements in thermal demand efficiency for space heating and hot water, were modelled. These projections were carried forward into the analysis on heat electrification projections, and overall carbon emissions savings outlined in the following sections.

The projected improvements in thermal demand efficiency in non-domestic buildings for each of the scenarios is shown below in Figure

5.16. The counterfactual assumes minimal energy efficiency improvements with only a very small drop in demand between now and 2045. The three net zero compliant scenarios each assume a reduction in demand of just less than 10% (note that the y-axis does not start at zero), with the electric engagement and holistic transition scenarios having a slightly larger decrease compared to hydrogen evolution.

Figure 5.16: Projected non-domestic thermal demand (GWh)



Source: Mott MacDonald modelling based on DFES data

Note: the future net zero scenarios include a 14% increase in houses from 2023

Building fabric and energy efficiency improvements will generally be less important for making buildings 'heat pump ready', compared to the domestic housing stock. However, they should still be implemented wherever cost effective to reduce energy demand and minimise impacts on the electricity grid as building electrify their heating demands.

Figure 5.17 below outlines the EPC rating breakdown for each non-domestic primary use type. This figure has been split into two to be more legible, due to the large discrepancy in total number of EPC reports between some of the primary use categories. The four categories in the upper chart all have relatively high rates of EPC

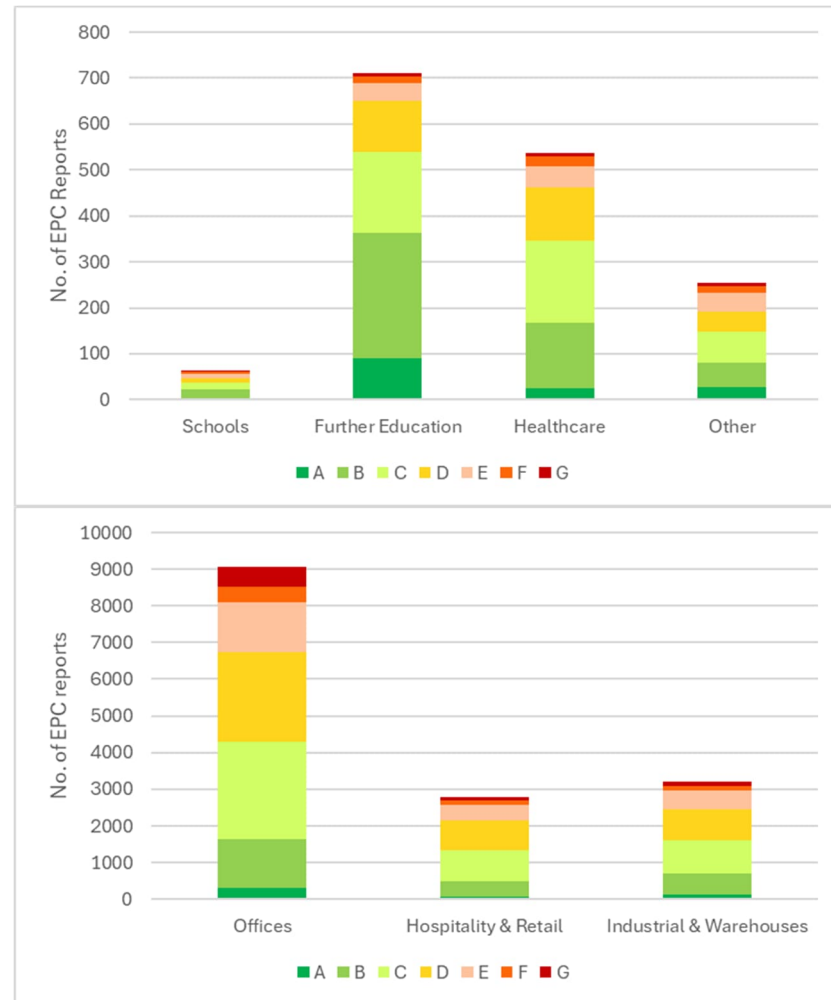
reports already at EPC C or higher, with further education buildings only having 24% of properties below EPC C, and healthcare and schools having 36% and 39% respectively.

The three categories in the lower chart have proportionally more buildings requiring upgrades, with offices, hospitality, and industrial and warehouses all having around 50% of their EPC reports currently below a C rating.

5.2.3 Potential projects

As discussed for the domestic sector, next steps relating to building fabric are provided alongside heating solutions in Section 6. However there is limited data available on the construction type and energy efficiency condition of building fabric in the non-domestic sector. A breakdown of the likely specific measures required to reach UK Government EPC rating targets and support the wider push to net zero could not be completed, as it was for the domestic sector. The appropriate measures for each building, and their cost effectiveness, will vary significantly site by site, with specific retrofit assessments at site level required. This is discussed further in Section 6.

Figure 5.17: Non-domestic EPC breakdown by primary use



Source: Cambridgeshire non-domestic EPC reports

6 Low carbon heating

This section analyses the decarbonisation of space heating technologies that will be required for the county to reach net zero carbon emissions. The majority of domestic and non-domestic buildings in the county currently use fossil fuels to meet demands for space heating and hot water, so the scale of the challenge here is significant. To decarbonise their energy consumed for heat, most buildings will need to transition to an electrical supply technology.

Table 6.1 outlines the list of heating technologies that are discussed in this section.

Table 6.1: Heat Technologies List

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 Cambridgeshire
Electric Resistive	Category used in the DFES scenarios to represent any direct electric heating, not being provided through a heat network or heat pump. This includes electric boilers, electric storage heaters, electric radiators and infrared panels.
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 electric resistive or fossil fuel boilers, of between 2.5 and 3.0. All heat pump uptake represented in the DFES scenario projections are 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.

Technology	Description
District Heat Network Connection	Some buildings in Cambridgeshire will likely be able to decarbonise their heat supply through connecting to a district heat network, instead of installing their own low carbon heating system. District heat networks supply heat to buildings via hot water in underground pipes, from a centralised plant. See Section 6.3 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 Cambridgeshire LAEP, due to hydrogen for space heating not being considered viable by the steering group and stakeholders.
Hybrid heat pump	A heating system category in the DFES projections where a building is assumed to have smaller capacity heat pump, with a hydrogen boiler used for back up and top up heating in times of peak demand. As hydrogen has not been considered viable for space heating in this LAEP, then all hybrid heat pump installations projected in the DFES numbers were instead considered to be standard air source heat pump installations in the modelling.

6.1 Domestic sector

6.1.1 Existing system

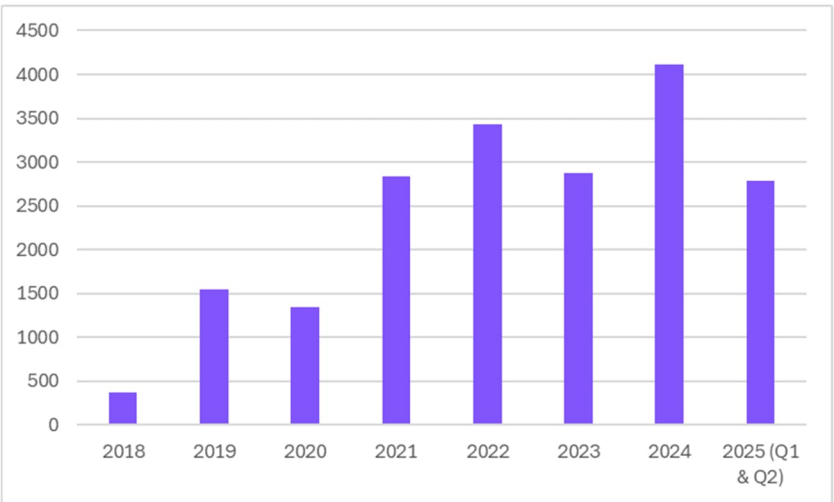
As shown in Section 3, Figure 3.2, emissions in the domestic sector have fallen from 2005 but this has been primarily a result of grid decarbonisation, with some improvements from fabric upgrades and more efficient lighting, appliances and systems being installed. To reach the UK and county's net zero targets, uptake in low carbon heating technologies in the domestic sector will need to sharply increase in the coming years.

Uptake in heat pumps and low carbon heat sources has started to increase in the region, however this trend will need to continue. The UK government publishes quarterly data on heat pump deployment by region. In Figure 6.1 we can see that heat pump uptake in the East of England has been increasing over the last few years, with 4,000 installations in 2024 and 2025 on track for around 5,000. The increase in uptake over the last few years is promising, however compared to the

2.7 million total homes in the East of England region, there are still only around 0.2% of homes changing to a heat pump each year.

Looking specifically at Cambridgeshire, the UK Government also publishes data at local authority level on the number of heat pump installations redeemed through the Boiler Upgrade Scheme each financial year. This can be seen below for the five Cambridgeshire local authorities in Figure 6.2. Here it can be seen that the regional trend of uptake increasing is still present locally, with the numbers installed each year in each local authority steadily increasing. South Cambridgeshire is currently leading the way, with more installations each year than each of the other local authorities. Even when corrected to account for total number of dwellings in each local authority, South Cambridgeshire is still leading, with 1% of all dwellings having installed a heat pump via this scheme in the last three years. Next best proportionally is East Cambridgeshire with 0.6%.

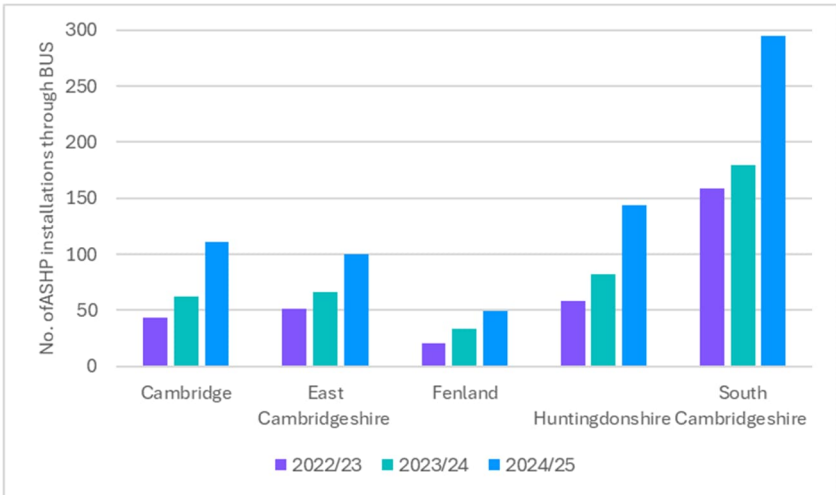
Figure 6.1: East of England historical heat pump uptake



Source: UK Government quarterly heat pump deployment

In the 2024/25 financial year, Cambridgeshire had 699 heat pump installations through this scheme. It is estimated that there are around 12,000 gas boiler replacements in Cambridgeshire each year, based on around 190,000 dwellings currently using natural gas, and an average boiler lifespan of 15 years. Therefore, only around 5% of boiler replacements each year are currently switching to heat pumps. To decarbonise energy consumed for heat in the county, this number will need to drastically increase. Even assuming that boiler replacements are banned by the government at some point in the 2030s, there needs to also be action to drive uptake increases in the short term.

Figure 6.2: Cambridgeshire Boiler Upgrade Scheme heat pump installations



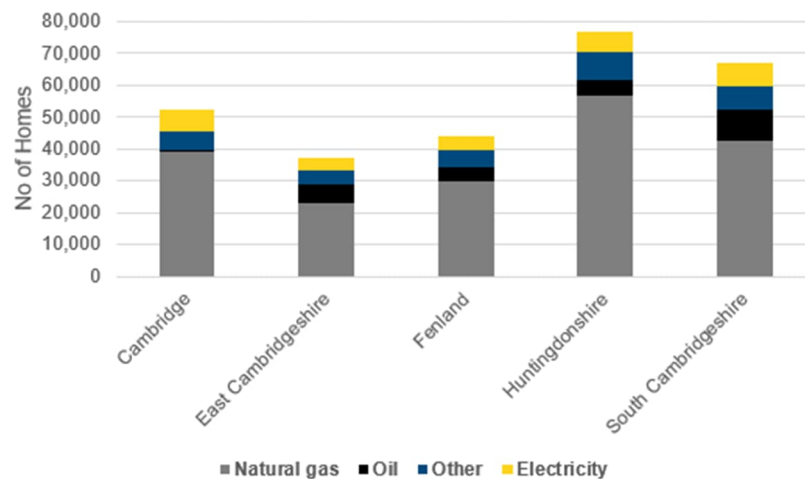
Source: UK Government Boiler Upgrade Scheme statistics

The fuel type split of the domestic homes in each of the districts can be seen in Figure 6.3. This is based on 2021 census data, which has a response rate of around 92% county-wide, so does not include all homes.

Natural gas is the most common fuel type throughout the county, with around 69% of all homes using it for space heating and hot water. Cambridge City has a negligible number of homes using oil for heating;

however it is relatively prevalent in the other, more rural, council areas, with 9.3% of all homes currently using it. The 'other' category includes fuels such as liquified petroleum gas (LPG), wood, coal and mixed systems with multiple (non-electric) fuel types, this category has a relatively consistent proportion across the council areas, and the majority of these homes will also need to transition to a decarbonised heat source. Only around 10.5% of homes in Cambridgeshire use electricity for their heating – accounting for both electric heat pumps and electric resistive heating. These homes can already be classed as having a low carbon heating system, as their emissions from heating decrease as the grid decarbonises.

Figure 6.3: Domestic Fuel type breakdown by District Council (2021)



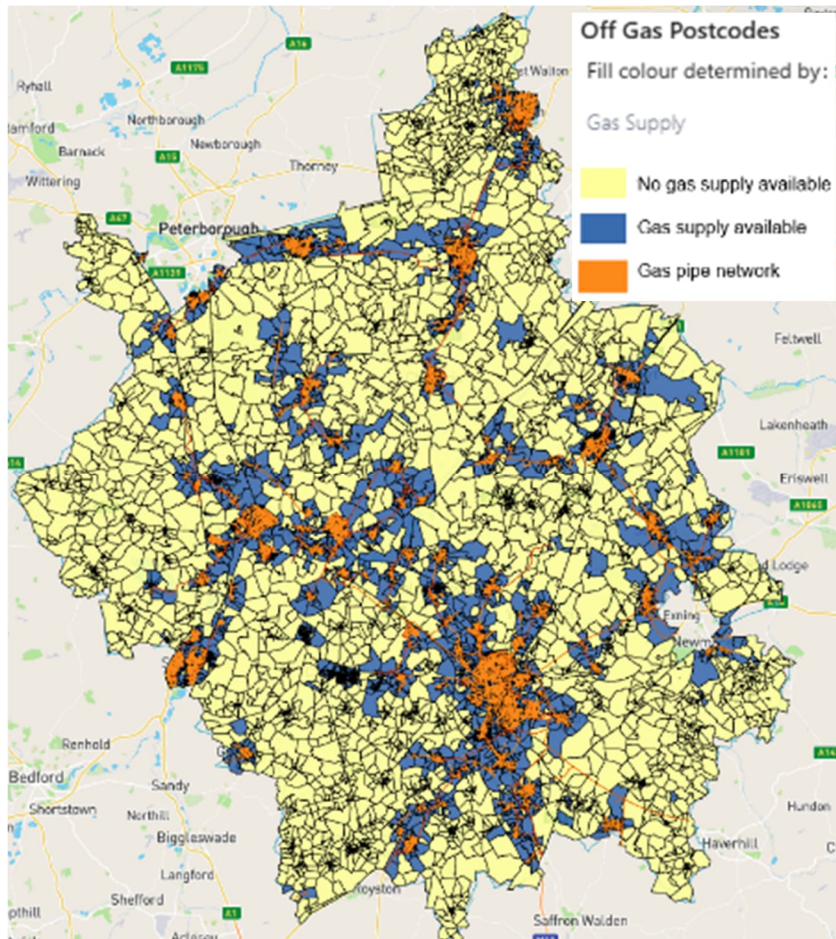
Source: Census data, 2021

Figure 6.4 highlights the postcodes throughout Cambridgeshire which currently do not have a gas connection. It can be seen that most of the land can be considered off-gas-grid, however most of the population is within the blue areas (gas supplied), as evidenced by the high rates of homes served by gas in Figure 6.3.

The bulk of the county's non-natural-gas consumption is within the zones shown in yellow in Figure 6.4. These rural areas will have high prevalence of heating systems using oil, LPG, and in some places coal, which have a higher carbon factor compared to natural gas, and are typically more expensive in terms of p/kWh. These homes should be prioritised for heat decarbonisation, via renewable technologies such as heat pumps, where cost-effective to do so.

These areas also have a higher proportion of electrified homes, compared to more urban areas which are predominantly natural gas. Homes currently using electric storage or electric resistive heating systems can be considered net-zero ready, due to the projected decarbonisation of the grid over the coming years. However, heat pumps may still offer a more cost-effective replacement of the existing system, to reduce operating costs and risk of fuel poverty. In many cases it may only be cost-effective to replace an existing electric system with a heat pump when it reaches end of life.

Figure 6.4: Off-gas-grid postcodes



Source: LAEP+ Tool

6.1.2 Counterfactual

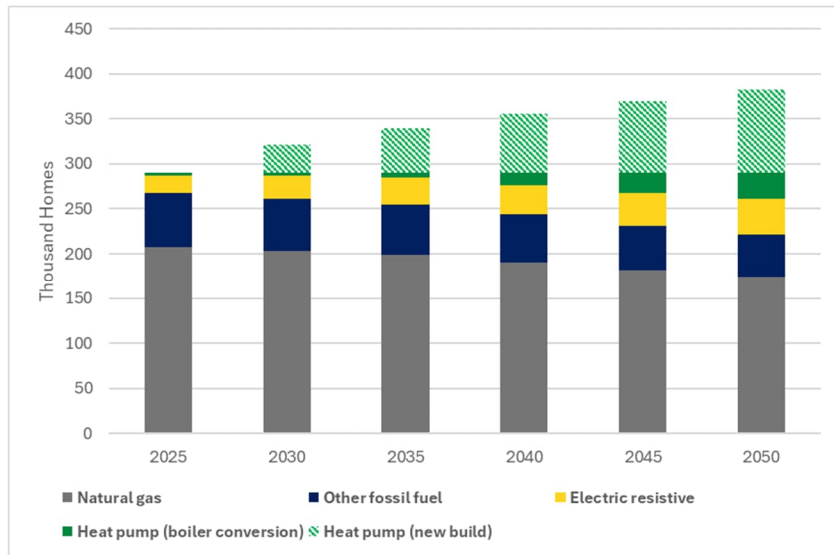
The DFES counterfactual used to model the uptake of low carbon heating technologies, assumes minimal policy requirements for heat decarbonisation. The only assumed policy intervention in this area is a ban on fossil fuel heating in new builds from 2030³⁵, with no policy implemented regarding the removal of fossil fuel heating systems from existing buildings. It assumes that the current Boiler Upgrade Scheme (which provides grants of up to £7,500 for the installation of heat pumps in eligible homes) runs until 2028, with no extension or replacement funding scheme implemented.

The counterfactual DFES projections can be seen below in Figure 6.5. 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. This increase in rate of installations amounts to 1600 homes per year, which equates to around 10% of the expected gas boiler replacements at end of life opting for a heat pump instead of a like-for-like replacement. Electric resistive heating is expected to double to almost 40,000 systems in operation by 2045.

The net result is that the counterfactual estimates that by 2045 less than a half (40%) of homes of the 393,095 homes expected will have a low carbon heating system installed.

³⁵ 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 6.5: Counterfactual heat electrification technology uptake

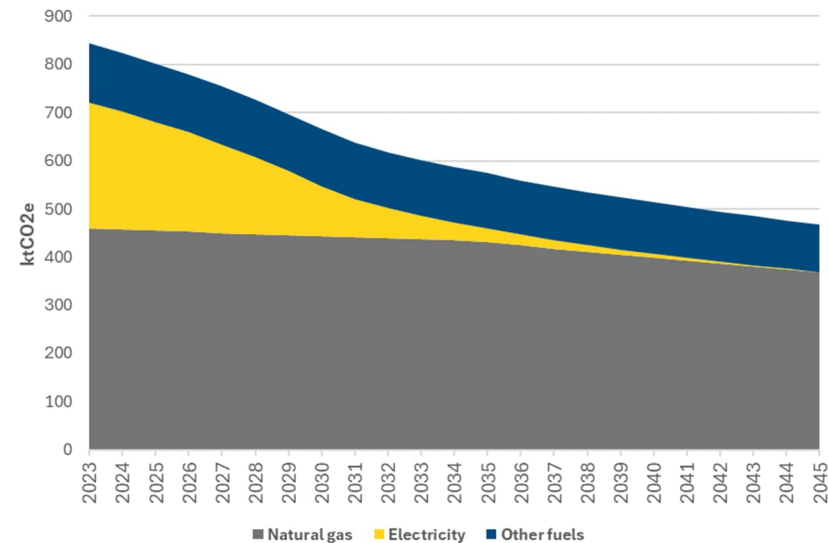


Source: DFES data

The carbon emissions projection for domestic homes in the counterfactual scenario is shown below in Figure 6.6. Despite some uptake in heat electrification in this scenario, electricity emissions quickly taper off towards zero as the grid decarbonises. Emissions due to the combustion of natural gas and other fossil fuels reduce slightly due to the small amount of assumed uptake of heat decarbonisation technologies, however by 2045 there is still nearly 500ktCO₂e of emissions.

These counterfactual projections for heat decarbonisation would make it impossible for Cambridgeshire to reach its net zero goals. With emissions from the consumption of fossil fuels to heat buildings making up a significant proportion of the county's total, it is vital that action is taken to increase the uptake of retrofits and heat decarbonisation works.

Figure 6.6: Counterfactual domestic emissions projection



Source: Mott MacDonald modelling based on DFES

6.1.3 Intervention methodology

The uptake of heat decarbonisation technologies under different scenarios has been modelled using projections from UKPN's DFES.

The original DFES technology uptake rates which are compliant with a net zero target of 2050, have been accelerated in order to meet Cambridgeshire's 2045 target.

It should be noted that the graphs shown in this section from the DFES uptake projections include a line for hybrid heat pumps, which represent systems where there is a heat pump as the primary system, with a backup boiler connected to the gas network, which uses natural gas in the counterfactual, and hydrogen in the three net-zero compliant scenarios. It was agreed with the district councils during preparation of this LAEP, that given the immaturity of hydrogen and that within the industry hydrogen for heating is still under review, it has been assumed

that there will be no hydrogen used for space heating in Cambridgeshire.

Therefore for all scenarios, when calculating energy demand changes and carbon reductions from technology uptake rates it has been assumed that the hybrid heat pumps are actually installed as standard heat pumps. The uptake of hybrid heat pumps projected by DFES has still been presented as a distinct technology category in the figures in this section, to use as a comparison.

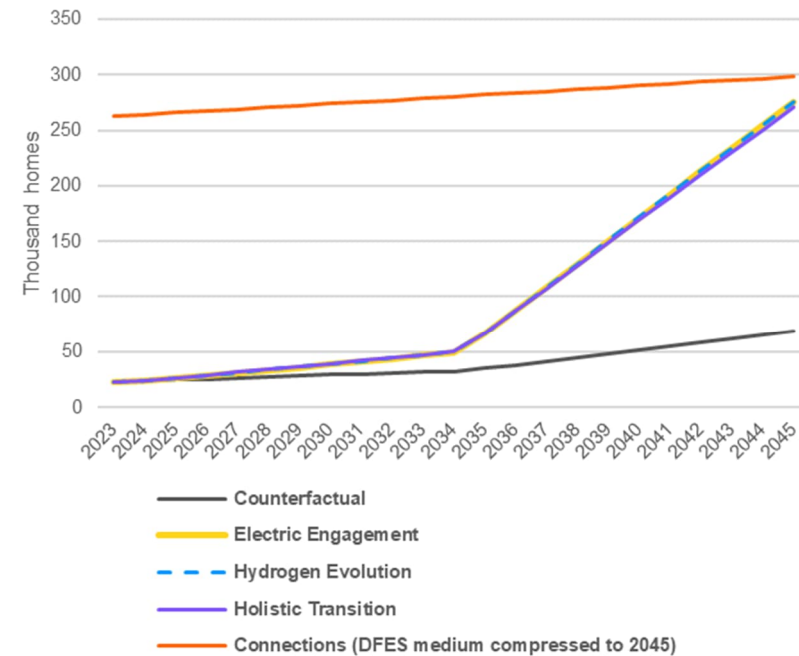
UKPN data on the mean household gas and electricity consumption per LSOA was then used to determine the resulting energy demand changes and carbon emission reductions from the expected uptake of heat electrification.

6.1.4 Scenarios

Figure 6.7 below, shows a comparison of the four scenarios in terms of the uptake rates of total low carbon heating systems in individual domestic buildings. It can be seen that the three net-zero compliant scenarios have significantly more installations than the counterfactual, as would be expected, with these three scenarios assuming all homes have a net-zero heating system by 2045. The holistic transition scenario has slightly lower total installations than hydrogen evolution or electric engagement, as this scenario assumes a higher rate of heat network connections, see Section 6.3 for more details.

The projected dwellings line in the figure increases based on the population projection figures outlined in section 4.3. It should be noted that all new builds are assumed to have a low carbon heating system, as per the Future Homes Standard. There is a small gap between the 2023 value for total dwellings, and the DFES scenario values for low carbon heating technology uptake, this is due to discrepancy in the baseline year number of homes, with DFES listing around 275,000 homes in Cambridgeshire and our population projection listing around 300,000.

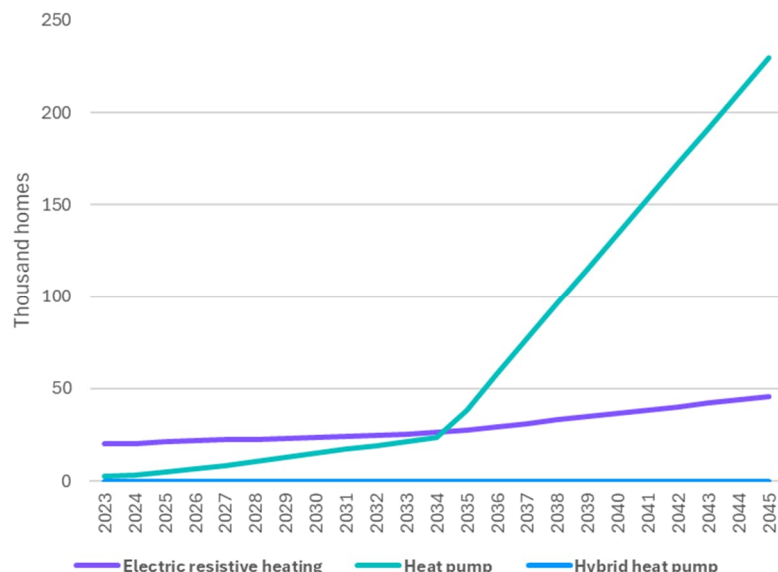
Figure 6.7: Scenario comparison of total heat electrification technology uptake



Source: DFES data

The heat electrification uptake rates for the electric engagement scenario are shown below in Figure 6.8. This scenario assumes a ban on fossil fuel heating in new builds from 2025, and from existing properties from 2035. This causes a sharp increase in the rate of uptake of heat pumps from 2035 onwards. This represents roughly 15,000 heat pump installations per year across the county, and while this may sound like a significant number, it does roughly align with the expected rate of boiler replacement assuming a 15-year average lifespan. Electric resistive heating has a slower, more consistent uptake, reaching about 50,000 installations by 2045. This scenario includes no hybrid heat pumps.

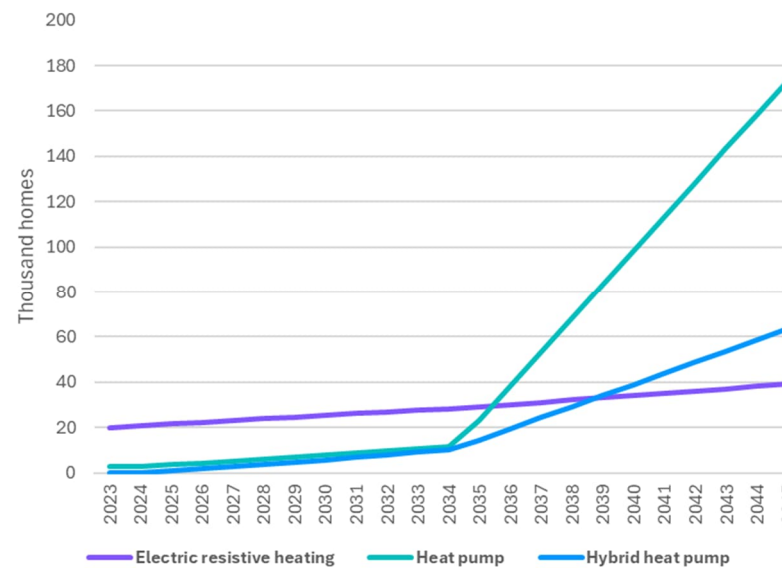
Figure 6.8: Electric engagement scenario technology uptake rates



Source: DFES data

The heat electrification uptake rates for the hydrogen evolution scenario are shown below in Figure 6.9. This scenario has slightly less total electric resistive and heat pump installs compared to the electric engagement scenario and assumes a steady uptake of hybrid heat pumps after 2035. This DFES scenario assumes that sections of the gas grid are repurposed for low-carbon hydrogen and used to supply the homes with a hybrid heat pump. As hydrogen for space heating is not likely to happen in Cambridgeshire, as previously discussed, it is likely that the homes included in the blue line showing hybrid heat pumps will actually install electric resistive heating or heat pumps. In the calculations for the LAEP of energy changes and carbon reductions it has been assumed that these homes install standard heat pumps.

Figure 6.9: Hydrogen evolution scenario technology uptake rates

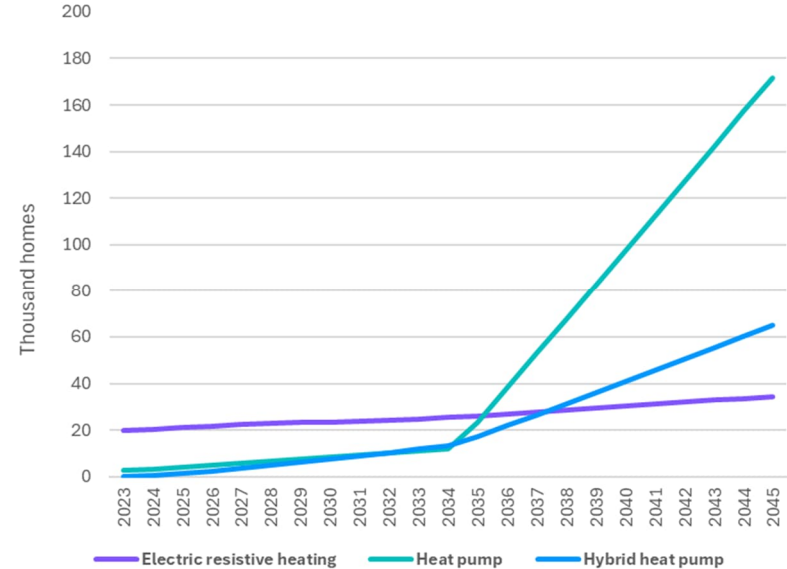


Source: DFES data

Figure 6.10 outlines the low carbon heating technology uptake rates for the holistic transition scenario. This scenario follows a broadly similar pattern to hydrogen evolution, but with slightly faster uptake rates, due to an assumed energy price re-balancing between electricity and gas. This scenario also has slightly less electric resistive heating in 2045, with more heat pump installations.

As can be seen by the sensitivity line for high growth, should the region grow in population and employment more than is forecasted, the number of ASHP needed would be significant (assuming as stated before, that all new builds have ASHP installed from 2025 onwards). This presents a challenge for the industry

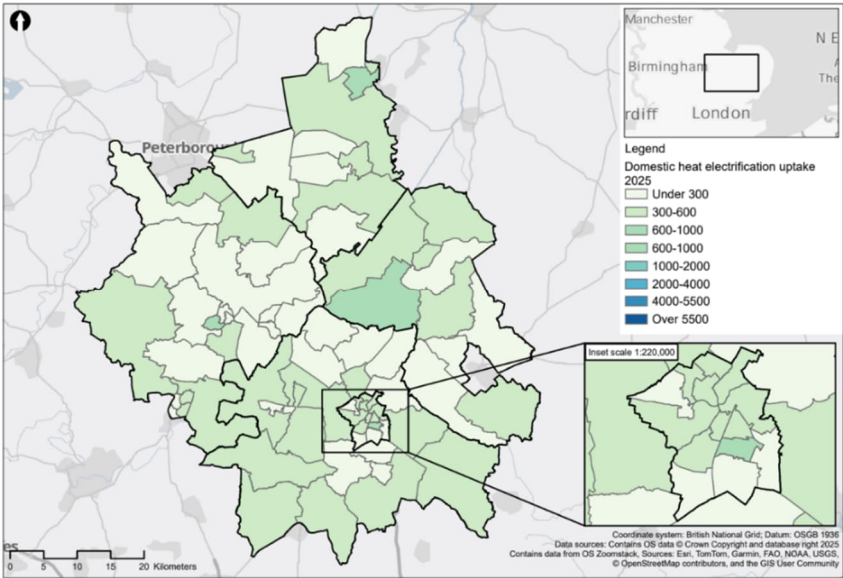
Figure 6.10: Holistic transition scenario technology uptake rates



Source: DFES data

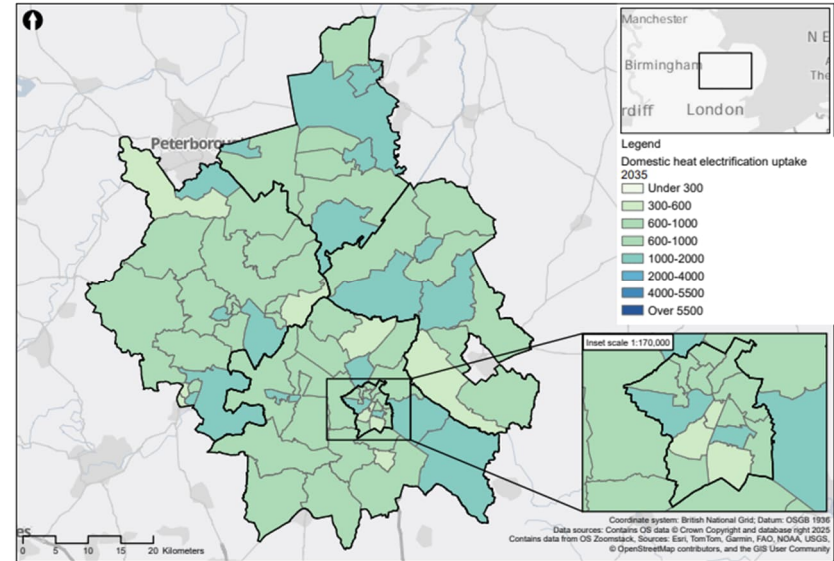
The uptake of heat electrification technologies in domestic buildings for the holistic transition scenario, mapped at MSOA level for the years 2025, 2035 and 2045 are shown below in Figure 6.11, Figure 6.12, and Figure 6.13 respectively. It can be seen in the 2045 map, that by this year MSOAs in Cambridge will have less installations of building level technologies due to the higher assumed uptake of heat networks in this area. The dark blue parts of rural Fenland and East Cambridgeshire show the areas where there are many properties consuming fossil fuels that required their heating system to be electrified.

Figure 6.11: 2025 domestic uptake of heat electrification technologies



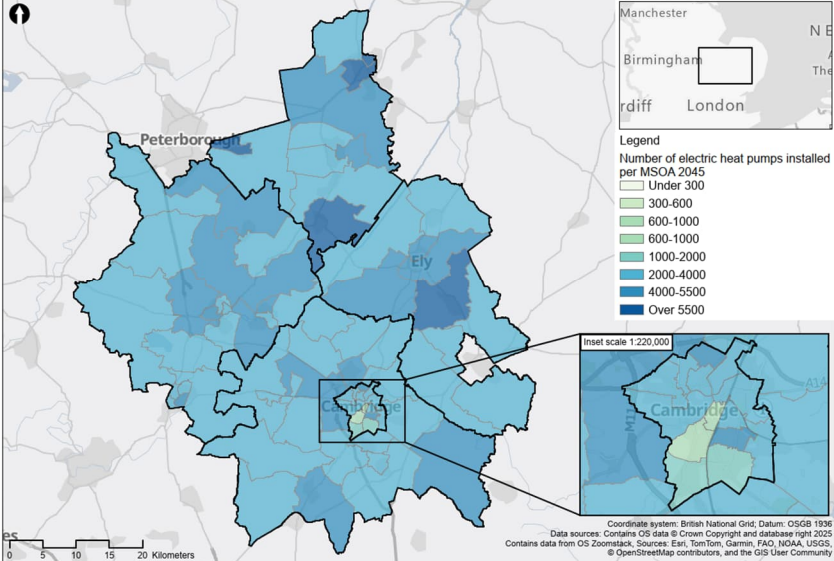
Source: Mott MacDonald GIS mapping

Figure 6.12: 2035 domestic uptake of heat electrification technologies



Source: Mott MacDonald GIS mapping

Figure 6.13: 2045 domestic uptake of heat electrification technologies

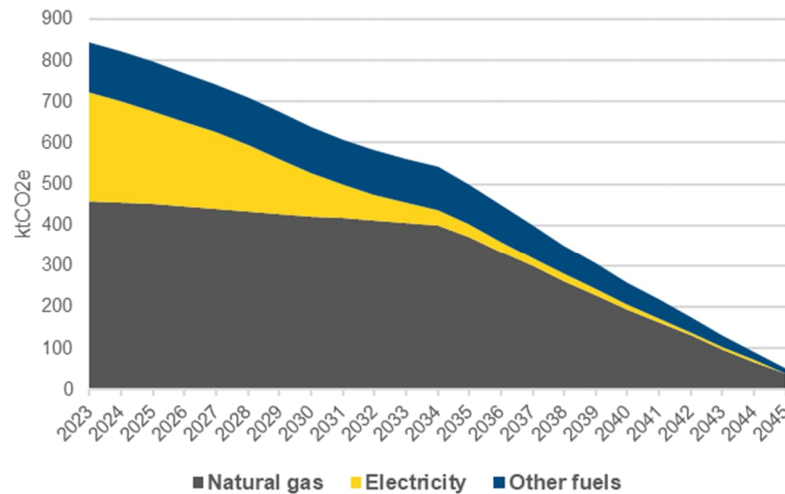


Source: Mott MacDonald GIS mapping

6.1.5 Domestic Carbon Projection

The projection of domestic carbon emissions breakdown for the holistic transition scenario is shown below in Figure 6.14. Despite a high level of uptake in electrical heating technologies for domestic buildings in this scenario, emissions from electricity trend sharply towards zero as the grid decarbonises in the 2030s. Emissions from natural gas and other fossil fuels also begin to decrease faster around this period, due to the projected acceleration of uptake rates for heat pumps at this time. The sharp decrease here emphasises the importance of sufficient policy and drivers being enacted to enable and encourage homeowners and landlords to transition to heat pumps at the significant rates that are required. Note that this emissions reduction projection includes the impact of domestic buildings transitioning to low carbon heat networks as described in section 6.3.

Figure 6.14: Domestic carbon emissions breakdown projection for holistic transition



Source: Mott MacDonald modelling

6.1.6 Barriers to the Transition

Barriers to building fabric improvements and installation of air source heat pumps have been widely studied. In the production of this LAEP, barriers to residents were reviewed, supplemented by stakeholder feedback throughout. Interventions were then mapped to these barriers, to identify policies / projects / innovations that could help unblock them.

Academic literature^{36,37}, Climate Change Committee³⁸, European Heat Pump Association³⁹ and Cambridge Institute for Sustainability Leadership⁴⁰ were primarily used to generate barriers within this LAEP,

³⁶ Chitchyan, 2025. Overcoming barriers to heat pump adoption among able-to-pay households

³⁷ Ahmad, 2023, Motivations and barriers associated with adopting domestic heat pumps in the UK

³⁸ CCC (2016) Annex 3 – Best practice in residential energy efficiency policy: a review of international experience

supplemented by our own sector expertise and experience. From the literature there is broad consensus that the following are barriers to both heat pump adoption and fabric upgrades.

- **Financial:** high upfront costs, high running costs, long payback periods
- **Knowledge and awareness:** perceived complexity of the technology / upgrade, lack of confidence in the supply chain and challenges around ensuring quality and benefits are delivered.
- **Amenity:** is the technology loud, visual impact, additional space requirements, disturbances during installation (both heat pumps and fabric upgrades).

The most commonly cited barrier, up front capital, is already partly being addressed at a national level. The Boiler Upgrade Scheme is already in place and aims to lower the upfront capital cost of heat pumps. Similarly, the government is trying to push the supply chain to bring down prices, with its clean heat market mechanism⁴¹.

However, in both the domestic and non-domestic sector, the current price ratio between gas and electricity, in most cases rendering switching to an electric form of heating more expensive to run, is the largest barrier yet to be addressed at national level. The European Heat Pump Association draws this into stark focus, showing that across Europe where heat pumps have proliferated, it is strongly correlated with a favourable gas to electricity price ratio (Figure 6.15). **Notably the UK is one of the worst countries in this regard.**

With regards to addressing the knowledge and awareness barrier, this is also something being dealt with at national level, and locally. Indeed, Cambridgeshire and its district councils have already established the Action on Energy Partnership, a local initiative to provide guidance

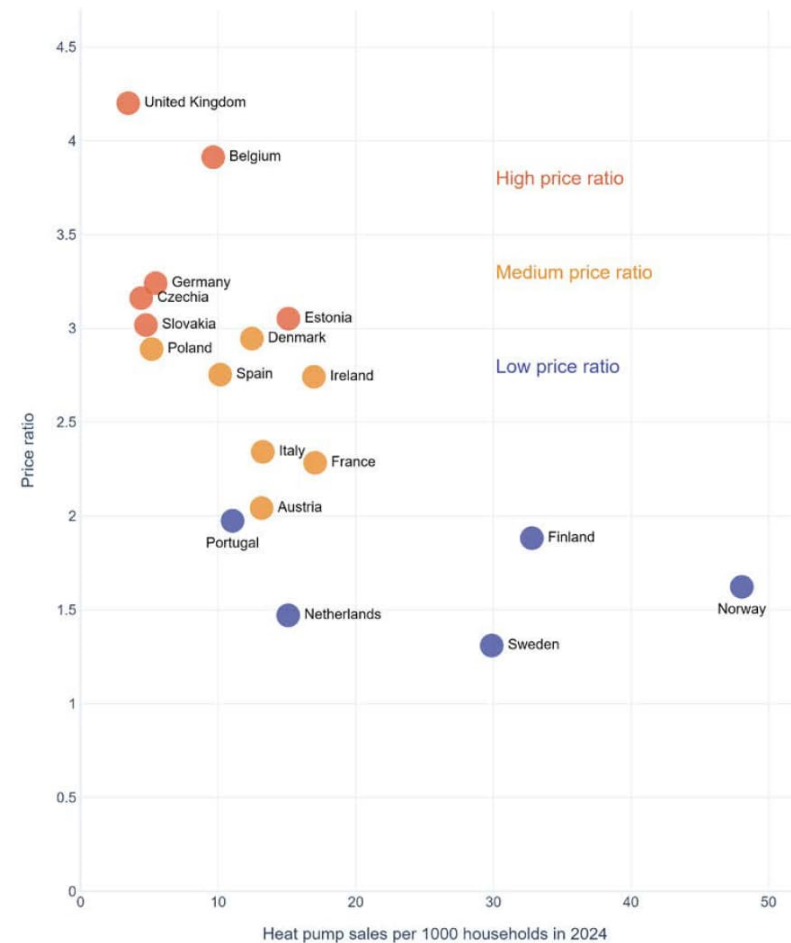
³⁹ EHPA, 2025, European heat pump market report executive summary

⁴⁰ CISL, 2025, Delivering Retrofit at Scale Together: Better homes for healthier, resilient and stronger communities

⁴¹ GOV (2025) Clean Heat Market Mechanism: who it applies to, annual tasks. <https://www.gov.uk/guidance/clean-heat-market-mechanism-who-it-applies-to-annual-tasks>

specifically to households looking to improve their homes⁴². This one of many vital local initiatives ensuring that households have reliable and trusted guidance.

Figure 6.15: Electricity-to-gas price ratio against heat pump uptake

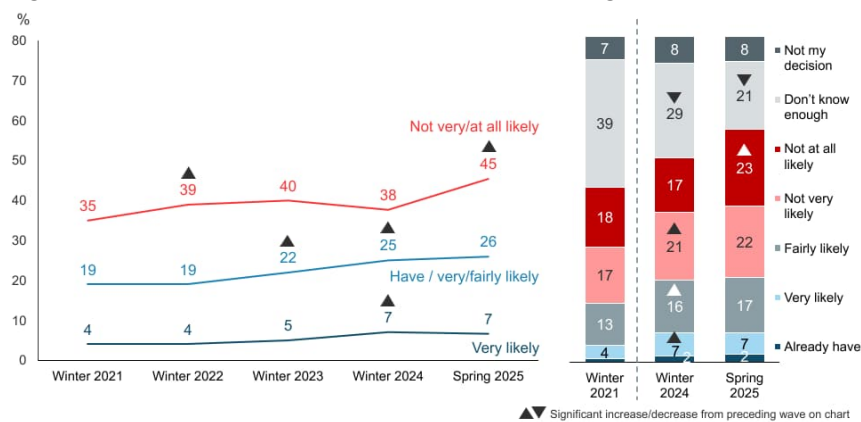


Source: Taken directly from EHPA (2025), Figure 10

⁴² Action on Energy (2023) Welcome to Action on Energy Cambridgeshire.
<https://www.actiononenergycambs.org/>

However, worryingly the most recent Public Attitudes Tracker survey conducted by DESNZ, indicated that public opinion across specifically owner occupiers, is swaying in the wrong direction, with the number of people saying they are unlikely to install an air source heat pump going up (Figure 6.16).

Figure 6.16: DESNZ Public Attitudes Tracker, Figure 4.5



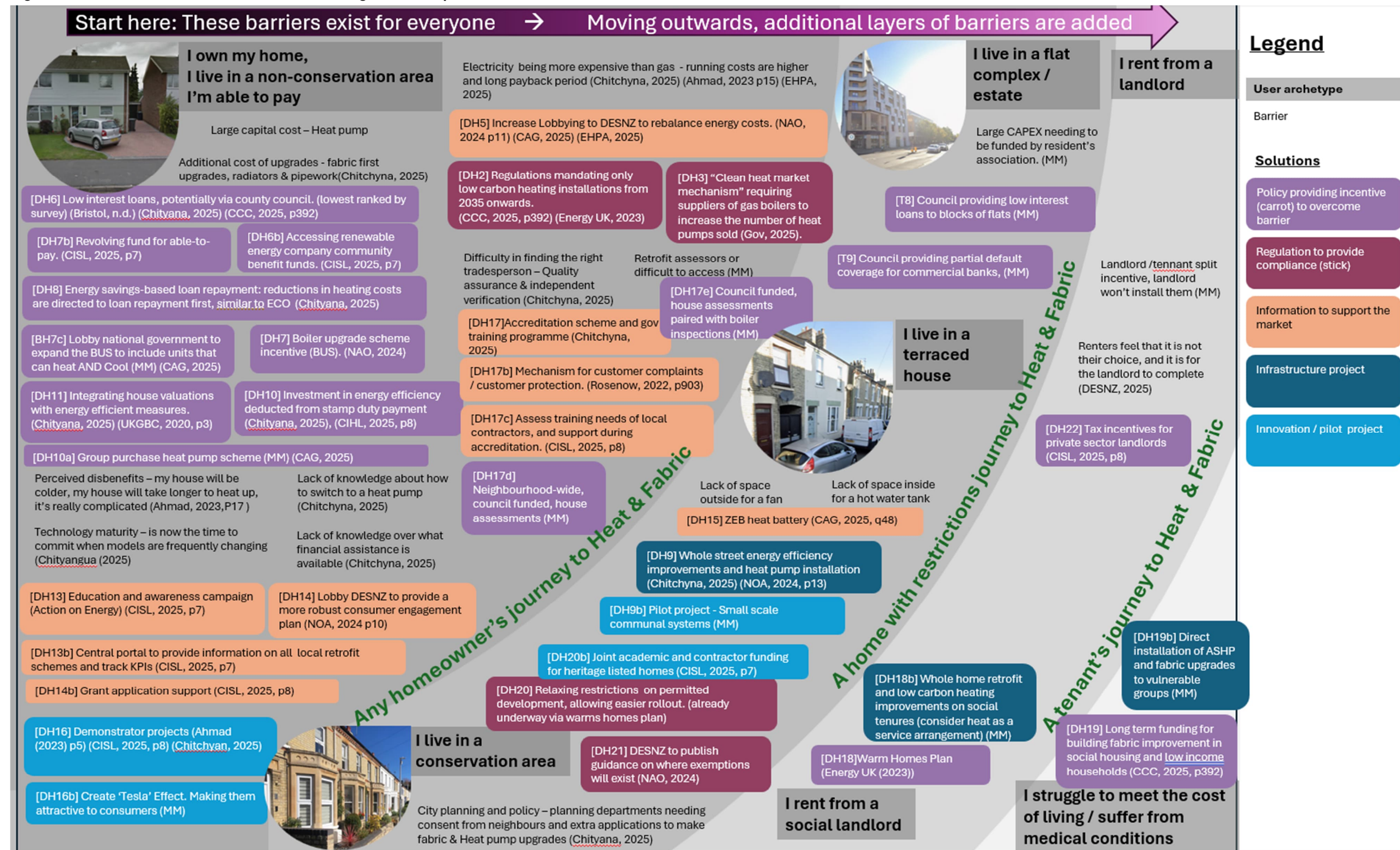
LCHEATINSTALL1. How likely is it that you would install each of the following heating systems in your home when you next need to change your heating system or boiler: air source heat pumps?

Base: All wave respondents living in owner-occupier households – Winter 2021 (2,738), Winter 2023 (2,566), Winter 2023 (2,681), Winter 2024 (2,476), Spring 2025 (2,622)

Source: Taken directly from DESNZ (2025), Figure 4.5

Beyond the barriers mentioned above, we find that additional barriers exist for certain sub-sets of the population – those who do not own their home, those on lower income, those living in conservation areas or heritage buildings – which is an area the Council or local actors can best add value. Figure 6.17 shows this compounding barrier analysis, along with identified solutions to overcome them.

Figure 6.17: Domestic Sector – Low Carbon Heating Barrier Map



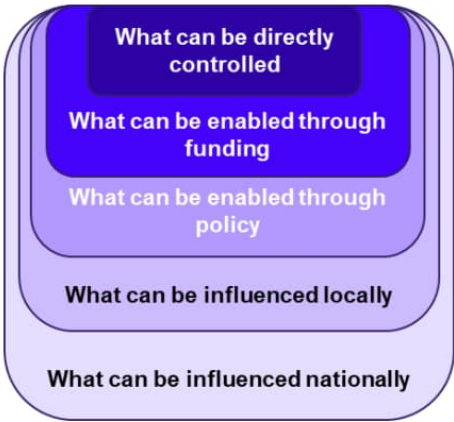
Note: The letter-and-number codes (e.g., DH13) are project reference identifiers. Please refer to the appendix for the full description of each project or intervention.

6.1.7 Interventions & Projects to stimulate change

Industry consensus suggests that there is no silver bullet policy, and often a range of policies are needed to tackle different barriers. To that end, we have categorised our interventions into four categories.

Intervention Type	Example
Financial Incentive (Carrot) – something to address a cost barrier, or provide an incentive	Grants, low interest loans, feed in tariff, etc
Regulation (Stick) – a regulation or law mandating action	Minimum Energy Efficiency Standard (MEES), ban on internal combustion engine vehicles.
Information to support the market – guidance, awareness campaigns, knowledge / expertise	Guidance documents, Energy savings trust, access to retrofit coordinators.
Innovation / Pilot project – Funding pilots or demonstrators.	Innovate UK’s Zero Emission HGV and Infrastructure Competition – funding pilot projects for new HGVs and charging

For areas where the council can directly control, **infrastructure projects have been identified**. A long list of projects (Appendix D) was taken from the barrier map (Figure 6.17), and then coarse screened by level of influence for the council. The categories (shown right) were used for this. The top performing projects from each category were selected, with more projects being taken from the “what can be directly controlled” category.



A qualitative multi-criteria analysis was performed to rank the list. The criteria are shown below.

Criteria	Rating
Cost to Council	Low = Less than £5million Med = £5million to £15 million High = £15million or more
Direct Carbon Impact	Low Medium High
Wider Systemic Impact	Low = intervention is fairly isolated in effect Med = intervention would have some knock-on effect to others in the sector High = Intervention could unlock significant wider change in the sector
Difficulty to Implement	Low = less than 2 yrs, permitted dev, 2 to 3 stakeholders Med = 2yrs to 5 yrs, Planning app, many stakeholders High = 5yrs+, DCO, complex stakeholders
Social Impact	Low = little or no direct effect Med = provides some targeted assistance High = specifically targeted to help vulnerable groups
Combined Score	Sum of scores, with a 1, 2 or 3, provided for Low medium or high

These have been prioritised into a delivery roadmap (Figure 6.18). For infrastructure projects, where applicable maps are provided in (Appendix D), showing spatially where these are located, so that financing and packaging of these projects can happen following this LAEP. Some key points on the interventions are listed below.

For some of matters that sit within the remit of central government, lobbying from the local authority to central government is recommended. Primarily this centres on encouraging DESNZ to rebalance energy costs, as has been promised for some time. However less common, is the recommendation to lobby central government **to expand the Boiler Upgrade Scheme to include units that can heat and cool**. In a stakeholder workshop as part of this LAEP, a representative from the NHS recommended that in the face of climate change and hotter summers, a focus is needed on space cooling as

well. Indeed, they stated that the health benefits associated with cooler homes in the summer, especially for elderly and those medical conditions, are likely to be just as important as the focus on warmer homes in the winter.

The Council and districts, given their local knowledge and touchpoints with residents, has a large role to play in education and awareness. One highlight from the roadmap, is leveraging on the success of Sweden. Sweden successfully changed public opinion from heat pumps being unfamiliar and risky, to a viable heating solution, via a range of measures aimed to improve consumer confidence⁴³. **One such measure worth highlighting is having a mechanism for dealing with customer complaints** or poor installations, essentially removing the risk the homeowner is taking when undertaking this costly upgrade.

However the largest area the Council may consider playing a role, is in neighbourhood-wide assistance for either home assessments, and/or group purchase schemes. On the first, securing retrofit assessors and engaging **whole streets or neighbourhoods on home assessments**, may help reduce the knowledge barrier of an individual occupant, and act as a trigger point for them to consider an energy efficiency improvement or prime them for a heating system switch. Similarly, **group purchase schemes for heat pumps**, analogous to the popular 'solar together' scheme now closed, is considered worth pursuing further.

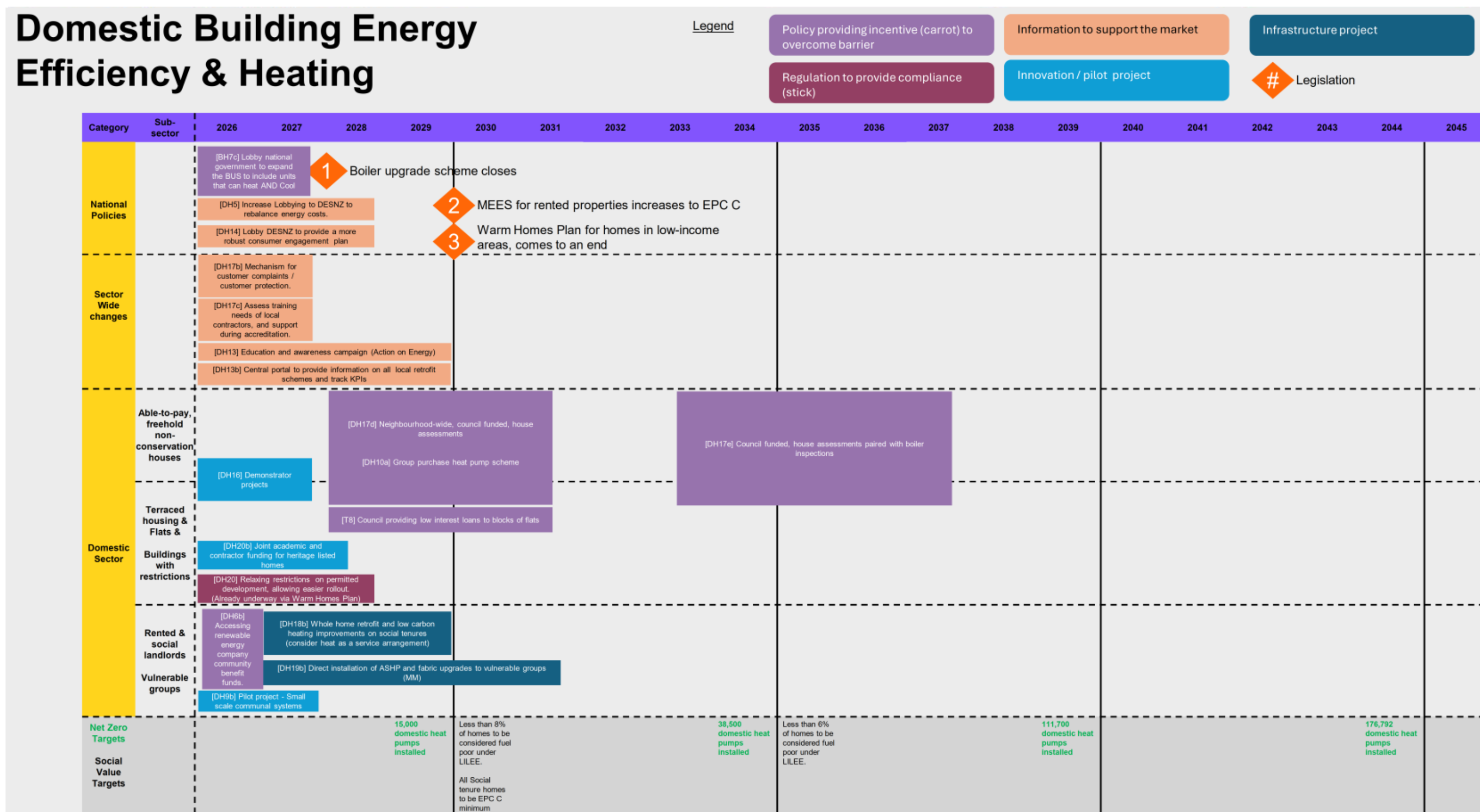
Another area the council could impact locally, is in addressing a lack of capacity within the local supply chain, both heat pump manufacturers and installers. The Cambridge Institute for Sustainability Leadership found that *"respondents expressed some concerns over availability of suitably skilled professionals who are based locally, and the willingness of service providers from other parts of the country to take on small-scale projects in the area"*⁴⁰. The Council could do a high-level assessment by comparing the number of heat pump installers regionally to the uptake rates required as shown in the LAEP, then take action to close the gap. This could include developing

incentives to encourage more heat pump installer businesses to expand in the area or engaging the local supply chain on training needs and barriers to meeting the projected market demand⁴⁰.

As one of the core objectives of the LAEP is to reduce inequality in the region, and at minimum ensure that the transition to net zero does not increase inequality or leave any portions of society behind, several interventions specifically targeting vulnerable groups have been identified. The council could continue its work to date, on improving the energy efficiency of social tenure homes, **possibly consider heat as a service arrangement where it is the landlord of blocks of flats**. Another option could be **directly providing fabric upgrades and low carbon heating to vulnerable residents**. Eligibility criteria could be established, and in addition to people in the low-income category, this could cover people suffering from medical conditions who would disproportionately benefit from more comfortable homes.

⁴³ Rosenow (2022) Heating up the global heat pump market. Nature Energy.

Figure 6.18: Building Energy Efficiency & Heating Roadmap



Note: The letter-and-number codes (e.g., DH5) are project reference identifiers. Please refer to the appendix for the full description of each project or intervention.

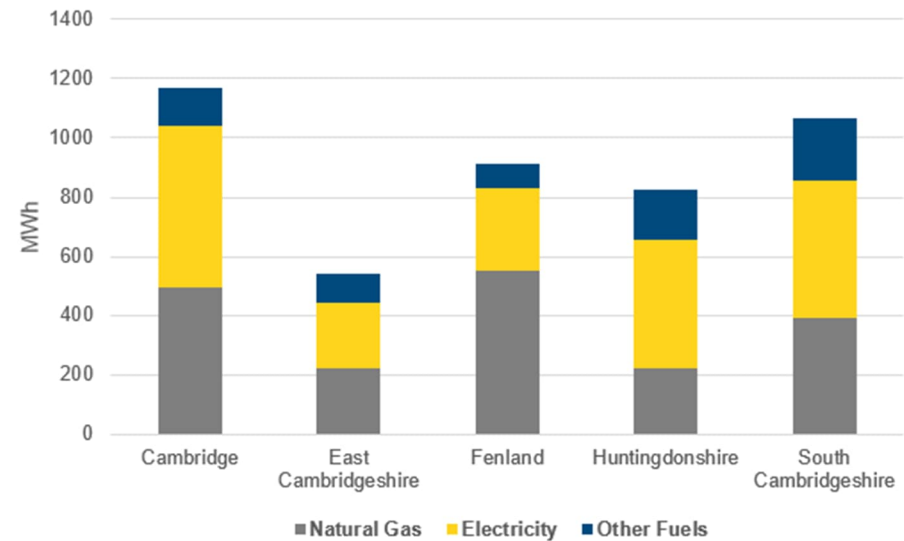
6.2 Non-domestic low carbon heating

6.2.1 Existing system

Compared to the domestic building stock in Cambridgeshire, there is limited information available on the fuel types used for space heating and domestic hot water in the non-domestic buildings in the commercial, public and industrial sectors. The total energy use of non-domestic buildings in each district council can be broken down by fuel consumption to give a high-level indication of potential fuel use for space heating and hot water (Figure 6.19).

It can be seen here that non-domestic buildings have a significantly higher proportion of total energy consumption resulting from electricity use, compared to domestic buildings. This implies that non-domestic buildings may have a higher proportion of properties using electricity for space heating and domestic hot water (DHW). Comparing the total number of non-domestic gas network connections to electrical connections per MSOA reinforces this assertion. It should be noted that part of the natural gas and other fuels consumption shown in Figure 6.19, will be due to process loads, not space heating and DHW. This is particularly true in Fenland, where there are relatively high process loads used in industrial buildings.

Figure 6.19: Non-domestic energy use fuel type breakdown (MWh)

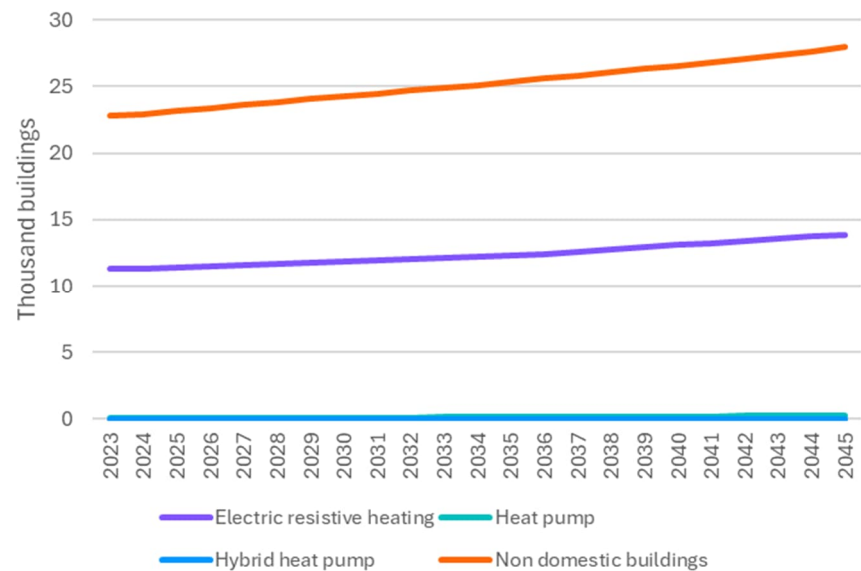


Source: [UK Government Data](#)

6.2.2 Counterfactual

As for domestic buildings, the non-domestic counterfactual assumes no policy requirement for replacing existing fossil fuel heating systems with a low carbon alternative. The counterfactual projections for low carbon heating technology uptake in non-domestic buildings is shown below in Figure 6.20. The counterfactual assumes a slight increase in the number of buildings using electric resistive heating, with no hybrid heat pump installations, and negligible increases in heat pump installations.

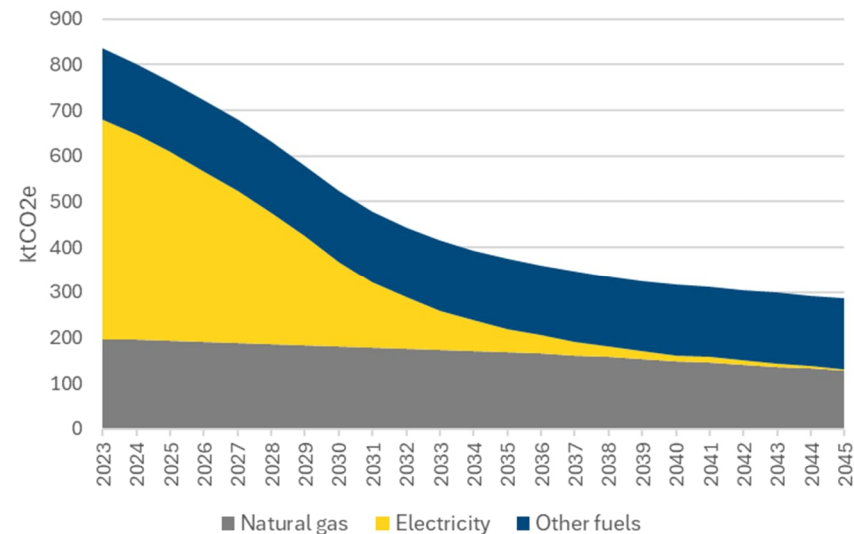
Figure 6.20: Counterfactual non-domestic heat technology uptake



Source: DFES data

The counterfactual carbon emissions projection for non-domestic buildings is shown below in Figure 6.21. Emissions from electricity trend towards zero as the grid decarbonises, particularly during the 2030s, providing a significant reduction in carbon emissions. Emissions from fossil fuel heating systems reduce slightly due to some assumed uptake of heat decarbonisation. However by 2030 there are nearly 300ktCO₂e being emitted from non-domestic buildings annually. This emphasises the scale of the challenge in decarbonising heat.

Figure 6.21: Counterfactual carbon emissions for non-domestic buildings



Source: Mott Macdonald modelling based on DFES

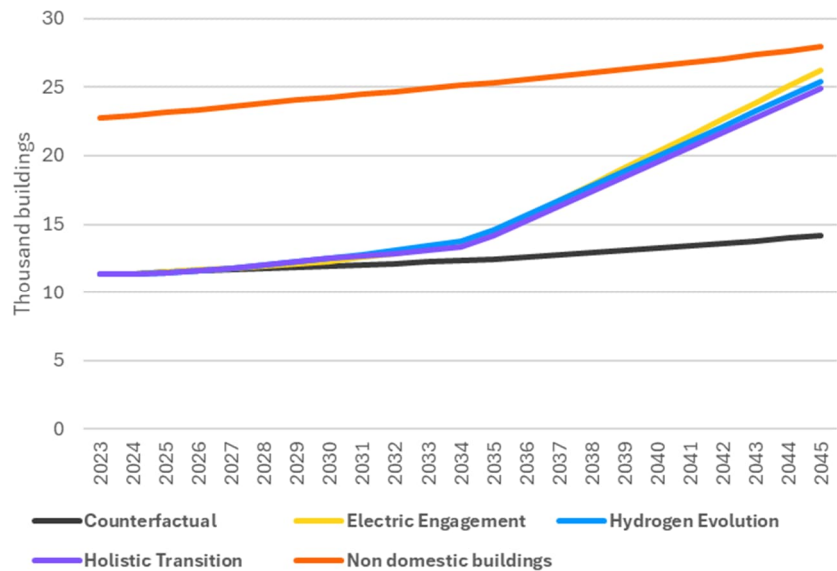
6.2.3 Intervention methodology

The uptake of heat decarbonisation technologies for non-domestic buildings has been modelled in the same way as for domestic buildings, as outlined in section 6.1.3. The same caveats regarding hybrid heat pumps also apply to non-domestic buildings.

6.2.4 Scenarios

A comparison of the total number of building level low carbon heating systems installed across non-domestic buildings for each of the scenarios modelled in shown below inFigure 6.22.

Figure 6.22: Scenario comparison of heat electrification technology uptake

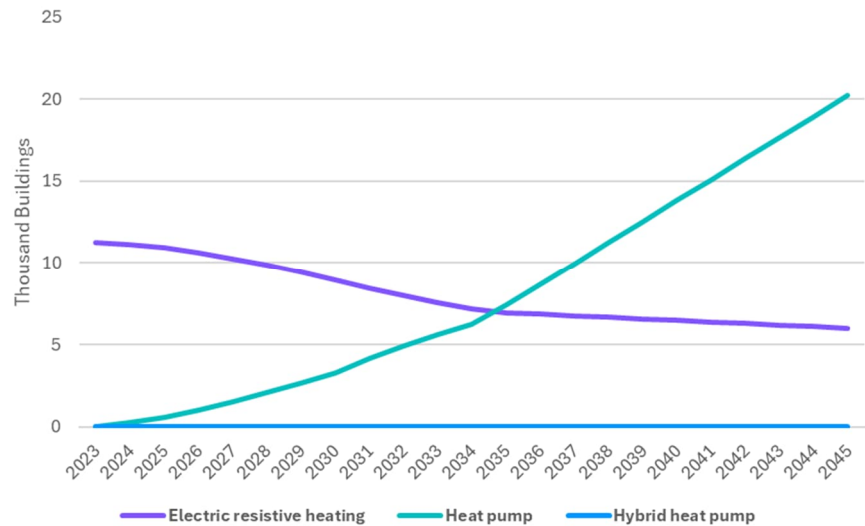


Source: DFES data

The three net zero compliant scenarios each include all non-domestic buildings having a decarbonised heating system by 2045. In these scenarios the increase in non-domestic buildings is assumed to have a low carbon heating system when constructed. The electric engagement scenario as the highest total number by 2045 in this graph, as the holistic transition and hydrogen evolution scenarios assume a higher uptake of district heat network connections in non-domestic buildings.

The projected number of installations for low carbon heating technologies in non-domestic buildings in the electric engagement scenario is shown below in Figure 6.23.

Figure 6.23: Electric engagement scenario technology uptake rates



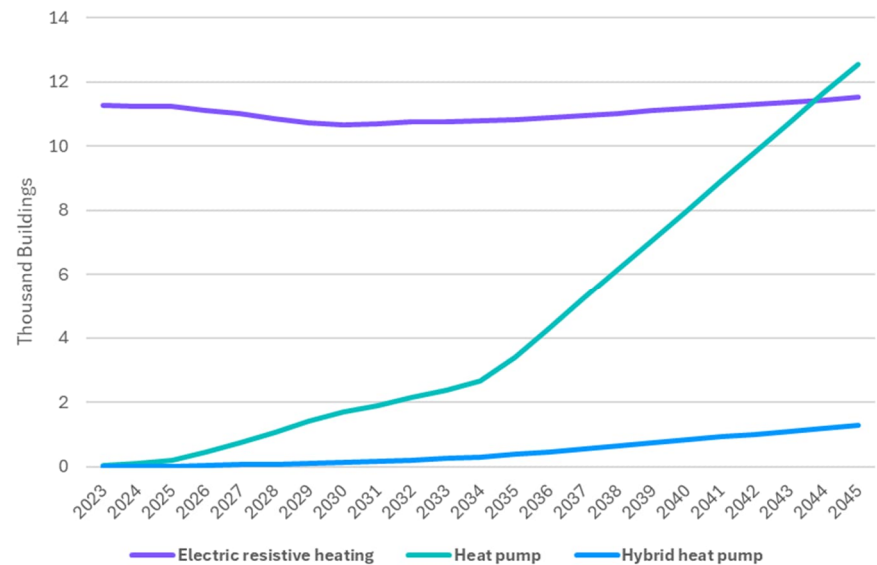
Source: DFES data

This scenario assumes a full electrification of space heating, with no hybrid heat pump installations. In the context of space heating for buildings, this scenario is the most realistic in terms of the three DFES net zero compliant, due to the likely lack of hydrogen availability for space heating in the county. This scenario assumes a relatively consistent, steady uptake of heat pumps, which accelerates slightly in the mid-2030s. This scenario also assumes a reduction in the total number of non-domestic properties using electric resistive heating, assuming that many will transition to heat pumps, as the technology matures and funding becomes available.

The technology uptake in hydrogen evolution scenario, shown in Figure 6.24, assumes that electric resistive heating remains approximately constant. There is still a sharp uptake in the number of heat pump installations in the 2030s,

but the final number of installations is less than in the electric engagement scenario. This scenario also assumes relatively low uptake of hybrid heat pumps, assuming that most non-domestic buildings would be better off fully electrifying via heat pumps.

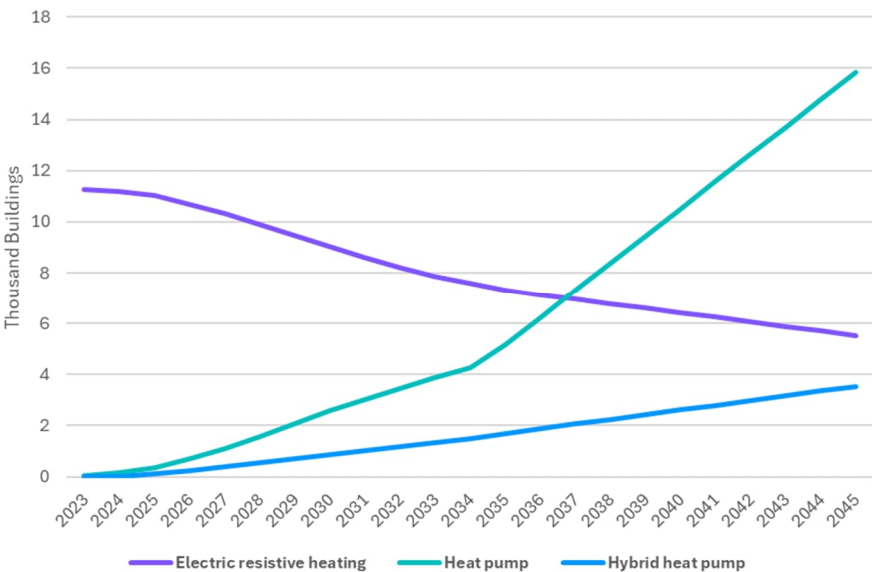
Figure 6.24: Hydrogen evolution scenario technology uptake rates



Source: DFES data

The project uptake in the holistic transition scenario is shown below in Figure 6.25. This scenario includes the transition of currently electric resistive heated buildings to heat pumps that was seen in the electric engagement scenario, but with many of these buildings changing to hybrid heat pumps instead of standard heat pumps.

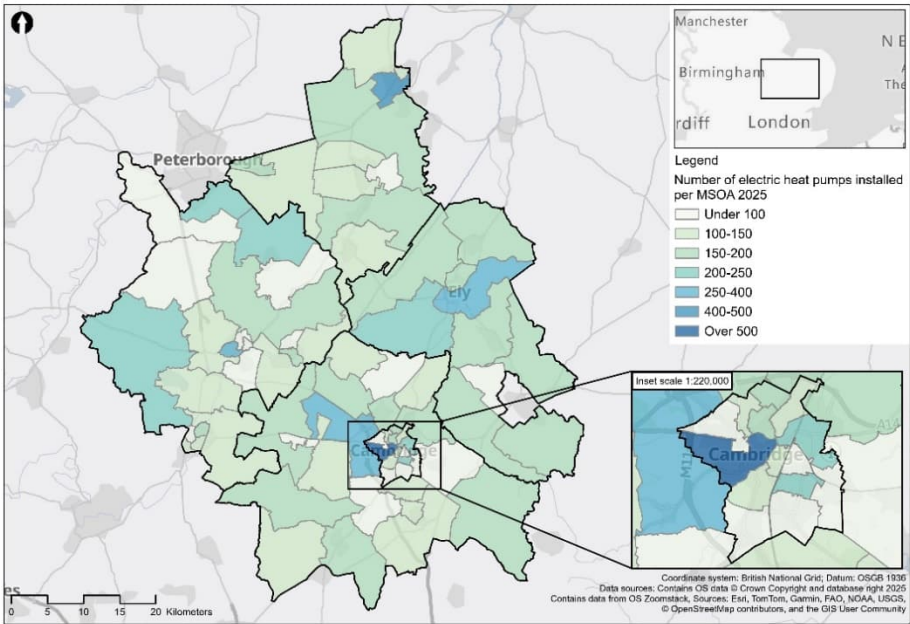
Figure 6.25: Holistic Transition scenario technology uptake rates (000s buildings)



Source: DFES data

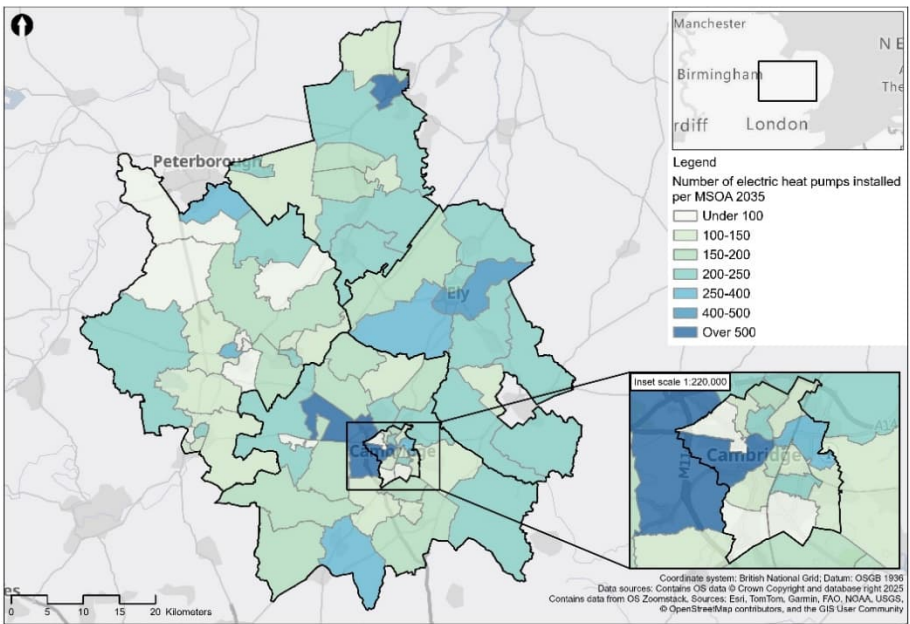
The required uptake rates of individual building heat electrification technologies, mapped at MSOA level, are shown for 2025, 2035 and 2045 on the following pages. The latter map highlights the MSOAs with the highest total number of non-domestic buildings that will need to change their heating system. It can be seen that these areas include: the North of Fenland around Wisbech, parts of East Cambridgeshire around Ely, areas in the West of Cambridge City, and areas further west of the city in South Cambridgeshire.

Figure 6.26: 2025 non-domestic heat electrification uptake



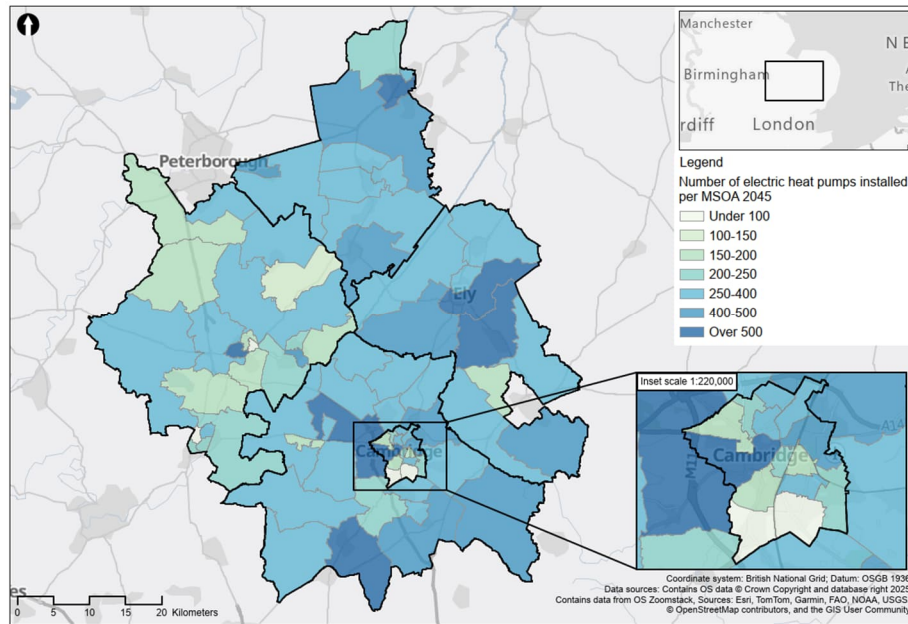
Source: Mott MacDonald GIS mapping based off DFES data

Figure 6.27: 2035 non-domestic heat electrification uptake



Source: Mott MacDonald GIS mapping based off DFES data

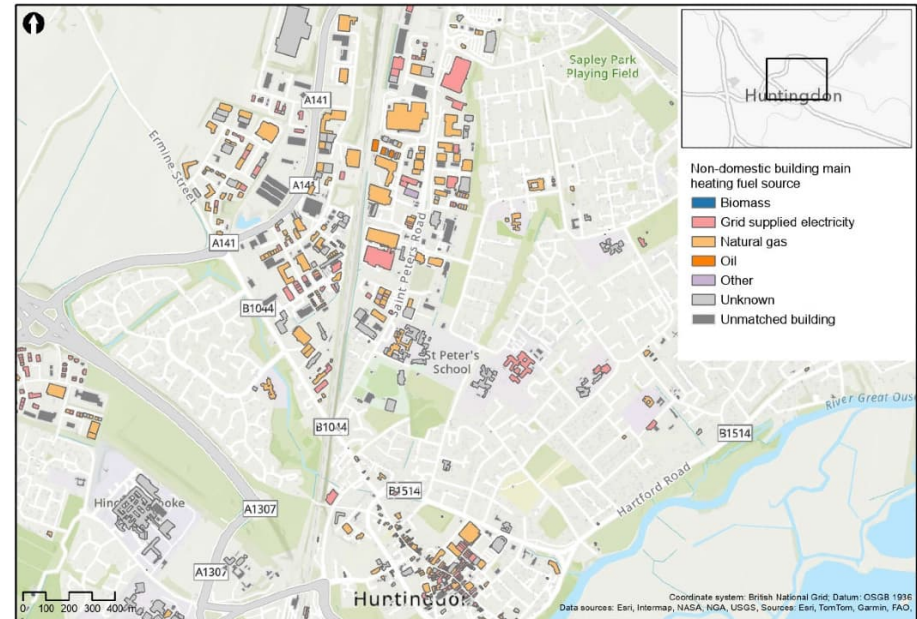
Figure 6.28: 2045 non-domestic heat electrification uptake



Source: Mott MacDonald GIS mapping based off DFES data

To achieve any of the uptake rates shown in the above scenarios will require a significant investment, and intervention to mobilise the supply chain. Of the MSOAs highlighted in the darker shades of blue in Figure 6.28 above, Huntingdon has several large non-domestic sites currently using fossil fuels for heating, that are clustered together. Figure 6.29 outlines the fuel types for non-domestic buildings in the North of Huntingdon, with natural gas shown in pale orange, and oil in orange.

Figure 6.29: Fuel types of non-domestic buildings in North Huntingdon



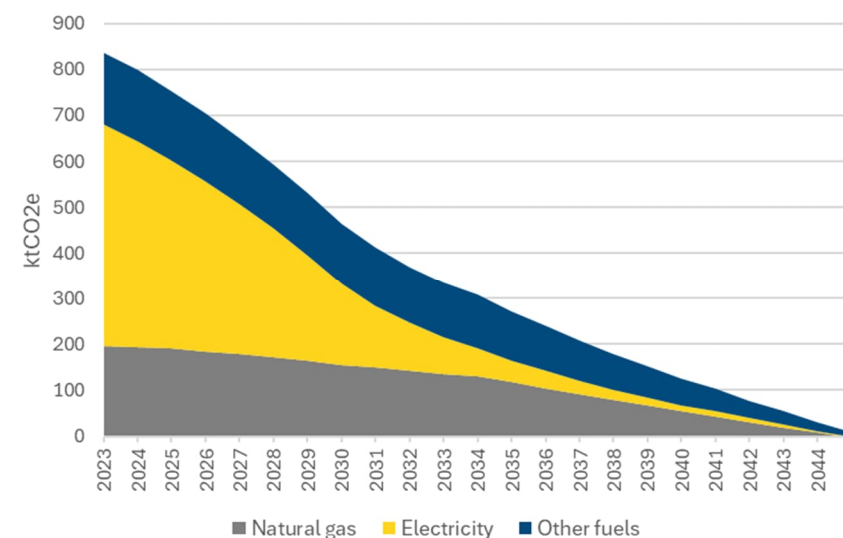
Source: EPC records for non-domestic properties (<https://epc.opendatacommunities.org/>)

As can be seen above, there are several non-domestic buildings clustered together here utilising gas heating (this is perhaps unsurprising as zoning often clusters non-domestic properties together). This presents an opportunity for shared investment for a number of properties, to better utilise economies of scale and bring down costs. Further maps showing non-domestic clusters, are shown in Appendix D, and discussed in Section 6.2.6 which outlines potential projects.

6.2.5 Non-domestic carbon projection

The projection of non-domestic carbon emissions breakdown for the holistic transition scenario is shown below in Figure 6.30. Despite significant uptake of heat electrification in this scenario, emissions from electricity tend towards zero due to the projected decarbonisation of the grid. The reduction in emissions from natural gas and other fossil fuel heating technologies start decreasing sharply in the 2030s. This is due to the assumed ban in new fossil fuel heating systems causing an acceleration of heat pump uptakes during this time. This emphasises the importance of policy drivers in enabling the shift to low carbon heating systems at the rates required. Note that this emissions reduction profile includes the impact of buildings transitioning to heat networks as outlined in section 6.3.

Figure 6.30: Non-domestic Carbon Projection for Holistic Transition scenario



Source: Mott MacDonald modelling based off DFES data

6.2.6 Barriers to the transition

There are many overlaps in barriers between the non-domestic and domestic sector (as discussed in an earlier section). Barriers such as high upfront costs, lack of financing, and higher operating costs due to the electricity to gas price ratio; are all consistent with barriers faced by the domestic sector.

However there are several barriers which are unique to the non-domestic sector. In its Seventh Carbon Budget, the Climate Change Committee consulted with an Advisory Business Group which highlighted several private

business specific barriers⁴⁴. Similarly, the UK Green Building Council produced an industry paper in 2020, specifically looking at building fabric upgrades and switching to heat pumps in the commercial and industrial sectors⁴⁵. Lastly, during the production of the LAEP, several business stakeholders responded citing specific barriers they face⁴⁶.

A full barrier map and solutions is shown in Figure 6.31, with the key unique non-domestic barriers summarised below:

- Financial: as per domestic sector, however there currently exist less incentives for the non-domestic sector
- Knowledge and awareness: there is limited industry experience in operating heat pumps, and furthermore suppliers of the equipment are often not competent to advise on whole system performance⁴⁵.
- Operational: disruption to the business and having to vacate spaces to undertake the work
- Physical: plant rooms and roof space do not have sufficient space for new equipment needed for heat pumps. Fabric upgrades are very site specific, and for older buildings asbestos and sheer feasibility of installing better insulation or windows is sometimes not practical.
- Leasing arrangements: most businesses rent the spaces they are in, and lack of effective sub-metering means it is not always possible to access useful energy data.
- Lack of regulations: unlike the domestic sector, current MEES only requires an EPC rating of E, and there is no gas boiler phaseout requirement. Similarly, landlords of commercial and industrial spaces are not required to publish operational ratings for the buildings⁴⁵.

Worth highlighting is the lack of regulations, as this is a primary driver of behaviour. The Advisory Business Group (ABG) highlighted that there is still

uncertainty over technology pathways: phase out date for boilers, increasing standards for MEES, etc. This undermines confidence to invest, where many businesses may take a 'wait and see' approach before investing what is often a large amount of capital which does not 'visibly' affect the product or service they are providing to customers. The group also highlighted that accessing financing through banks and financial institutions for low carbon technologies can be a challenge.

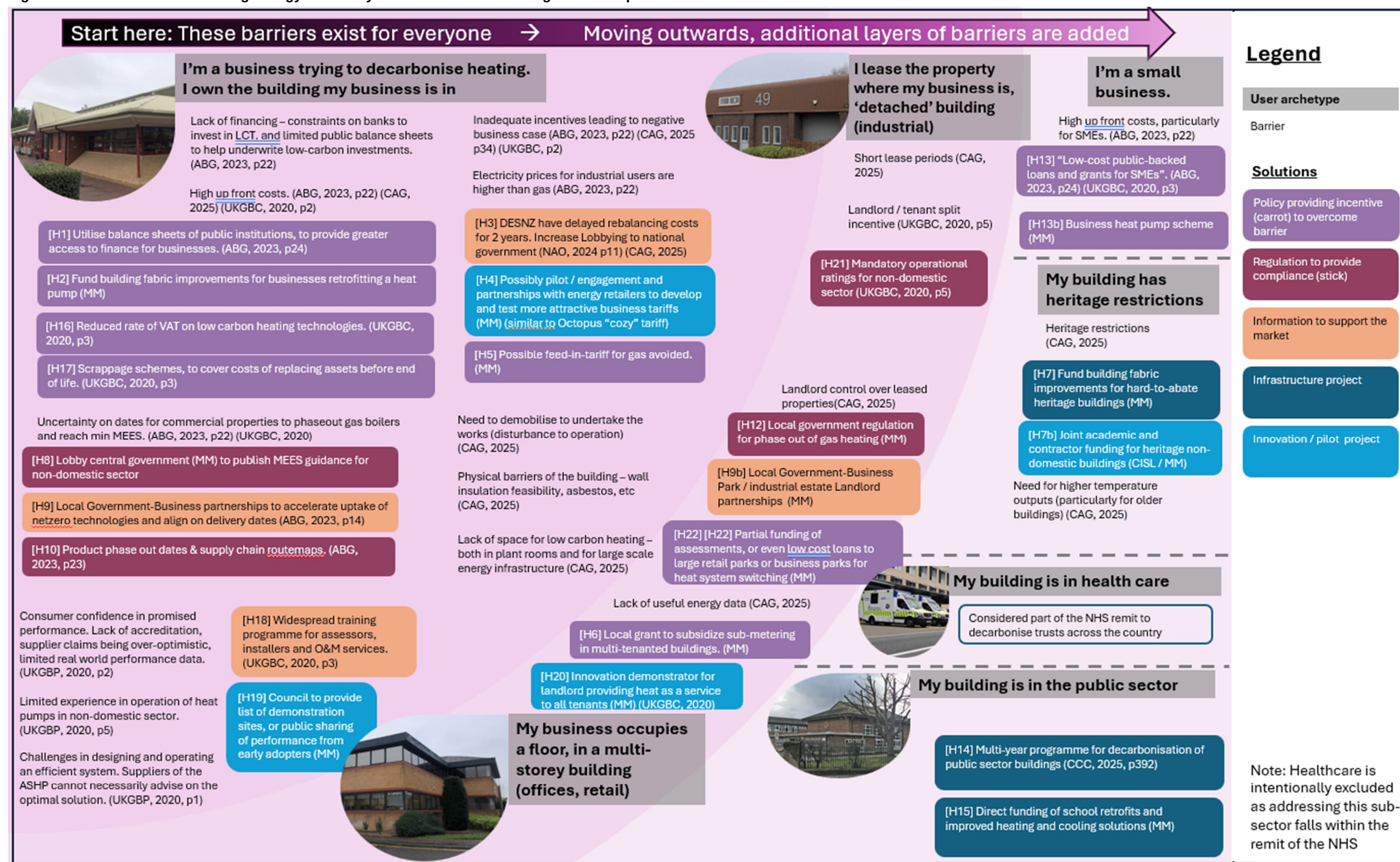
Meanwhile, there is currently a market gap/failure in the non-domestic rental sector. Currently, tenants looking to lease a space do not get access to adequate energy performance data of a rented space and therefore cannot exercise any market power when selecting a business premises⁴⁵. On the other side landlords may be reluctant to invest in energy efficiency improvements when there is no visible 'value' placed on it in the market. This information gap results in neither side being able to invest.

⁴⁴ ABG (2023) The Power of partnership, Unlocking business action on Net Zero

⁴⁵ UKGBC (2020) Unlocking the barriers to low carbon heat: an industry view

⁴⁶ CAG (2025) Cambridgeshire LAEP Survey Analysis Findings

Figure 6.31: Non-domestic Building Energy Efficiency and Low Carbon Heating Barrier Map



Note: The letter-and-number codes (e.g., H16) are project reference identifiers. Please refer to the appendix for the full description of each project or intervention.

6.2.7 Interventions and projects

As discussed in previous sections, we have categorised our interventions into four categories: Financial Incentive (Carrot), Regulation (Stick), Information to support the market, Innovation / Pilot project.

For areas where the council can directly control, infrastructure projects have been identified. A long list of projects (Appendix D) was taken from the barrier map (Figure 6.31) and then prioritised into a delivery roadmap (Figure 6.32). For infrastructure projects, where applicable maps are provided in (Appendix D), showing spatially where these are located, so that financing and packaging of these projects can happen following this LAEP. Some key points on the interventions are listed below.

For the private sector, we recommend less direct financial intervention from the Council, and a great focus on providing the enabling environment. In particular, **exploring the possibility of local regulations / restrictions, which would require non-domestic properties to provide operational ratings and phase out gas heating would help strength the case for investment**. The UKGBC⁴⁵ specifically referenced the National Australian Built Environment Rating System (NABERS) scheme in Australia, which requires sustainability measurement metrics, including energy ratings. Rolling out a scheme, or lobbying central government to do the same, would then give the incentive to landlords to invest in improving their energy performance, and tenants the ability to put a value on energy efficiency in the buildings they occupy.

We also see the role of the Council as acting as a convener and bringing together different parties to generate collaborative solutions. Specifically, as so much of the non-domestic building stock likely is part of industrial estates, business parks, retail parks or campuses, the **Council could establish a partnership with landlords to better understand their barriers and solutions towards achieving the region's net zero ambition**. The ABG specifically referenced the initiative the government of Denmark pursued⁴⁴, which although conducted at national level and for different sectors,

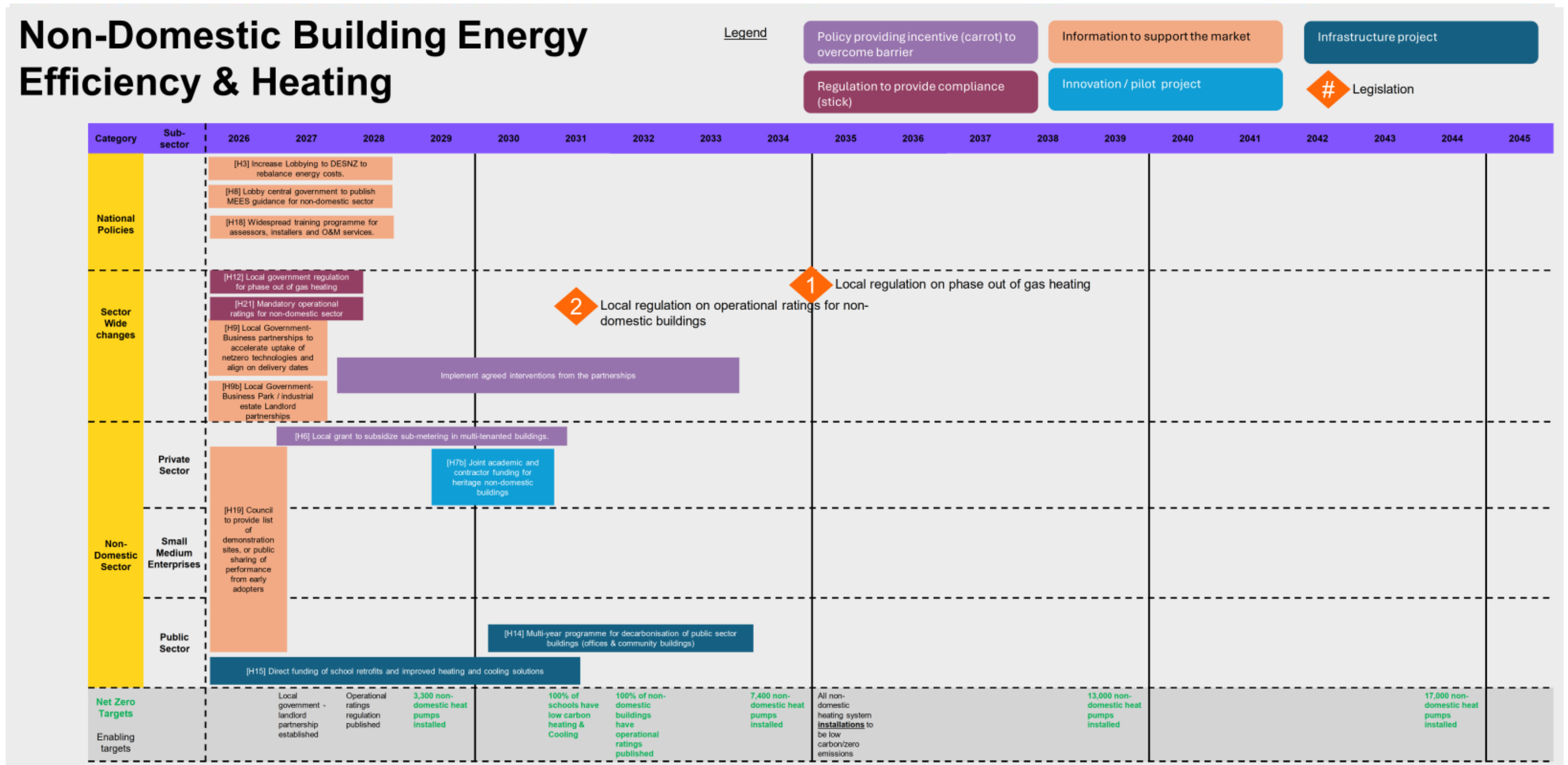
demonstrated that partnerships between government and businesses can yield better recommendations for implementation. When looking at the non-domestic building stock from this lens (by estate / landlord rather than individual property), a fewer number of key interventions could act as big leverage points.

One of the barriers identified by businesses was the lack of real data around future performance of low carbon heating systems and building fabric upgrades, and the often inflated benefits that can be reported by suppliers. A quick win for **the Council could be to make available case studies and demonstration sites, that provide real world running costs of new systems**, so that building management systems (BMS) operators and investment committees from business can gain the confidence they need to make investments in their own estate.

Lastly but perhaps most importantly, the Council likely has a larger influence over certain public sector buildings, such as schools, community buildings, and some offices. For **schools in particular (primary and secondary), priority should be placed on improving fabric efficiency and heating and cooling systems**, especially in light of the fact of warming summers making it difficult for children to stay focus during class time. A direct investment, or grant support, could be provided to upgrade our schools by 2030.

Of note, hospitals, local surgeries and other healthcare facilities are also in need of improvement, however are considered not areas the Council needs to provide support to as they will be catered for by the NHS.

Figure 6.32: Non-domestic Building Energy Efficiency and Heating Roadmap and Low Carbon Heating Barrier Map



Note: The letter-and-number codes (e.g., DH8) are project reference identifiers. Please refer to the appendix for the full description of each project or intervention.

6.3 District Heating

This report section will examine the current state of district and communal heating systems in Cambridgeshire, look at the DFES projections for heat network connection uptake, and compare that to the figures and results from DESNZ's recent modelling on potential heat network uptake in the area.

The development of district heat networks has been identified as a key priority by the UK Government, in the transition to decarbonised heat supply. District heat networks operate by using a large, centralised heating plant to heat hot water in pipes, which is then delivered to connected buildings for space heating demands, and sometimes domestic hot water (DHW). In dense areas with clusters of buildings with high heat demands located in proximity to each other, they often represent the lowest cost low carbon heating solution, compared to typical case of each building having its own decentralised heating system. With one large centralised system, economies of scale mean it's often more cost-efficient for the connected buildings to share the capital, operating and maintenance costs of one system, rather than several.

6.3.1 Existing system

Table 6.2 below shows the total number of households currently connected to a district or communal heat network in each of the district areas compared to the total number of households. There are currently no operational large district heat networks in the county, so most of these connections are likely to be small scale communal heat networks, where a centralised heating plant serves more than one residential building. Cambridge currently has around 2% of all households connected to a district or communal heat network, with the other more rural district councils all below 0.5% of homes connected.

Table 6.2: Current (2023) heat network connections by district council

District Council	Households connected to district or communal network	Total number of households	% connected to district or communal network
Cambridge	1139	54689	2.08%
East Cambridgeshire	77	38607	0.20%
Fenland	168	45651	0.37%
Huntingdonshire	161	79914	0.20%
South Cambridgeshire	106	69645	0.15%

6.3.2 Counterfactual

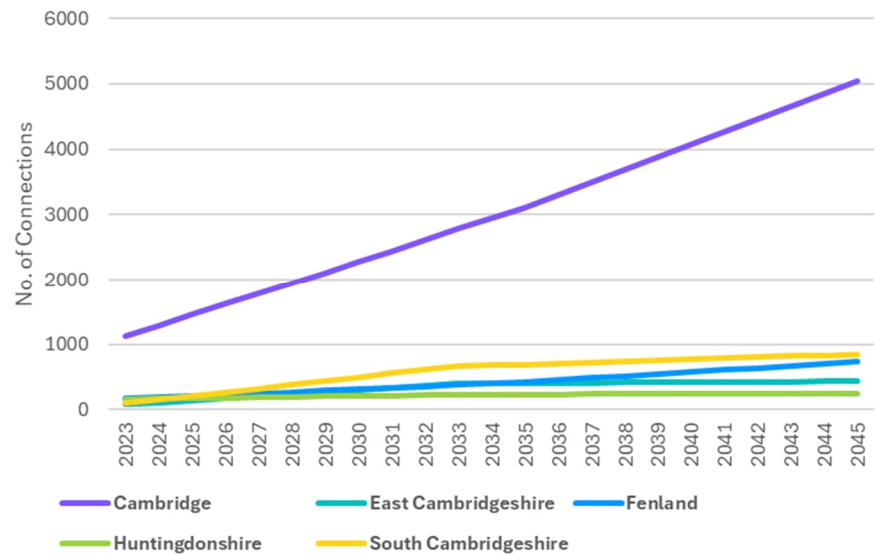
The DFES rates of uptake for heat network connections were modelled based on LSOA-level heat density analysis, with the counterfactual assuming minimal heat network uptake, predominantly only in areas of high heat demand density. There are currently no legal requirements to install heat networks, however as stated previously, the UK government has identified it as a key priority⁴⁷, with upcoming legislation on heat network zoning likely to prescribe mandatory connections for certain types of buildings if there is a suitable heat network being developed in the area.

Figure 6.33, below shows the projected domestic connections to heat networks for the counterfactual. Unsurprisingly, Cambridge City is the only district council with a significant uptake, however the number of homes connected by 2045 is still less than 10% of the total number of households in

⁴⁷ [Heat network zoning: overview - GOV.UK](#)

that district council. The four other district councils have some minimal uptake, with less than 1000 households connected each.

Figure 6.33: Counterfactual scenario number of domestic heat network connections



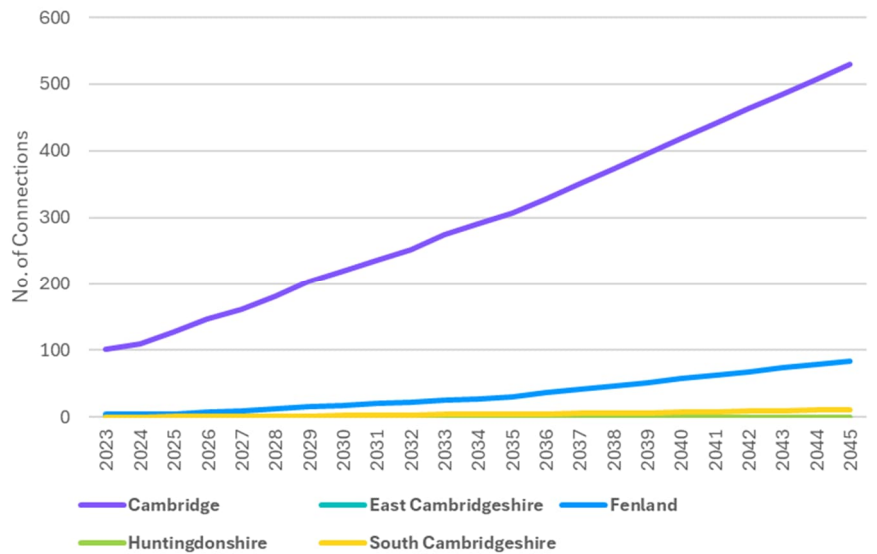
Source: DFES data

The uptake rate shown for Cambridge above equates to about 140 homes per year. To achieve this, it is likely that at least one or two of the zones in the city currently undergoing feasibility assessment, building on the advanced zoning pilot from DESNZ, would have to be developed and offer competitive rates for heat purchases. It should be noted that the steady uptake rate shown here and in Figure 6.33 are averaged out based on the likely amount of connections by certain years. In practise, heat networks are large infrastructure project that may take several years to complete, meaning in

reality there will be step changes in the number of connections to heat networks based on when they are constructed and become live.

Figure 6.34 below outlines the counterfactual projections for non-domestic connections to heat networks. The difference between the urban and rural areas is even more stark here, with Huntingdonshire, South Cambridgeshire and East Cambridgeshire having no assumed connections, and Fenland having less than 100 – compared to Cambridge where it is assumed that 500 non-domestic buildings will connect into a network. This is approximately 40 connections per year, which similar to the domestic connections, is considered very ambitious.

Figure 6.34: Counterfactual scenario number of non-domestic heat network connections



Source: DFES data

6.3.3 Intervention methodology

As previously outlined, UKPN's DFES projections for the uptake of heat network connections were based on heat demand assessment at LSOA level. **These DFES projections were accelerated to be compliant with a 2045 net zero target, as was done for individual low carbon heating system uptake.** Short term uptake rates were supplemented using the Heat Network Planning Database from DESNZ, which lists nearly 100,000 planned customer connections nationwide over the next ten years.

It should be noted that the heat network connection uptake projections provided by DFES are in addition to the heat pump and individual systems uptake outlined in Sections 6.1 and 6.2. The carbon emissions reduction calculations presented in each of those sections include contributions from the uptake of individual building systems, and heat network connections, provided by DFES.

The Department for Energy Security and Net Zero (DESNZ) National Model Run (NMR) ⁴⁸, provides a different forecast of where heat networks will be implemented in Cambridgeshire. The zonal outputs and their modelled data from the third iteration of their National Model Run (NMR) were provided – which indicate the zones throughout the county where the implementation of a district heat network would likely represent a cheaper way to decarbonise heat demand compared to building level systems. The NMR determined this through identifying clusters of building demand estimates, and spatially mapping them against existing networks, potentially heat sources and local geographical constraints. A network optimisation analysis is then done to determine the least cost network configuration, before a techno economic model determines whether an individual building level system, or a heat

network would be more cost effective in each zone. 6.3.5 summarises this data and compares it to the DFES projections.

The number of connections in the NMR are similar to that proposed by the DFES scenarios. The DESNZ NMR is discussed in greater detail later in this section, however for impact on carbon emissions and the electrical grid, the DFES projection of heat networks has been used in the analysis.

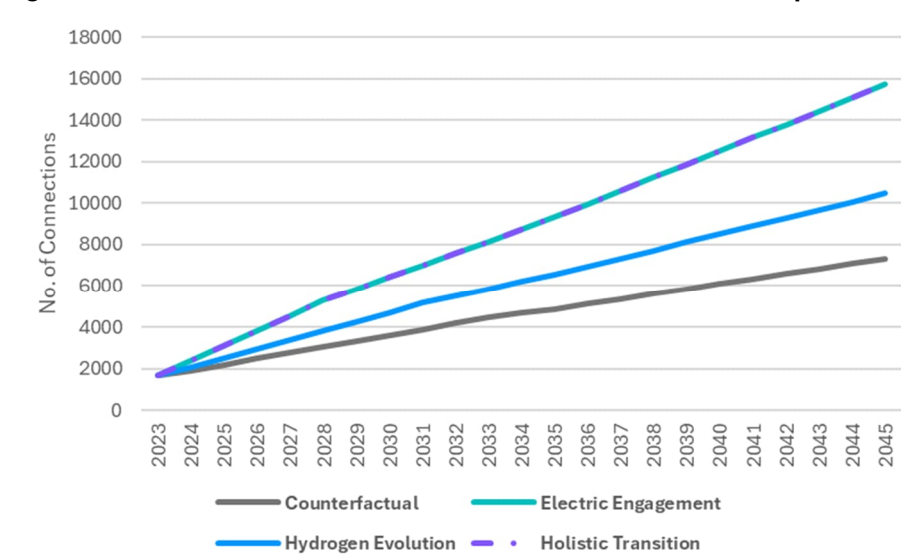
It should be noted that, at the time of writing, Cambridge City Council are currently undergoing work to build upon the DESNZ assessment, and determine where the most viable heat network opportunities are. While the LAEP provides a summary of potential heat network connection numbers and zones based on the available data, this piece of work will determine the specific network locations and customer connections for Cambridge and will be fed into future iterations of the LAEP.

6.3.4 Scenarios

A comparison of the expected number of domestic buildings connected into heat networks in each scenario is shown below in Figure 6.35. As previously discussed, the counterfactual has relatively low uptake, mainly focussed in Cambridge City. The electric engagement and holistic transition scenario both assume extensive heat network developments to occur within the coming years, with around 5% of homes being heated by networks in 2045. The hydrogen evolution scenario assumes more properties keep individual systems, with less uptake of heat networks projected compared to the other two net zero compliant scenarios.

⁴⁸ DESNZ National Model Run Version 3.0. Please note that these network zones are indicative only, and do not necessarily represent where a network will actually be constructed.

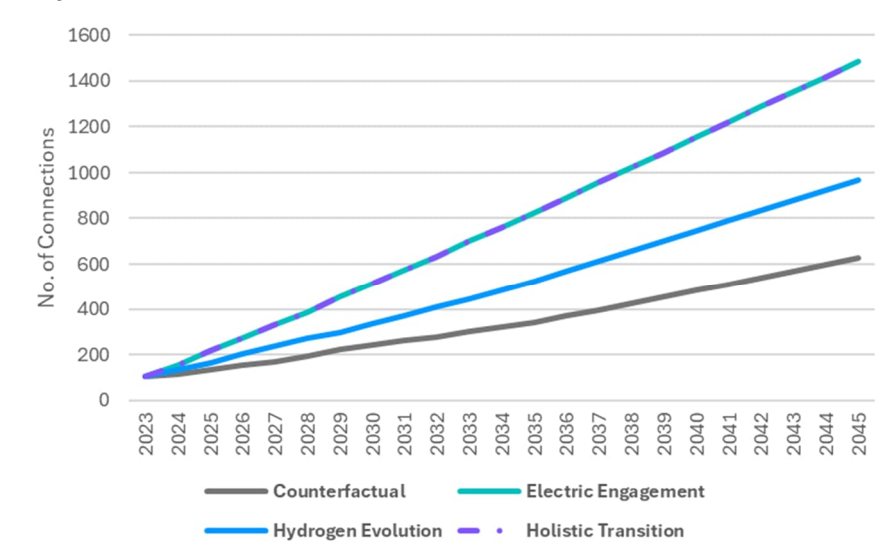
Figure 6.35: Domestic heat network connections scenario comparison



Source: DFES data

Figure 6.36 below, outlines the DFES projections for non-domestic buildings connecting to heat networks. The overall pattern is very similar to that of domestic buildings, with the electric engagement and holistic transition scenarios assuming a steady uptake in connections through until 2045.

Figure 6.36: Non-domestic heat network connections scenario comparison



Source: DFES data

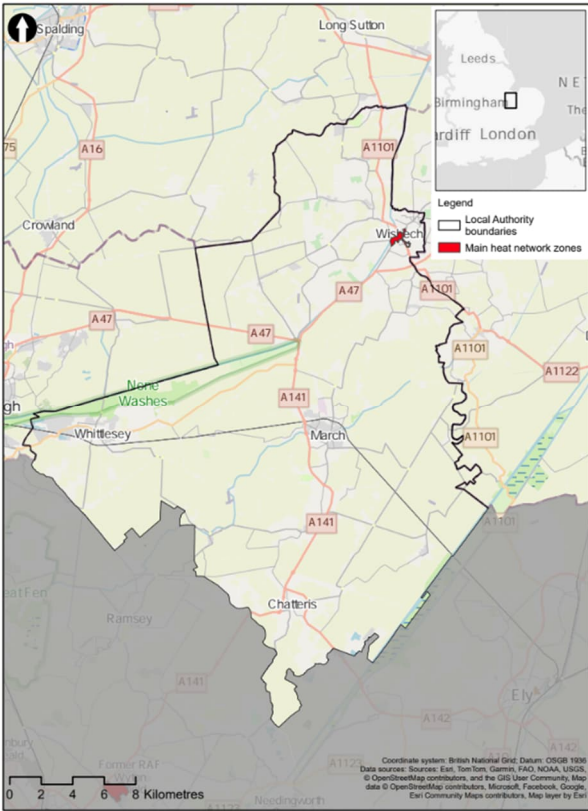
6.3.5 DESNZ NMR

The zones produced by the Department of Energy Security and Net Zero (DESNZ) in their National Model Run (NMR) (see Section 6.3.3) are shown in Figure 6.37, Figure 6.38 and Figure 6.39 highlighted in red for Fenland, Huntingdonshire, and Cambridge and South Cambridgeshire respectively.

It can be seen that DESNZ have only allocated one zone in Fenland, covering the centre of Wisbech. Huntingdonshire includes zones covering areas in the centre and West of Huntingdon, most of Wyton and Alconbury, and areas in the South-West and South-East of St Neots.

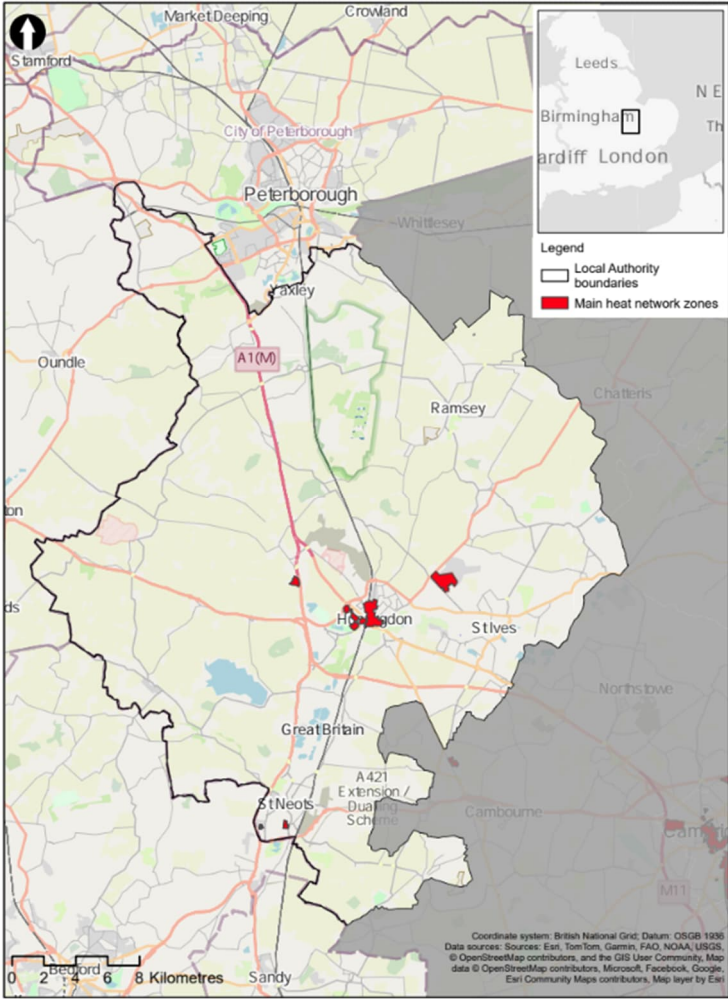
Indicative network zones in Cambridge City include large areas in the centre, South-East and West of the city. South Cambridgeshire has three relatively small zones, in Abington, Papworth Everard and the science park just to the North of Cambridge City. East Cambridgeshire has no zones in the DESNZ NMR model.

Figure 6.37: DESNZ NMR Heat Network Zones in Fenland



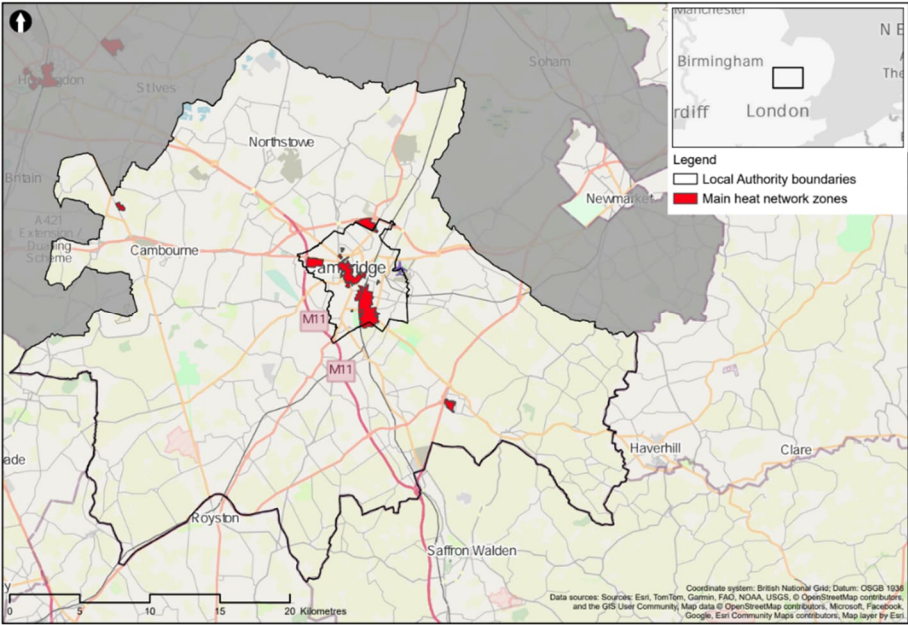
Source: DESNZ NMR 3

Figure 6.38: DESNZ NMR Heat Network Zones in Huntingdonshire



Source: DESNZ NMR 3.0

Figure 6.39: DESNZ NMR Heat Network Zones in Cambridge and South Cambridgeshire



Source: DESNZ NMR 3.0

A summary of some of the modelled data from DESNZ is shown below in Table 6.3. As would be expected based on the zonal map above, the bulk of the building connections, is in Cambridge City, and to a lesser extent Huntingdonshire. East Cambridgeshire is not included in the table as it has no network zones in the NMR.

The final column gives the average estimated levelised cost of heat (LCOH) for networks in each local authority in p/kWh. For comparison, a gas boiler in a domestic home will typically have an LCOH of around 9-11p/kWh, and an ASHP, around 16-19p/kWh, not including grant funding contributions.

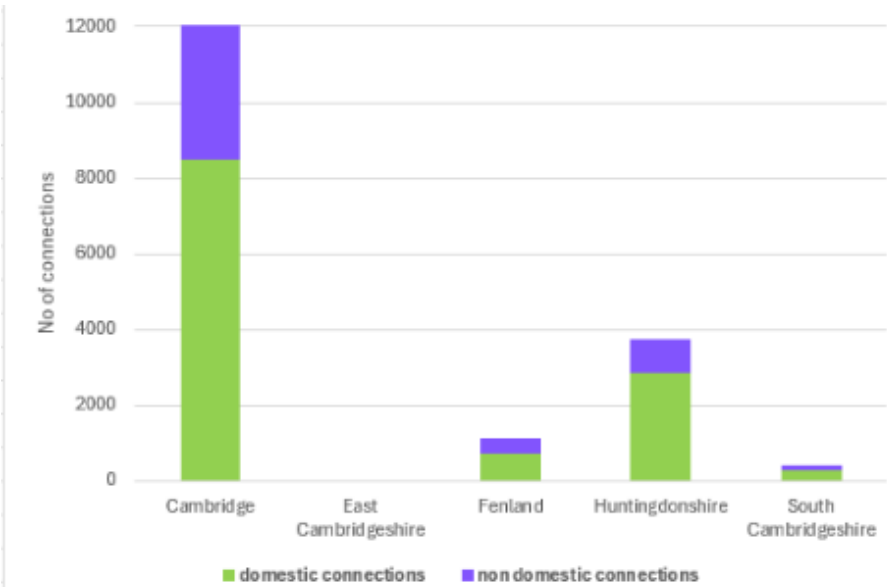
Generally, heat network's LCOH will be higher than that of a gas boiler, however if gas and electricity prices are re-balanced in the future at a national level then this should reduce the LCOH of heat pumps and heat networks compared to natural gas. The LCOH for each of the networks was lower than a typical value for a home using an air source heat pump, as was to be expected.

Table 6.3: DESNZ NMR summary by District Council

District Council	Total domestic connections	Total non-domestic connections	Total networked heat demand (GWh/year)	Total Capex required (£m)	Average network levelised cost of heat (p/kWh)
Cambridge	8502	3738	482.24	554.32	16.0
Fenland	705	391	26.61	36.66	14.3
Huntingdonshire	2825	915	150.92	192.25	12.6
South Cambridgeshire	281	133	48.34	44.15	11.6

Figure 6.40 below visualises the breakdown of the domestic and non-domestic connections identified in the NMR for each district council.

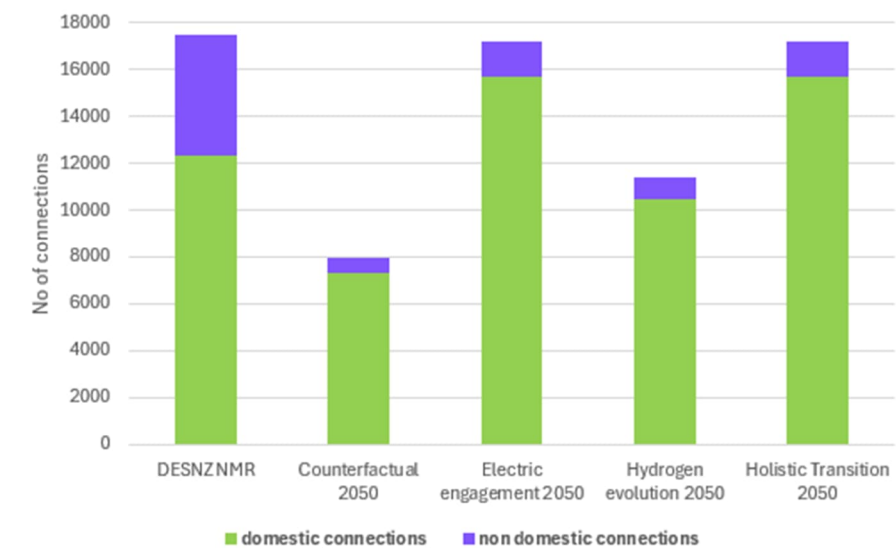
Figure 6.40: DESNZ NMR connections per District Council



Source: DESNZ NMR 3.0

Figure 6.41 below compares the DESNZ NMR projected heat network connections, to those of the four DFES scenarios. The NMR has a similar number of total connections compared to the electric engagement and holistic transition scenarios. However, it should be noted that the latter two have a much higher proportion of the total connections as domestic, and less non-domestic, compared to the NMR projections, which have a higher proportion of non-domestic buildings connecting into networks.

Figure 6.41: DESNZ NMR heat network connections comparison to DFES Scenarios



Source: DESNZ NMR 3.0

It should be noted that there are currently proposals for heat networks ongoing in Cambridgeshire outside of these DESNZ zones, which may be developed. These include the Melbourn super loop, where low grade heat will be supplied by a network and then topped up via small “shoebox” heat pump units at each connected property, and the Grantchester Heat link, which is currently investigating options for supplying the village of Grantchester with a heat network supplied by either air or water source heat pumps. There may therefore be other areas not included in the DESNZ zones outlined above, which may be suitable for heat network developments. The identification of these areas will depend on suitable technical feasibility assessments being carried out.

6.4 Future Cooling Demand

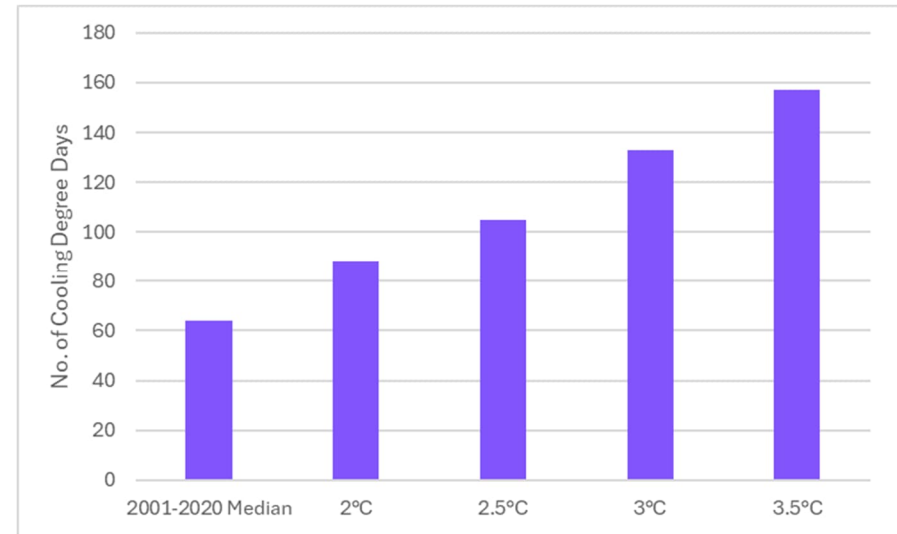
As global temperatures continue to rise, it is expected that cooling demand in the UK will increase as a result. It is difficult to accurately predict the impact this will have on energy demands, due to uncertainties around how much the climate in the UK will warm by, whether this increase is concentrated into a few extreme heat effects each year, or if it is a more consistent increase throughout the year, and how quick will the uptake of air conditioning units be when temperatures do rise.

The Met Office provide predictions of how the number of cooling degree days will likely change for each local authority in the UK, based on different global temperature increases. Annual Cooling Degree Days (ACDD) are defined as the sum, over a year, of the number of degrees by which the daily average temperature exceeds 22°C. For example, if the average temperature on one day is 25°C, that day would contribute three cooling degree days to the annual total.

Figure 6.42, provides projections for the number of cooling degree days expected in Cambridgeshire, based on different average global warming projections. It can be seen below that cooling demand is roughly expected to double in Cambridgeshire, should global average temperatures increase by three degrees. This would likely require the installation of air conditioning units on many homes and businesses, and increases the risk of extreme heat events.

Despite the almost certain increase in cooling demand, this LAEP has not considered it for assessing the impact on the carbon emissions or the electrical network. Regarding carbon emissions, air conditioning units run off of electricity and therefore their increase is likely to only affect electrical demand. With regards to electricity, the peak power throughout the year is still highly likely to be driven by the coldest winter day, when heat is provided by low carbon technologies (electricity). Because of this, impacts on the electrical network (Section 10) are assessed based on the roll out of heat pumps for heating, as opposed to including an allowance for cooling in the summer.

Figure 6.42: Annual sum of Cambridgeshire Cooling Degree Days projection



Source: [Met Office](#)

Regarding electrical energy consumption throughout the year, the increase in cooling demand will have an impact, and this is shown in Section 11 which looks at annual energy consumption in 2045.

It should also be noted, that as summers get warmer, effective cooling in homes will become essential. Similar to how a focus on building fabric efficiency and effective heating have been the focus of improving health outcomes of the past 30 years, NHS participants in the stakeholder engagement highlighted that effective cooling during hot summer days is also likely to have significant health benefits. Well-insulated homes not only retain

heat in winter but also help limit heat gain during summer, reducing the risk of overheating and the need for active cooling. The LAEP highlights this in some of the policy and project interventions listed, so as to ensure that in the transition to better homes and heating systems, effective cooling is not overlooked.

7 Industrial decarbonisation

This section analyses the current industrial process loads throughout the county and models the likely changes in energy source used to supply these process loads that will be necessary for full decarbonisation. Data from Cadent gas is used to map the existing process loads. It is assumed that the majority of low temperature process loads will be electrified, and that the majority of high temperature process loads will require a transition to hydrogen.

7.1 Methodology

To analyse the industrial process loads currently operating in Cambridgeshire, data from Cadent gas was obtained. This provided information on the gas consumption of each connection to the gas network from a non-domestic building.

The primary use of each connection was determined from its SIC code, a standard classification system produced by the Office for National Statistics (ONS) and widely used to categorise commercial and industrial activities. A description of the primary uses matched to each code was also provided by Cadent to facilitate this process. Each industrial SIC code primary use that was present in Cambridgeshire was then assigned as either low temperature, or high temperature, based on an assessment of the degree of heat required for the majority of process loads for that specific industry. For more details on the assignment for each industry type, see the process load modelling spreadsheet or Appendix E.

High temperature process loads require high grade heat for processes such as melting, drying and chemical transformations. They typically require the combustion of fossil fuels to reach the temperatures required. High temperature process loads in Cambridgeshire include the manufacturing of

chemical products, machine tools and other metal products, paper and cardboard, and motor vehicle components. As a conservative estimate, high temperature process loads which were assumed to require heat of around 200°C or above were assumed to require hydrogen to decarbonise, with all other process loads assumed to be able to electrify to reach net zero.

Lower temperature process loads in Cambridgeshire (typically less than 200°C) include electronic consumer goods manufacturing, food processing, textiles and clothing production and publishers/printing. Examples of how processes in some of these industries can transition from fossil fuels to electricity are given in the table below. It should be noted that while technology to electrify these loads readily exists, with the current energy price ratio (cost of natural gas relative to electricity) they will often not be cost effective compared to fossil fuels. If energy prices are re-balanced in the future then the electrification of processes in most industries will become more cost effective.

It should be noted that this section focusses on process loads currently using natural gas, which will need to switch to alternative energy sources and fuels for the County to reach net zero. Electrical process loads for industries such as biotech and R&D have already been incorporated into the modelled projections for non-domestic electrical demand across all sectors, including growth projections, as part of the overall energy demands by fuel type (and their resultant carbon emissions and grid impacts) presented in the energy efficiency and heat section. Electrical process loads will not significantly impact carbon emissions as the carbon content of the electricity grid will tend towards zero from the 2030s onwards.

Table 7.1: Low temperature process load examples

Industry	Technologies used
Food processing	Swapping of gas fired boilers used for steam generation to electric steam generators, swapping of gas burners for dryers, ovens, toasters and surface heating to electrical infrared or inductive heaters.
Clothing and textiles	Fossil fuel boilers are typically used for heating water for steam baths for washing, heating dye baths and providing steam for dyeing and fixation, supplying hot air for drying and conditioning. All of the above processes can instead use electric boilers or steam generators, or direct electric heaters.
Electronic consumer goods	Steam generation and hot water is used for cleaning and rinsing, hot air ovens are used for the drying of coatings on products and for bonding adhesives, heat is also required for environmental testing of temperature and humidity. Typically, these processes use fossil fuels but can readily electrify.
Publishing	Gas burners are used to supply hot air to dryers and curing tunnels when printing, laminating, applying solvents, and for humidification and climate control. These processes require relatively low-grade heat which can instead be electrified.

From the above process, the existing low and high temperature process loads throughout the county could be modelled and mapped at MSOA. These were 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.

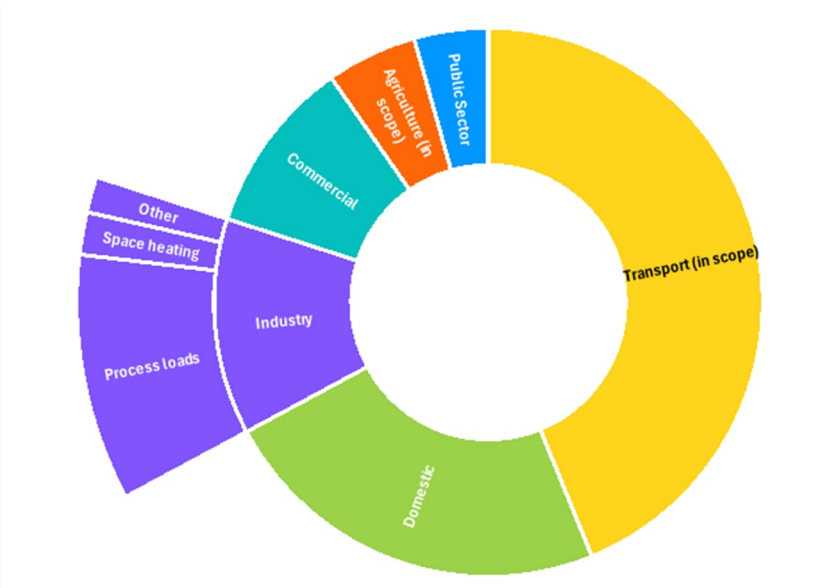
A profile was then created to project the annual changes in fuel use for process loads, and their resultant carbon emissions. This was based on the UK Government’s projections for industrial process load decarbonisation in the 7th Carbon budget, scaled appropriately to be applied to the Cambridgeshire process loads.

⁴⁹ [Energy Consumption in the UK - data.gov.uk](https://data.gov.uk)

7.2 Existing System

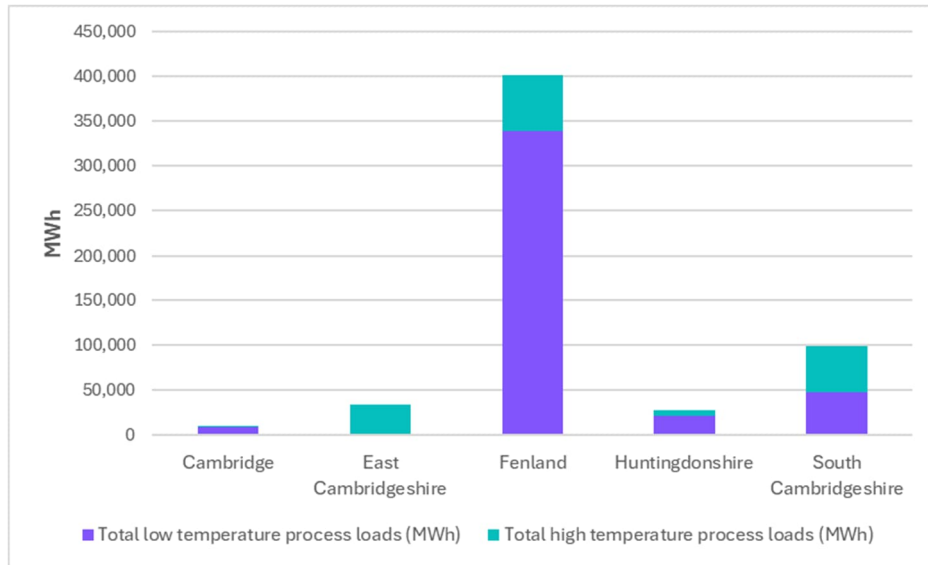
A breakdown of the county wide carbon emissions outlined in Section 3, is shown in Figure 7.1, with a further breakdown by energy use shown for industrial emissions. This proportional split for industrial emissions was estimated based on the UK Government’s energy consumption in the UK end use tables⁴⁹. Here it can be seen that while process loads make up the majority of the emissions in the industrial sector, they represent a relatively low proportion of the county’s total emissions (9%).

Figure 7.1: County wide Carbon Emissions Breakdown (2023)



Source: UK local authority and regional greenhouse gas emissions statistics - GOV.UK

Figure 7.2: 2023 Process load breakdown by local authority



Source: Cadent gas data and Mott Macdonald Analysis

Figure 7.2 outlines the current consumption of natural gas for industrial process loads in each local authority, split between low temperature and high temperature loads.

It can be seen that Fenland has significantly higher process loads than the other four local authorities in Cambridgeshire. The majority of these are low temperature however, which could likely be electrified, with only 15% being high temperature, which will likely require hydrogen to decarbonise. Cambridge and Huntingdonshire have similar proportions of high temperature vs low temperature loads. Nearly all East Cambridgeshire's process loads are high temperature, and in south Cambridgeshire the ratio is roughly 50/50.

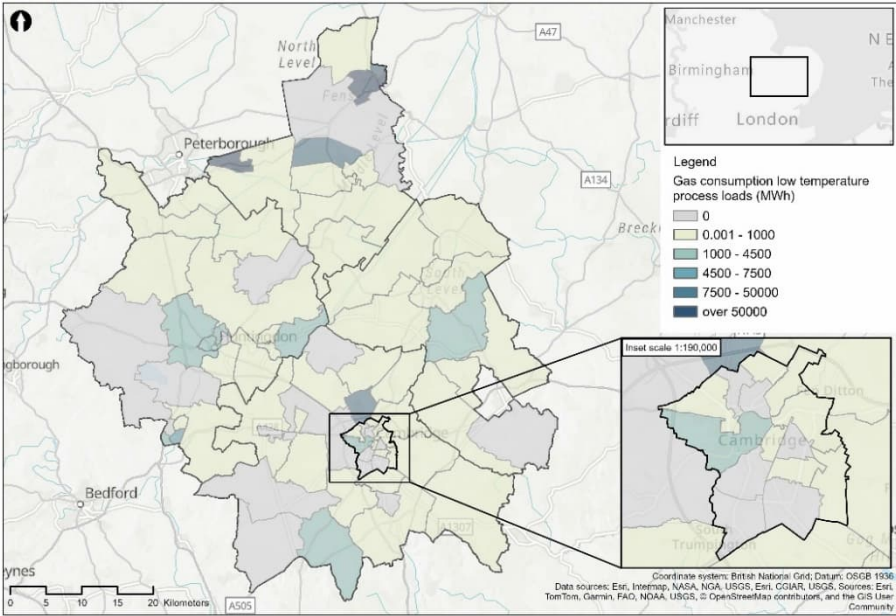
Figure 7.3 maps the low temperature process loads in Cambridgeshire to each MSOA. Here it can be seen that there are relatively low amounts of process loads spread throughout most of the county, with relatively few MSOAs having none at all, and most of the demands concentrated in a couple of areas.

The high amount of low temperature process loads in Fenland are mainly concentrated in Whittlesey and Wisbech. After those areas, the MSOA area with the largest gas consumption for low temperature loads is "Histon, Impington and Orchard Park" in South Cambridgeshire.

Figure 7.4 presents a similar map as Figure 7.3 but showing high temperature process loads. It can be seen that these process loads are more concentrated than low temperature, with most MSOAs having none and there being more MSOAs showing in darker blue and green.

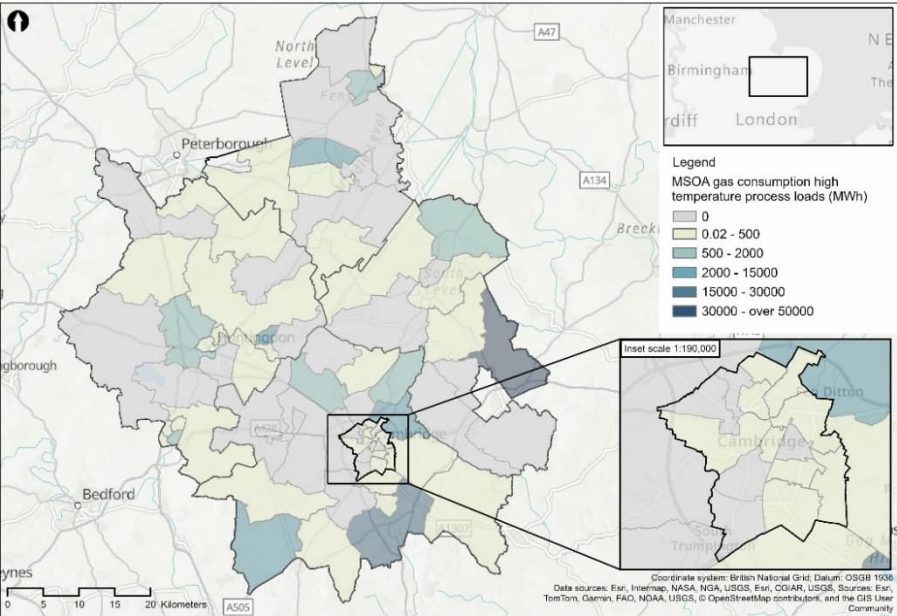
Whittlesey in Fenland, again, has more high temperature process loads than any other area in the county. This is followed by the "Isleham, Fordham & Chippenham" MSOA in East Cambridgeshire, and the "Duxford, Whittlesford & the Abingtons" MSOA in South Cambridgeshire, which also have significant amounts of high temperature process loads compared to the rest of the county. Cambridge has very few high temperature process loads, with the other four local authorities all having some MSOAs with moderate amounts, as shown by the spread of green and blue MSOAs in the maps.

Figure 7.3: Low temperature process loads mapped by MSOA



Source: Cadent gas data and Mott Macdonald Analysis

Figure 7.4: High temperature process loads mapped by MSOA



Source: Cadent gas data and Mott Macdonald Analysis

7.3 Decarbonisation requirements

To model the projected energy consumption changes and resultant carbon emissions for process loads, it was assumed that all low temperature process loads would electrify, and that all high temperature process loads would convert to hydrogen. It should be noted that the low temperature classification includes industries that do not currently have cost effective technology available on the market to electrify, but it is assumed that this may occur within the next ten years. As stated at the beginning of Section 7, this typically

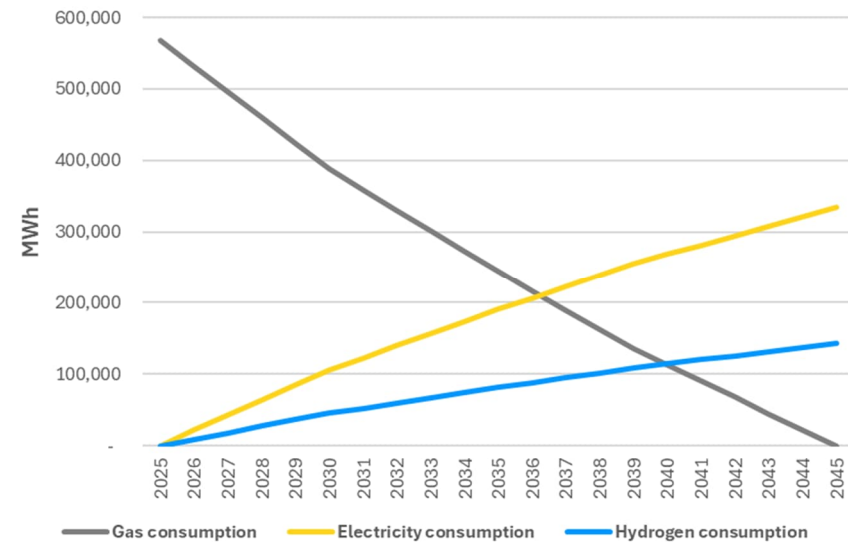
includes requirements for heated steam, water, air or chemicals in the 150-200°C range. While there are currently technologies which can provide this temperature electrically, they are currently typically more expensive to both install and then operate compared to fossil fuel equivalents.

A profile to project the rate of uptake of fuel switching for process loads we then developed, using the projections in the UK Government's 7th Carbon Budget⁵⁰, scaled down appropriately to Cambridgeshire. This profile included a reduction in the total energy required for process loads due to energy efficiency, of around 6%. Efficiency improvements of electrical systems compared to fossil fuel boilers were also included in the consumption projections for low temperature loads.

The industrial decarbonisation projection from the 7th Carbon Budget included contributions from Carbon Capture and Storage. However this technology was ruled out for Cambridgeshire, as it is generally only suitable for extremely large industrial sites of national level importance infrastructurally. Based on the data available, there did not appear to be any suitable sites within the county.

Figure 7.5 below shows the projected consumption of gas, electricity and hydrogen for process loads. This follows the previously outlined assumptions. The ratio of hydrogen consumption to electricity consumption in 2045 is higher than the current ratio of high temperature to low temperature process loads, due to the system efficiency improvements when electrifying burners and other processes that previously combusted fuel.

Figure 7.5: Process load energy consumption projection



Source: Cadent gas data and Mott Macdonald Analysis

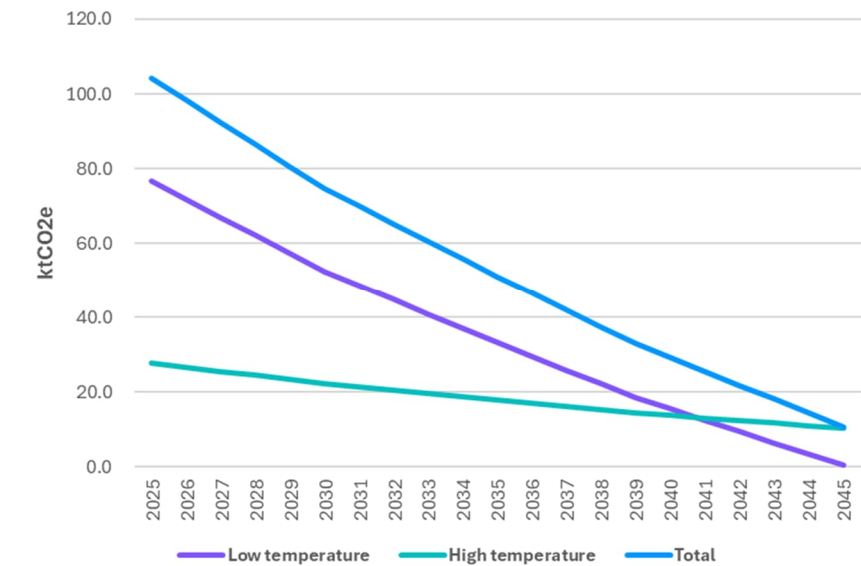
The resultant carbon emission reduction from the energy source changes in process loads outlined in Figure 7.5, is outlined below in Figure 7.6 for low temperature, high temperature and total process loads.

It can be seen that the low temperature emissions that convert to electricity reach zero by 2045. The high temperature process loads consuming hydrogen will still emit around 10ktCO₂e that will likely need to be sequestered to reach net zero. The carbon factor used for hydrogen was taken from the

⁵⁰ [The Seventh Carbon Budget - Climate Change Committee](#)

UK Government’s Low Carbon Hydrogen Standard⁵¹ which provides the legally binding maximum carbon content that green hydrogen produced in the UK can have. Which, at 0.072 kgCO₂e/kWh, is significantly higher than the carbon factor of electricity post grid decarbonisation in the 2030s. If the standards for the carbon content of green hydrogen in the UK are made more stringent in the future, then the value of industrial emissions that will need sequestered may be lower than the value provided here.

Figure 7.6: Process load carbon emissions projection



Source: Cadent gas data and Mott Macdonald Analysis

⁵¹ [UK Low Carbon Hydrogen Standard - GOV.UK](#)

The table below provides a more detailed breakdown of the current carbon emissions due to process loads, and the resultant savings once they have switched to electricity and hydrogen.

Table 7.2: Process load carbon emissions reductions

Local Authority	Total Current Process Load Carbon Emissions (tCO ₂ e)	Electrical Carbon Emissions post fuel switch (tCO ₂ e)	Hydrogen Carbon Emissions Post Fuel Switch (tCO ₂ e)	Total Process load Carbon Emissions Post Fuel Switch (tCO ₂ e)	Percentage Decrease
Cambridge	1,743	7	55	62	96.5%
East Cambridgeshire	6,165	2	2,135	2,137	65.3%
Fenland	73,287	270	4,215	4,485	93.9%
Huntingdonshire	5,047	17	438	455	91.0%
South Cambridgeshire	18,055	38	3,422	3,460	80.8%
total	104,297	334	10,264	10,599	89.8%

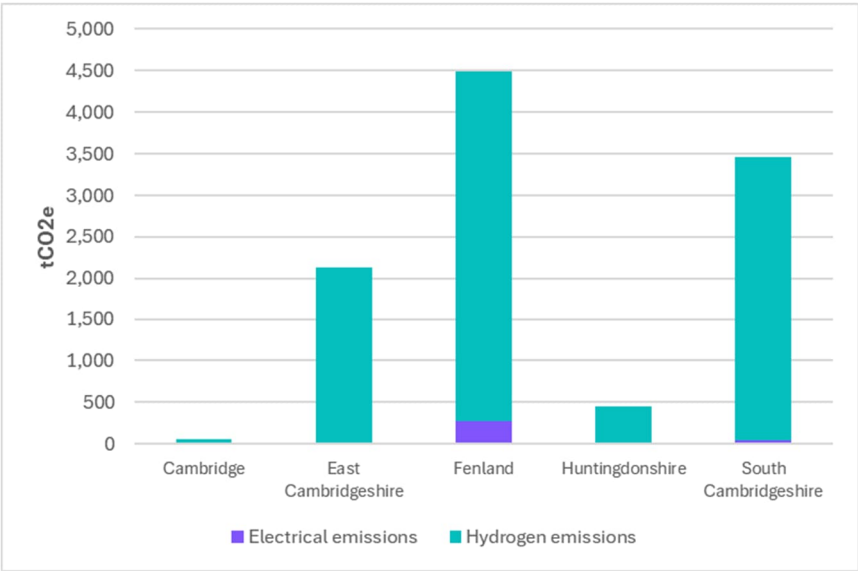
Figure 7.7 below breaks down the carbon emissions by local authority, split between electricity and hydrogen consumption for process loads once fossil fuel use has been removed from industrial processes.

It can be seen in Table 7.2 that East Cambridgeshire has the lowest carbon reduction for process loads, which is due to its much higher proportion of high temperature loads compared to the other authorities, as highlighted in Figure

7.1. The higher resultant carbon emissions that will need to be sequestered in areas with more high temperature loads is also evident when comparing Figure 7.7 and Figure 7.1.

It is therefore important that industries electrify their process loads where viable, due to the lower carbon content compared to using green hydrogen. It is important that all industrial companies in Cambridgeshire have a decarbonisation plan which outlines when they will decarbonise different process loads that currently rely on fossil fuels and specifying the alternative energy sources they will switch to.

Figure 7.7: Process load carbon emissions post fuel switch



Source: Cadent gas data and Mott Macdonald Analysis

7.4 Next Steps

The decarbonisation of process loads through transitioning from fossil fuels to low carbon alternatives, will mainly be dependent upon the private sector, as all industry in Cambridgeshire is privately owned. Ultimately, how and when each industrial site decarbonises its energy use will be the decision of the business and site owners.

However, the council can support this transition by engaging with utilities providers and industrial bodies. The facilitation of communication between these key stakeholders will enable the transition away from fossil fuels by ensuring that local infrastructure is ready for the required fuel switching. The DNO can ensure that the electricity grid is able to take on the additional demands from low temperature process loads electrifying, and the local gas network, or other hydrogen providers operating locally, can ensure that there is enough supply for high temperature process loads moving away from natural gas.

8 Transport

This section covers modes of transport, Cambridgeshire's transport goals/plans, emissions from transport, and electric vehicle/alternative fuel uptake. It outlines the current state of transport emissions in Cambridgeshire, the assumptions underpinning the counterfactual scenario, and the interventions modelled across three net-zero aligned scenarios that prioritise different pathways to decarbonisation.

8.1 Existing system

Like many urban centres in the UK, transportation is a large topic covering many aspects. Cambridgeshire has long endeavoured to increase mobility in the region, by reducing congestion on roads and improving more sustainable forms of travel. Reducing single occupancy vehicles, and the kms travelled per person will help reduce emissions in any scenario of electric vehicle (EV) uptake.

The Cambridgeshire and Peterborough Local Transport and Connectivity Plan (LTCP)⁵² sets out a strategic approach based on three core principles: Avoid, Shift, Improve. These principles underpin the region's ambition to decarbonise transport and deliver a modern, integrated, and equitable transport system:

- Avoid: Reducing the need to travel and the distance travelled, through better spatial planning, digital connectivity, and local service provision.
- Shift: Encouraging a switch from private car use to more sustainable modes, including walking, wheeling, cycling, and public transport.

- Improve: Enhancing the efficiency and emissions profile of all transport modes, including through electrification and alternative fuels.

Cambridgeshire has set a target that by 2030, at least half of all journeys within the region will be walked, wheeled, or cycled. The LTCP also includes plans to expand access to e-bikes and shared mobility options, recognising their role in supporting modal shift, especially in areas where distances are greater or public transport is limited. These ambitions align with the Local Growth Plan, which identifies transport connectivity as a critical enabler of sustainable economic development across the region.

According to the Department for Transport⁵³, the number of licensed vehicles in Cambridgeshire increased by 16% from 2011 (Census year) to 2023 (our baseline year). This is relatively on-pace with a 13% population increase from 2011 to 2023⁵⁴, from Census data. The share of EVs in Cambridgeshire's total vehicle fleet is relatively small, as shown in Figure 8.1. While the growth of EVs in total vehicle makeup has been somewhat slow, year-on-year EV registration has increased by an average of 57%. As shown in Figure 8.2, the number of EVs has sharply increased in the past four years.

Cambridgeshire and Peterborough Combined Authority has been awarded capability funding under the Local Electric Vehicle Infrastructure (LEVI) fund through to end of financial year 2025/26 and is negotiating with Office for Zero Emissions Vehicles an indicative capital allocation of £5.4m⁵⁵.

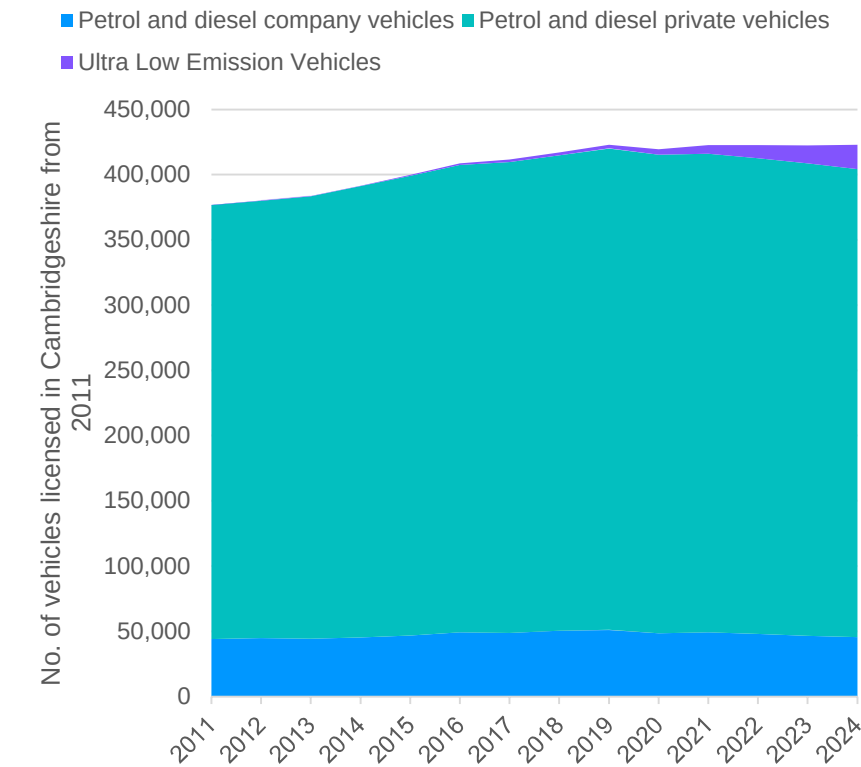
⁵² [Local Transport and Connectivity Plan \(LTCP\)](#)

⁵³ [Department for Transport Vehicles Licencing Statistics](#)

⁵⁴ [Cambridgeshire and Peterborough Census Insight Data](#)

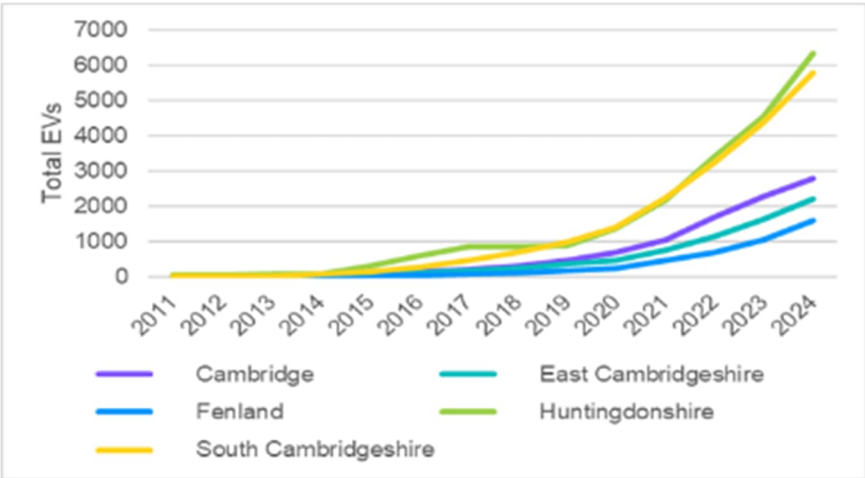
⁵⁵ [Local Electric Vehicle Infrastructure \(LEVI\) capital: funding amounts and project status](#)

Figure 8.1: Total Vehicle Growth from 2011 in Cambridgeshire



Source: [Department for Transport Vehicles Licencing Statistics](#)

Figure 8.2: Historical EV Uptake by Local Authority



Source: [Department for Transport Vehicles Licencing Statistics](#)

As shown earlier in Section 3 (Figure 3.2), emissions from transport have not significantly reduced over the last 15 years. That section also showed that transport emissions vary significantly between district areas. This is perhaps unsurprising given the population density differences between the districts. Differences in access to public transport and commuting times may also play a role in this variation. Measures needed to decarbonise transport will vary depending on the district council area.

8.2 Counterfactual

The Counterfactual scenario represents the best estimate of a 'do nothing' scenario, before the LAEP is implemented. Regarding modal shift (people switching to more sustainable modes of travel), the counterfactual assumes a strong adoption of electric vehicles (EVs) by 2045, but Internal Combustion

Engine (ICE) vehicles remain prevalent, especially in rural and less economically developed areas. Public charging networks are scarce, leading to continued reliance on fossil fuels for transportation. National legislation / policy remains in place but uptake is not further accelerated by connected policies from local authorities that enable phasing out internal combustion engines (ICEs) and phasing in EVs.

8.2.1 Counterfactual Modal Shift Assumption

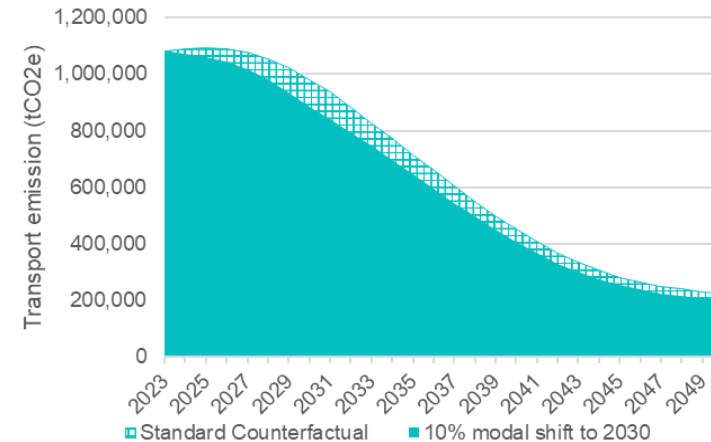
Cambridgeshire has long demonstrated a commitment to achieving transport modal shift, with the latest LCTP outlining a comprehensive strategy to encourage residents to transition away from private vehicle use. This ambition is supported by a wide array of infrastructure projects and initiatives, many of which are catalogued in the Cambridgeshire Transport Proposals Database⁵⁶.

These projects reflect a strong emphasis on active travel and public transport infrastructure, as recommended by the Cambridgeshire and Peterborough Independent Commission on Climate in its October 2021 report⁵⁷. However, the extent of future modal shift remains uncertain. To account for this uncertainty, our modelling assumes **an approximate 6% reduction in passenger vehicles (cars and vans) in our holistic transition scenario, with the other scenarios assuming no modal shift. This is consistent with the mode shift included in the DFES forecast. Notably**, the average number of kilometres driven per vehicle is assumed to remain the same. This assumption provides a worst-case scenario for estimating energy consumption, charging infrastructure needs, and impacts on the electrical network. **This allowance of a reduction in vehicles in one of the future scenarios, caters for a** degree of modal shift to occur in the region, given the scale and ambition of the projects underway.

Figure 8.3 illustrates the impact of a 10% reduction in vehicle kms by 2030 compared to a zero-modal shift scenario. While modal shift contributes meaningfully to emissions reduction, the largest driver of decarbonisation

remains the transition from ICEs to low-carbon fuel types, which is discussed in the next section.

Figure 8.3: Impact of 10% modal shift on carbon emissions



Source: Mott MacDonald modelling based off DFES data, Cambridgeshire Population Forecast and UK Government Vehicle Statistics

8.2.2 Counterfactual Fuel change assumption

As outlined in Section 2.1.12, the UK government will ban the sale of new internal combustion engine (ICE) vehicles from 2035 as part of its mission to decarbonise the transportation sector²³. This policy is expected to drive a significant shift in the fuel makeup of Cambridgeshire's vehicle fleet over the coming decades. Figure 8.4 illustrates the projected uptake of EVs across different vehicle types under the counterfactual scenario.

⁵⁶ Transport Proposals Database

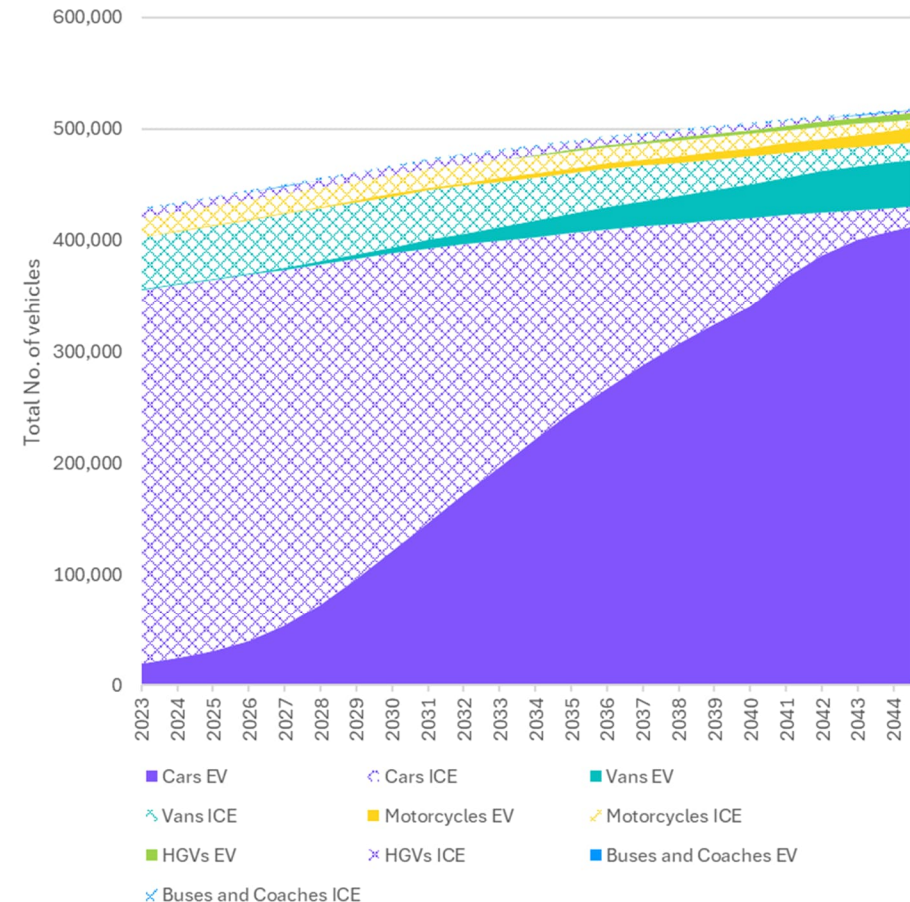
⁵⁷ FINAL CLIMATE REPORT LOW (002).pdf

Several key assumptions are illustrated in Figure 8.4, driven by national trends and policy:

- The number of licensed vehicles is expected to increase, primarily driven by cars. This reflects both population growth and increased mobility demand across the region.
- Between 2030 and 2040, the transition to EVs accelerates sharply, particularly for cars. By the mid-2030s, EVs are projected to surpass 50% of the total car fleet in Cambridgeshire, driven by national policy and market momentum.
- The uptake of EVs among vans and heavy goods vehicles (HGVs) is more gradual, with internal combustion engines remaining dominant in these categories well into the 2040s. This slower transition reflects technological and infrastructure challenges, including payload limitations and charging requirements for commercial fleets.
- Even by 2045, ICE vehicles will still be present on Cambridgeshire's roads, particularly among HGVs and older private vehicles. This residual presence of ICEs suggests that to fully decarbonise transport, complementary measures such as the adoption of low-carbon liquid fuels (e.g. HVO) may be required.

The counterfactual scenario assumes no additional local interventions beyond national policy. As such, while EV uptake is substantial, it is not sufficient to achieve net zero transport emissions by 2045. The continued presence of ICE vehicles and the slower transition in commercial fleets highlight the need for targeted local action to accelerate decarbonisation, particularly in hard-to-electrify segments.

Figure 8.4: Counterfactual EV uptake projection



Source: Mott MacDonald modelling based on DFES data, Cambridgeshire Population Forecast and UK Government Vehicle Statistics

8.2.3 Counterfactual Charger Uptake

As residents replace their ICE vehicles with EVs, local authorities, residents and private companies will need to meet that demand by installing more EV charging infrastructure. In the counterfactual scenario, EV charger deployment is assumed to occur organically in response to national policy and market trends, without additional local authority intervention. We can categorise four types of EV chargers that will be required to support the transition to electric vehicles, as shown in the photos below. These are named as to whether they are private or public sector funded, available only to one family or open to the public, and above 50kW (rapid) or below 50kW (fast).

- Private - Shared - Rapid
- Private - Shared - Fast
- Private - Private - Fast
- Public - Shared - Fast

Advice provided to Local Authorities by the Energy Saving Trust, in their role as delivery partner for the Local Electric Vehicle Infrastructure (LEVI) fund, suggests that authorities plan on the basis of the ratio of publicly accessible charge points compared to the vehicle fleet, irrespective of whether these were installed using public funding or private funding. A ratio of 10 vehicles for each publicly available charger can be used as a guide for planning⁵⁸.

As such, the counterfactual scenario assumes there will be a level of charging infrastructure installed, funded by private companies, public entities or residents, that will occur naturally with the transition to EV. The uptake of Private–Private–Fast chargers is expected to lead, particularly in areas with high rates of home ownership and off-street parking. Private–Shared–Fast and Private–Shared–Rapid chargers will grow more slowly at, for example, petrol stations, supermarkets, out-of-town retail parks and gyms constrained

by capital costs and planning requirements. Public–Shared–Fast chargers, primarily catering for residents without off-street parking, are assumed to remain limited, as their deployment requires proactive investment and coordination by local authorities, actions not included in the counterfactual scenario.

In line with national policy developments, the introduction of Approved Document S to the Building Regulations 2010⁵⁹ now mandates the installation of EV charge points in all new buildings in England with associated parking. This regulation, which came into effect on 15 June 2022, applies to both residential and non-residential developments, as well as major renovations. Complementing this national mandate, local authorities across Cambridgeshire have introduced planning policies that further encourage EV infrastructure. For example, the Greater Cambridge Shared Planning Draft Local Plan includes Policy I/EV⁶⁰, which sets minimum EV charging standards for new developments, while South Cambridgeshire District Council requires EV provision through its planning process and supports community-led installations. The Cambridgeshire & Peterborough Electric Vehicle Infrastructure Strategy⁶¹ also provides regional guidance and tools to support consistent EV deployment. These are already influencing development patterns as seen in developments such as Marleigh⁶², where EV smart chargers are being installed from the outset. Together, these measures support the transition to low-carbon transport and align with the wider decarbonisation objectives of the LAEP.

Figure 8.5 and Figure 8.6 illustrate the projected requirement for publicly accessible chargers by type, showing a steady increase in private installations, with public chargers growing more slowly due to higher capital costs and planning constraints. The greater volumes in Huntingdonshire and South Cambridgeshire arise from the larger vehicle fleets (each with over

⁵⁸ [Forecasting public electric vehicle charging demand](#) page 27

⁵⁹ [Infrastructure for charging electric vehicles: Approved Document S](#)

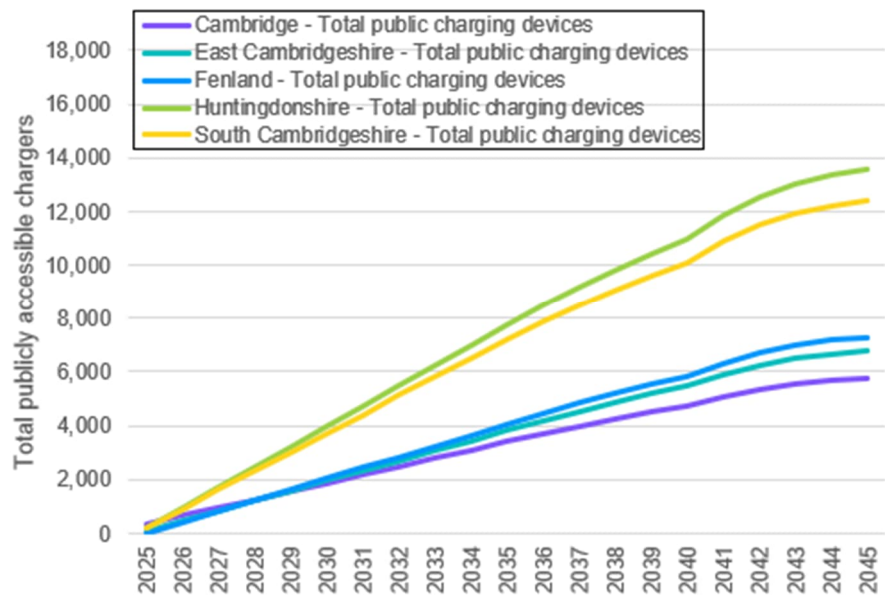
⁶⁰ [Policy I/EV: Parking and electric vehicles](#)

⁶¹ [Cambridgeshire and Peterborough Electric Vehicle Infrastructure Strategy](#)

⁶² Marleigh is a new community located in the north-east corner of Cambridge City, approximately two miles from the historic city centre.

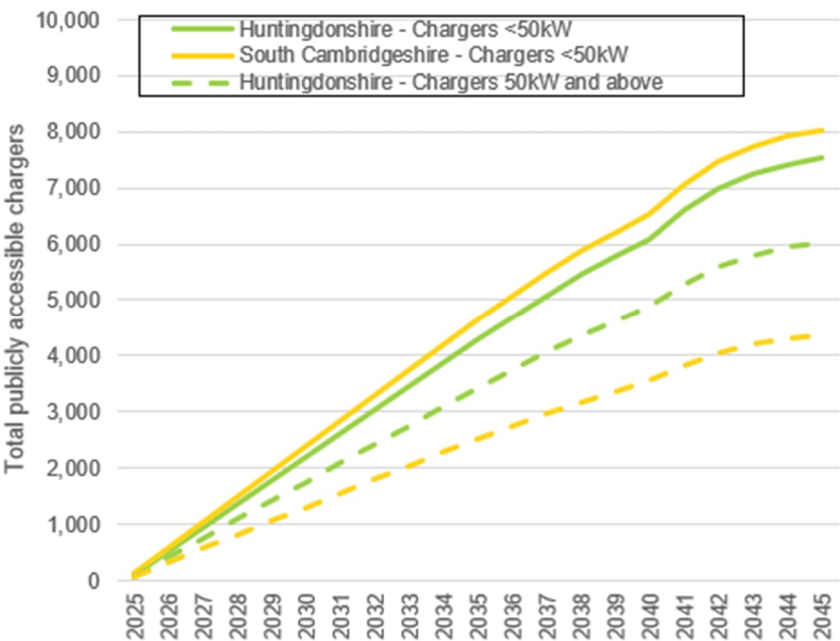
100,000 registered vehicles in 2024 compared to 75,000 or less in the other districts).

Figure 8.5: Estimated requirements for publicly accessible chargers (Counterfactual)



Source: Mott MacDonald analysis based on vehicle projections from DFES and Energy Savings Trust benchmarks for charger provision

Figure 8.6: Indicative split of rapid or high-powered chargers (>50kW) in the local authorities with the greatest requirement (Counterfactual)



Source: Mott MacDonald analysis based on vehicle projections from DFES and Energy Savings Trust benchmarks for charger provision

Private-Shared-Rapid

High-powered DC chargers (>50kW) installed by private companies at petrol stations, park-and-rides, and motorway services.



Private-Shared-Fast

Chargers installed by private entities (e.g. landlords, employers) for shared use. These include 7kW AC chargers in car parks, flats, and business premises.



Private- Private- Fast

Home chargers installed by residents in single-family dwellings, usually with off-street parking. These are assumed to be 7kW AC chargers and are expected to dominate uptake in rural areas and new housing developments.



Public – Shared – Fast

Chargers funded by the public sector and accessible to multiple residents. These are 7kW AC chargers typically installed in housing estates or public car parks.

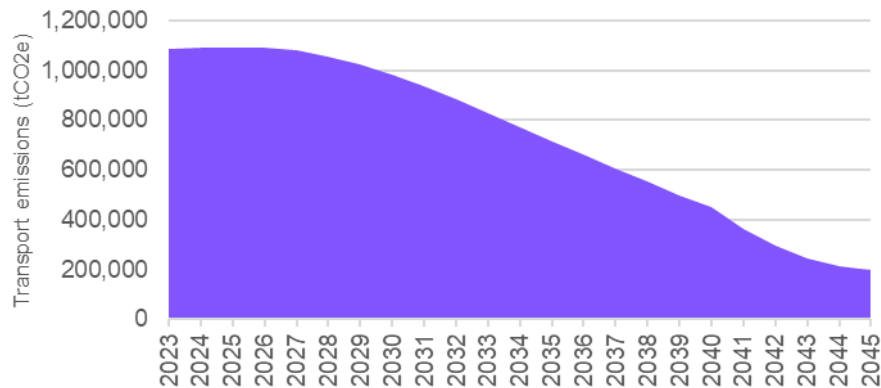


Note: Public EV chargers specifically for taxis are excluded from the LAEP analysis. Charging infrastructure for buses, coaches, and heavy goods vehicles (HGVs) is also out of scope. This is because buses and coaches are typically operated by private companies or regional transport authorities, and their charging infrastructure is planned and delivered through separate fleet decarbonisation programmes. HGVs primarily travel on trunk roads and motorways, with charging infrastructure located at strategic freight hubs and service stations. These are governed by national transport and logistics strategies rather than local planning. The LAEP focuses on personal transport and localised infrastructure that can be influenced by local authorities, residents, and community organisations. Photo Credits: All photos Nick Jimenez.

8.2.4 Counterfactual Projected Emissions Decrease

The transition to electric vehicles (EVs) under the counterfactual scenario is projected to significantly reduce transport-related carbon emissions, as shown in Figure 8.6. EV uptake is expected to accelerate from 2030, largely driven by the UK Government’s ban on the sale of new internal combustion engine (ICE) vehicles by 2035. Passenger cars are anticipated to lead this shift, with EVs making up more than half of the fleet by the mid-2030s. However, the transition for vans, HGVs, and buses is expected to progress more slowly, with ICE vehicles still present across all categories by 2045.

Figure 8.7: Projected Decrease in Cambridgeshire Transport Emissions under a Counterfactual Scenario



Source: Mott MacDonald modelling

While national policy delivers a substantial reduction in emissions, it is not sufficient to achieve net zero in Cambridgeshire’s transport sector by 2045. A faster uptake of EVs, especially among HGVs, and the development of alternative technologies such as hydrogen or sustainable fuels will be essential. This reinforces the importance of local interventions, including improved charging infrastructure, support for fleet transitions, and innovation

in low-carbon freight solutions. The following sections outline the additional measures the LAEP should consider.

8.3 Scenarios

8.3.1 Overview of scenarios

This section outlines the projected evolution of transport emissions across four scenarios: Counterfactual, Electric Engagement, Hydrogen Evolution, and Holistic Transition. Each scenario reflects a different pathway to decarbonisation, shaped by varying levels of policy ambition, technology uptake, and behavioural change. These scenarios are explained in Section 4. Whilst the roll-out of EV charging at new developments is secured through planning conditions, we recommend one of the key parameters for the local authorities to monitor is the installation of EV chargers by private entities at existing sites, and whether this roll-out shows signs of stalling. This may require additional intervention from the local authorities and earlier or increased public funding for publicly accessible chargers to remain on track for net zero.

The electric engagement scenario focuses on electrification as the primary route to decarbonisation. It assumes strong policy support to make EVs widely accessible, underpinned by investment in charging infrastructure and affordability measures. This scenario requires the electricity network to be resilient and responsive to rising demand.

The hydrogen evolution considers the potential role of hydrogen infrastructure in decarbonising transport, particularly for hard-to-electrify segments. It exhibits a small allocation of the transition for HGV towards other fuels, rather than assuming full electrification. However, given the lack of DFES data on hydrogen vehicles and stakeholder consensus that hydrogen is unlikely to be viable for personal transport, uptake is assumed to be negligible.

The holistic transition presents a balanced approach, combining widespread electrification with strategic deployment of hydrogen and alternative fuels.

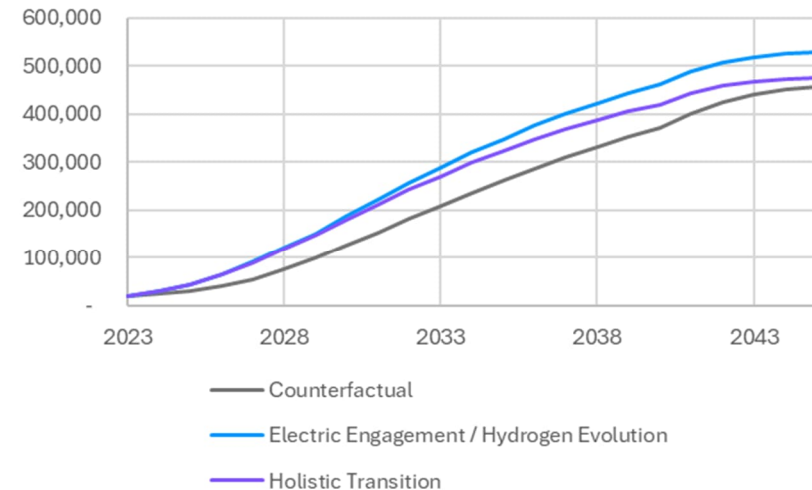
Internal combustion engine (ICE) vehicles are actively phased out, in line with the UK Government's 2035 ban on new ICE sales. This scenario achieves the most comprehensive emissions reductions while maintaining flexibility across transport modes.

8.3.2 Projected EV Uptake

EV uptake across the scenarios is expected to pick up speed in the late 2020s, plateauing in growth through the late 2040s. The figures below show the future EV uptake by scenario. Across all vehicle types, in all three of the intervention scenarios, EV uptake is higher than in the counterfactual.

Figure 8.8 presents three scenarios for passenger EV adoption in Cambridgeshire. While all scenarios show steady growth, the rate varies. The counterfactual scenario reflects minimal intervention and results in the slowest uptake. The holistic transition scenario shows moderate growth, suggesting coordinated planning and community engagement. The electric engagement / hydrogen evolution scenario projects the fastest growth, indicating strong policy support, infrastructure investment and potential integration of hydrogen technologies.

Figure 8.8: Projected growth in EV cars and vans

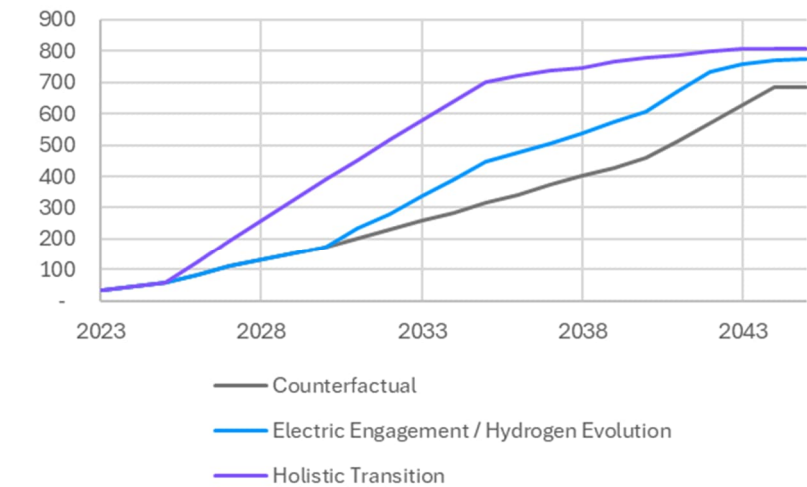


Source: Mott MacDonald modelling based on DFES data

To note, both the Holistic transition and electric engagement / hydrogen evolution scenarios achieve near full transition to electric vehicles. However the holistic transition includes an approximate 6% reduction in passenger vehicles given an assumed mode shift to public transport or active travel; which explains why the above a graph shows a higher number of EV cars and vans in the electric engagement / hydrogen evolution scenario.

Similar trends are observed for buses and coaches, as shown in Figure 8.9. Growth occurs across all scenarios, with the counterfactual again showing the slowest and most gradual increase. The holistic approach delivers the most rapid uptake initially, reflecting a comprehensive strategy and early systemic change, before levelling off towards 2045. In contrast, the electric/hydrogen scenario shows steady growth throughout, reflecting targeted investment in zero-emission technologies and supportive policy frameworks.

Figure 8.9: Projected Growth in EV Buses + Coaches



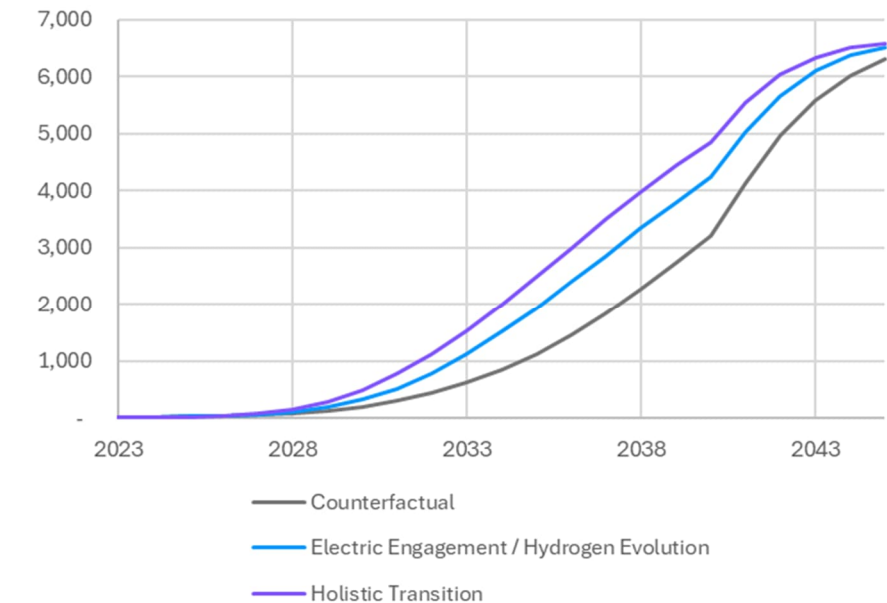
Source: Mott MacDonald modelling based on DFES data.

For HGVs (Figure 8.10), uptake begins to accelerate around 2028 and plateaus by 2045, with all scenarios reaching between 6,000 and 7,000 vehicles by 2049. The counterfactual remains the least ambitious, assuming minimal intervention or continuation of current trends. The electric engagement scenario shows steady growth which could be due to targeted investment and technology deployment; the small re-distribution of vehicles towards other alternative fuels (including hydrogen) is shown for the Hydrogen Evolution scenario and is of the order of ~1 fleet of vehicles by 2040. The holistic transition shows the fastest growth, with vehicle numbers rising sharply until around 2045, then stabilising, with peaks at approximately 800

vehicles. This could reflect a comprehensive strategy involving multiple technologies and systemic changes.

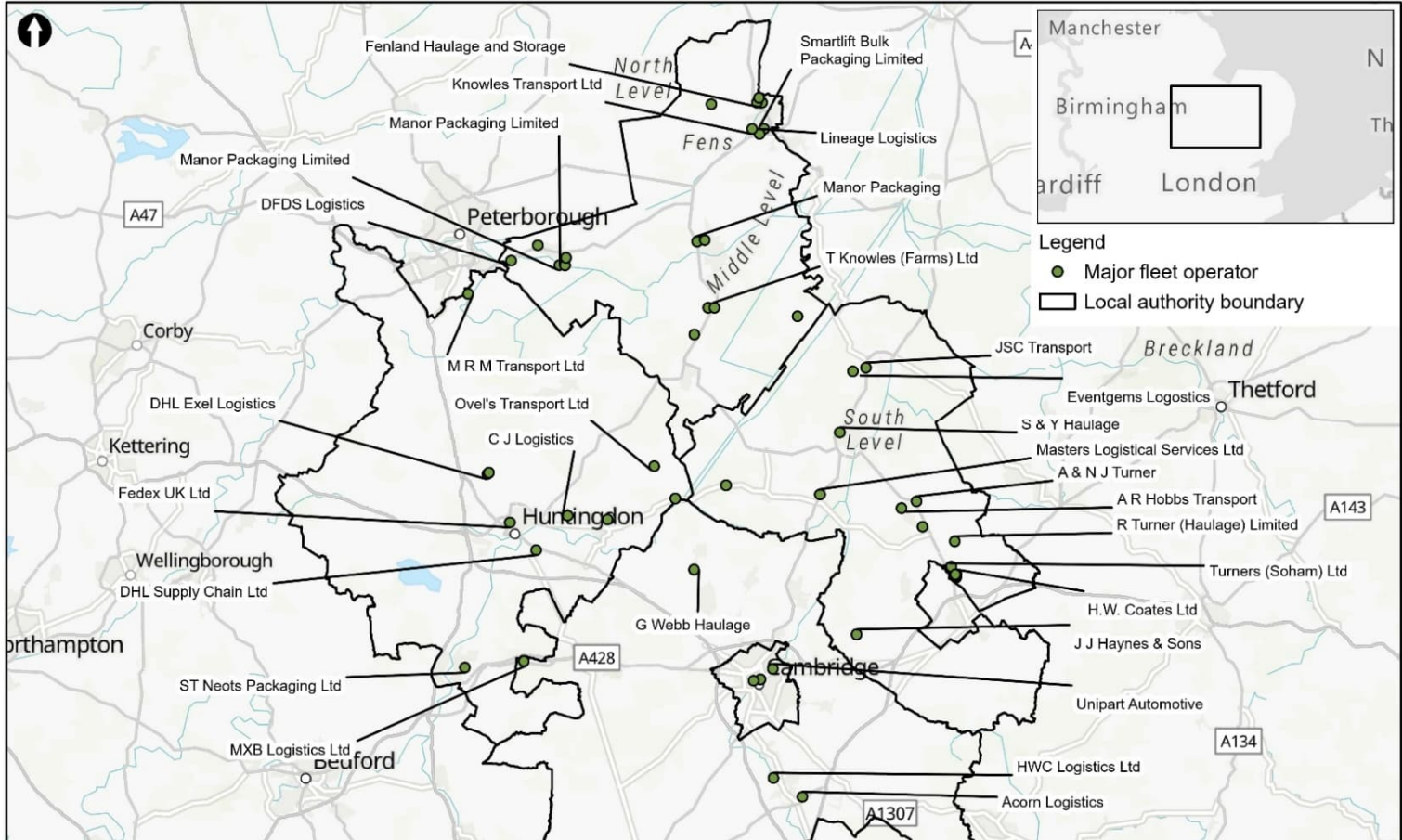
To make the challenges tangible, Figure 8.11 illustrates the location of the HGV depots in the region which we could readily identify.

Figure 8.10: Projected Growth in EV HGVs



Source: Mott MacDonald modelling based off DFES data

Figure 8.11: Illustration of HGV depots in the region



Source: Mott MacDonald analysis of Address Base Premium. Note: Although all locations shown were identified as major fleet operators, some remain unlabelled because their company names were unknown at the time of analysis.

8.3.3 Projected EV charger infrastructure

We make the following assumptions to estimate the requirements for EV chargers and combined investment across both private and public sector:

- All residents with off-street parking will install a home charger when transitioning their first ICE vehicle to an EV and will treat this as part of the purchase cost of the EV.
- As per the Energy Savings Trust guidance, an additional 1 publicly accessible charger is required for every 10 EVs in the fleet. We apply the ratio to the total of both cars and vans. Vans (whether owned by sole traders or by companies) will access any of home, workplace/depot and on-street charging.

We estimate the need for a significant scale-up in the number publicly accessible chargers, and a sustained installation rate of ca. 6,000 chargers per year for the next decade through to 2035:

Table 8.1: Publicly accessible chargers required by 2045 to support cars and vans, by local authority

Local authority	Counterfactual	Electric Engagement	Hydrogen Evolution	Holistic Transition
Cambridge	5,741	6,458	6,478	5,839
East Cambridgeshire	6,772	7,955	7,965	7,153
Fenland	7,286	8,800	8,902	8,069
Huntingdonshire	13,560	15,874	15,943	14,383
South Cambridgeshire	12,388	14,219	14,291	12,913
Total	45,748	53,306	53,579	48,356

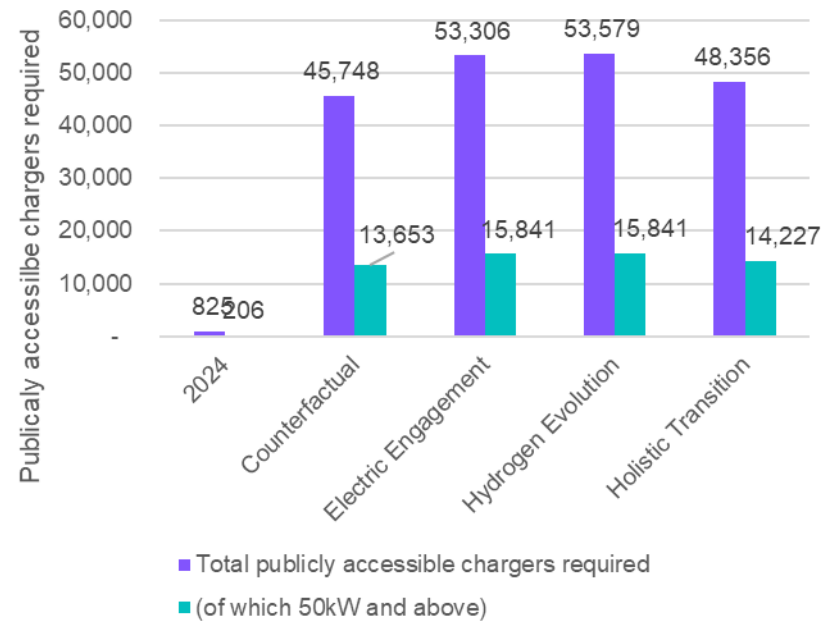
Source: Mott MacDonald analysis based on DFES projections

This deployment rate is significant, representing a close to ten-fold increase on the existing installed base of 8,265 public chargers⁶³. Huntingdonshire and South Cambridgeshire consistently show the highest demand for EV chargers, driven by their larger fleet.

We estimate that under all scenarios a baseline of rapid chargers (50kW and above) of 12,500-15,000 is required across the region to support net zero by 2045. This is shown in Figure 8.12.

⁶³ [Markdown_map_LocalAuthority_publication_template.knit](#)

Figure 8.12: Proportion of rapid chargers needed

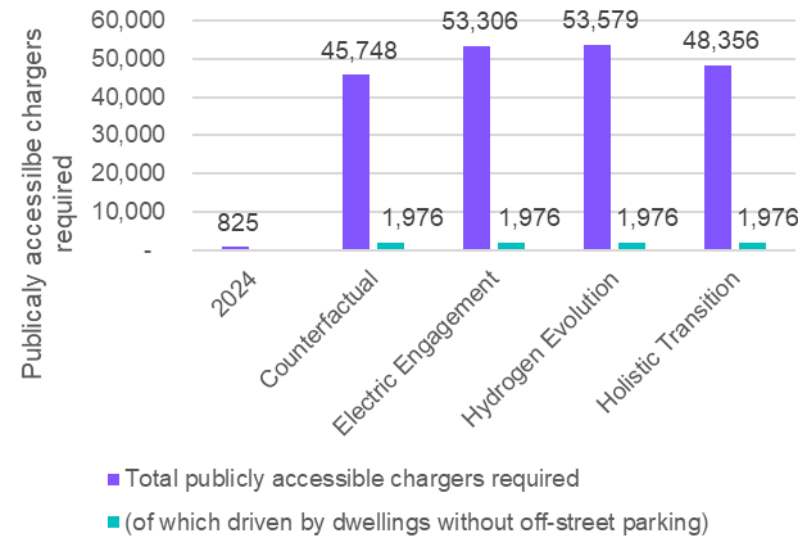


Source: Mott MacDonald analysis based on DFES projections

A specific area in which private investment may not have a business case and public investment may be required is existing residential areas with limited access to private off-street parking (such as terraced housing, flats and estates, where residents may be unable to install home chargers). To ensure a just transition, public sector funded charging infrastructure, such as on-street chargers and installations in public sector-owned social housing estate / flat charging must be prioritised to remove that barrier for residents who risk being late adopters to EVs and to support equitable access across all

communities. Figure 8.13 estimates the proportion of the chargers required to address the needs of households without off-street parking.

Figure 8.13: Proportion of chargers needed for homes without off-street parking



Source: Mott MacDonald analysis based on DFES projections, data from YLNZH on homes without off-street parking and ONS data on vehicle ownership per LSOA

The level of investment to address this specific issue is similar across all of the local authorities:

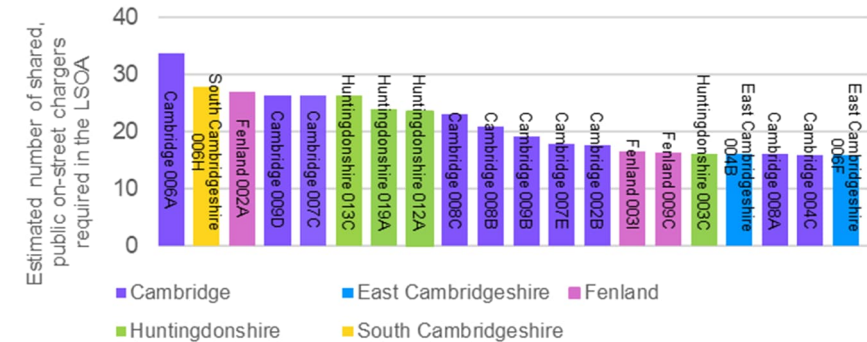
Table 8.2: Chargers needed for homes without off-street parking

Local Authority	Chargers needed for homes without off-street parking
Cambridge	465
East Cambridgeshire	285
Fenland	320
Huntingdonshire	465
South Cambridgeshire	440
Total	1,976

Source: Mott MacDonald analysis based on DFES projections, data from YLNZH on homes without off-street parking and ONS data on vehicle ownership per LSOA.

To emphasise that this is an issue across the county, Figure 8.14 shows the distribution of the LSOAs we identified where this may be a particular issue. Please refer to Table 14.4, which includes the full LSOA names. For this figure, the names were not used because they are too long and would not be legible within the visual layout. The 930 charge posts planned under the Local Electric Vehicle Infrastructure (LEVI) Fund will make a material impact.

Figure 8.14: LSOAs with a need for on-street charging



Source: Mott MacDonald analysis based on DFES projections, data from YLNZH on homes without off-street parking and ONS data on vehicle ownership per LSOA

Appendix F includes heat maps for each local authority highlighting areas where this issue may be most pronounced, based on the overlap of high vehicle ownership and low rates of off-street parking, along with illustrative photos.

8.3.4 Vehicle-to-Grid (V2G) infrastructure

Vehicle-to-Grid is a means by which EVs can inject power back into the electricity distribution grid by means of an on-board bidirectional charger. According to two reports, the market for this is typically national markets for “ancillary services” required to balance GB-wide demand and supply and/or to keep the transmission system within its operating limits; or the wholesale market. By earning income, an EV owner with V2G can offset their costs in charging and reduce their overall cost of ownership⁶⁴. Whether this takes off

⁶⁴ Plugging into potential: unleashing the untapped flexibility of EVs

at scale is still to be seen; it has the practical limitation that it is not guaranteed or seen and felt at the point of EV purchase, unlike EV grants or subsidies. Cenex provided a thorough review of V2G driver archetypes, and interestingly identified local authority-owned pool car fleets as a suitable fleet for V2G⁶⁵.

8.4 Potential Projects

As shown in the previous sections, achieving Net Zero in any scenario requires a dramatic increase in EV uptake, and charger rollout by citizens, businesses, and the public sector. This section identifies potential interventions / projects to enable that change.

8.4.1 Barriers to the transition

Barriers to EV adoption for the average citizen have been widely studied. In the production of this LAEP, barriers to resident charging infrastructure and business charging infrastructure were reviewed, supplemented by stakeholder feedback throughout. Interventions were then mapped to these barriers, to identify policies / projects / innovations that could help unblock them.

Residents

The Department for Transport⁶⁶, Climate Change Committee⁶⁷ and House of Commons⁶⁸ research was primarily used to generate barriers, supplemented by our own sector expertise and experience. The DfT report clearly summarises the necessary consumer journey for anyone looking to purchase an EV (Figure 8.15).

⁶⁵ [V2GB Vehicle to Grid Britain](#)

⁶⁶ TRL & Behavioural Insights Team (2020) Driving and accelerating the adoption of electric vehicles in the UK [Driving and accelerating the adoption of electric vehicles in the UK](#)

⁶⁷ ERM (2024). Understanding the Tail of the Electric Vehicle Transition. Final report for the [UK Climate Change Committee](#).

Figure 8.15: Intermediate objectives and barriers influencing the transition to large-scale electric vehicle (EV) adoption



Source: Directly taken from TRL (2020) Driving and accelerating the adoption of electric vehicles in the UK (Figure 1)

Many of the barriers are already being addressed at a national level. For example, it is widely understood that EV cost parity with ICE vehicles is a key driver for future EV adoption, as the upfront cost of EV remains a dominant barrier⁶⁸. Most car manufacturers are bringing EVs to market which cost more than £40,000⁶⁹, and as such it is recognised that most people will rely on the second-hand market (used EVs). While in the seventh Carbon Budget, the citizens panel did not support grants for new EVs be continued³⁰, to grow the second-hand market we need new EVs to be built and sold, and in 2040 83% of new EV cars were purchased by fleet operator businesses⁷⁰. Therefore the case could easily be made to continue to support fleet operators in switching to EVs, as the knock-on effect is a larger second-hand market for residents who may be more cost sensitive.

The above trends are macro-economic trends better influenced by national government. We find that additional barriers exist for certain sub-sets of the

⁶⁸ M Benson et al., (2025) Electric Vehicles and Infrastructure... [CBP-7480.pdf](#)

⁶⁹ Autotrader (2025) The Road to 2030. [Road to 2030](#) (Figure "number of EV derivatives by price band")

⁷⁰ DfT Vehicle Licensing Statistics, VE01153 [Vehicle licensing statistics data tables - GOV.UK](#)

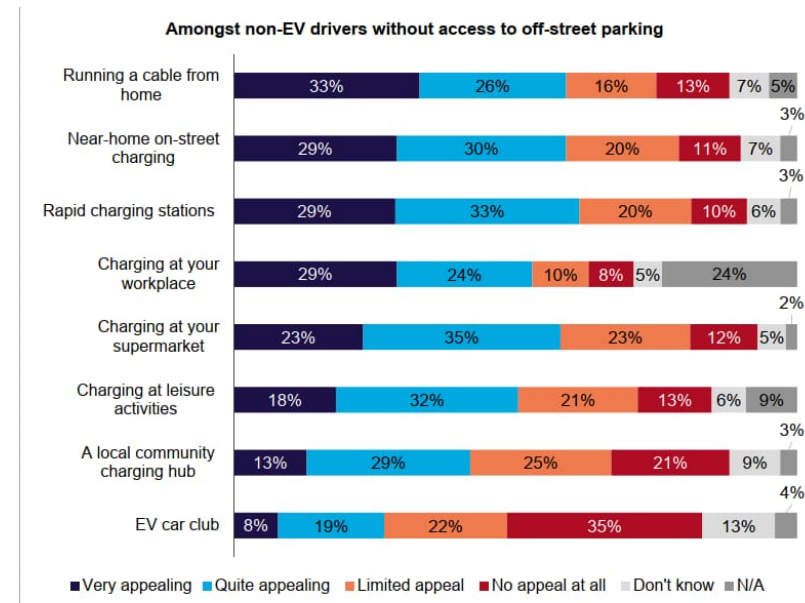
population – those without access to off-street parking, those who do not own their home, those on lower income – which is an area the Council or local actors can best add value. Figure 8.17 shows this compounding barrier analysis, along with identified solutions to overcome them.

Focusing on those without off-street parking, research from DfT⁷¹ shows that in a survey of 1,000 people without access to off-street parking, *"requiring more deviation from current parking and refuelling behaviours... is a major barrier when thinking about transitioning to an [EV]"*. Of options presented to the respondents, running a cable from home or near-home on-street charging scored best, with rapid charging stations or workplace charging following closely behind. Notably, EV Car clubs scored very poorly (Figure 8.16).

The full list of barriers alongside potential solutions, are shown in Figure 8.17, however some key barriers that could be addressed for residents are shown below:

- Financial incentives for residents' associations, to cover blocks of flats or estates that have leasehold properties.
- Charging infrastructure in social tenures, either directly managed by the councils or managed by housing associations.
- Inability to install to run cables across public footpath, inhibiting charging infrastructure for terraced houses with on-street housing.
- Financial assistance to individuals who fall into lower income levels.

Figure 8.16: Appeal of potential future BEV charging options

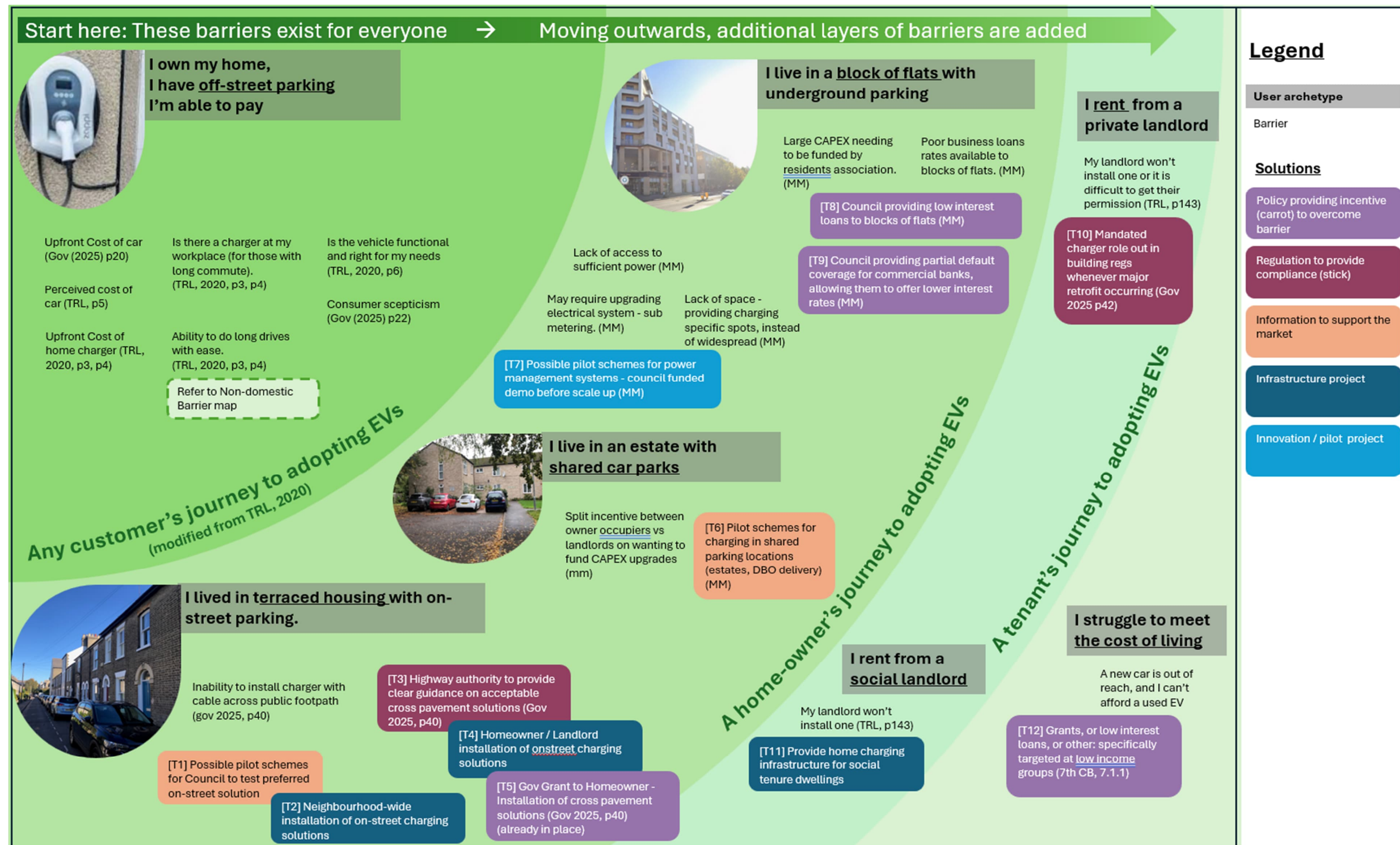


Q14. How would you feel personally about the charging options listed below? Base: all respondents (n=1006)

Source: Directly taken from DfT (2022) Public Electric Vehicle Charging Infrastructure (Figure 19)

⁷¹ DfT (2022) Public Electric Vehicle Charging Infrastructure, Deliberative and quantitative research with drivers without access to off-street parking

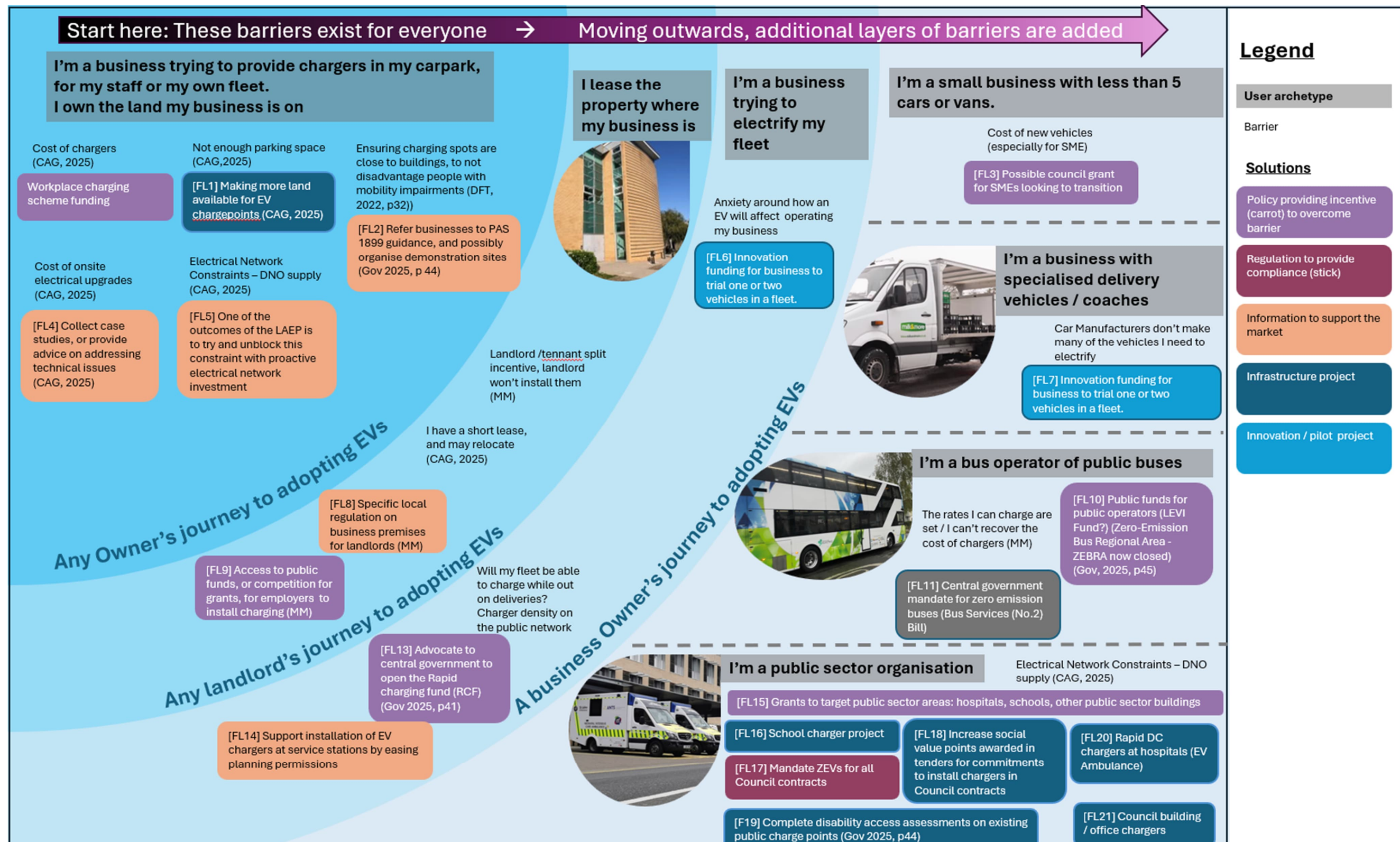
Figure 8.17: EV charging for Residents – Barrier and solution map



Source: Mott MacDonald, and various sources as listed

Note: The letter-and-number codes (e.g., T1) are project reference identifiers. Please refer to the appendix for the full description of each project or intervention.

Figure 8.18: EV charging for Businesses – Barrier and solution map



Source: Mott MacDonald, and various sources as listed

Note: The letter-and-number codes (e.g., FL14) are project reference identifiers. Please refer to the appendix for the full description of each project or intervention.

Businesses play a crucial role in decarbonising transport. As stated earlier in this section, they purchase the majority of new EVs in the UK⁷⁰, growing the second-hand market that other users depend on. Installation of slow chargers in business carparks can help enable citizens without off-street parking switch to an EV, by providing a reliable place to charge at work.

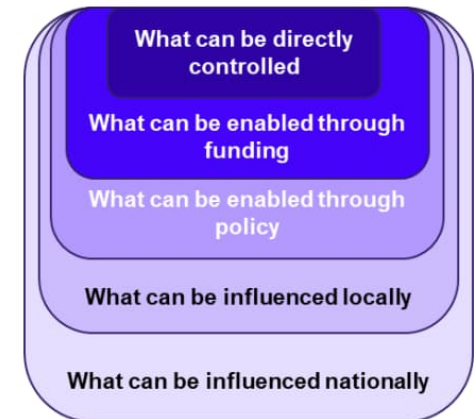
Businesses face a variety of barriers themselves in rolling out charging infrastructure, either for their employees, their customers, or their own fleets. Throughout the stakeholder engagement as part of this LAEP, a number of survey respondents and workshop attendees identified a number of barriers they are facing. Figure 8.18 shows those barriers and potential interventions to unblock them, but below are some summary barriers.

- Lack of electrical capacity and constraints on the network.
- Not enough parking space: reserving a number of car parking spaces for EV charging removes spots available to employees / customers without an EV.
- Landlord / tenant split incentive, and leasing periods: businesses not wanting to invest in physical infrastructure during a lease period, when the business may relocate in the future.
- Uncertainty over how an electric fleet would affect operation of the business (primarily for small-medium-enterprises).

8.4.2 Interventions & Projects to stimulate change

As discussed in previous sections (Section 6.1.7), we have categorised our interventions into four categories: Financial Incentive (Carrot), Regulation (Stick), Information to support the market, Innovation / Pilot project. For details on the multi-criteria analysis used to shortlist interventions, please refer to that section.

For areas where the council can directly control, **infrastructure projects have been identified**. A long list of projects (Appendix F) was taken from the barrier map (Figure 8.17 and Figure 8.18), and then coarse screened by level of influence for the council. The categories (shown right) were used for this. The top performing projects from each category were selected, with more projects being taken from the “what can be directly controlled” category.



These interventions have been prioritised into a delivery roadmap (Figure 8.19). For infrastructure projects, where applicable maps are provided in Appendix F, showing spatially where these are located, so that financing and packaging of these projects can happen following this LAEP.

There are parts of the vehicle transition that are more uncertain. **For Buses**, the zero-emission bus regional area (ZEBRA) was a funding scheme for purchasing zero emission buses and is now closed. It is uncertain, and probably unlikely, that central government will extend this scheme, suggesting that for operators of buses within the County, another funding scheme will be needed if bus fares are to be kept as they are or even reduced. This LAEP does not suggest directly funding bus operators to switch their fleet.

For HGVs, the future is even more uncertain than for buses. As discussed previously, the industry and HGV manufacturers have not yet committed to battery electric as the preferred technology for HGVs, given the challenges with payload batteries present. If battery electric HGVs proliferate, then rapid charging stations along trunk roads will be critical, however the latest signalling from central government is that the Rapid Charging Fund (which is has only delivered a pilot to date) is non-committal on whether the fund will open to applications and be used as originally planned to increase super-fast

chargers across motorways⁶⁸. Furthermore, the government only started its HGV demonstrator projects in 2023, and on the topic of infrastructure, the government confirmed it remains “technology neutral”, with a Zero Emission HGV and Coach Infrastructure Strategy still unpublished⁶⁸.

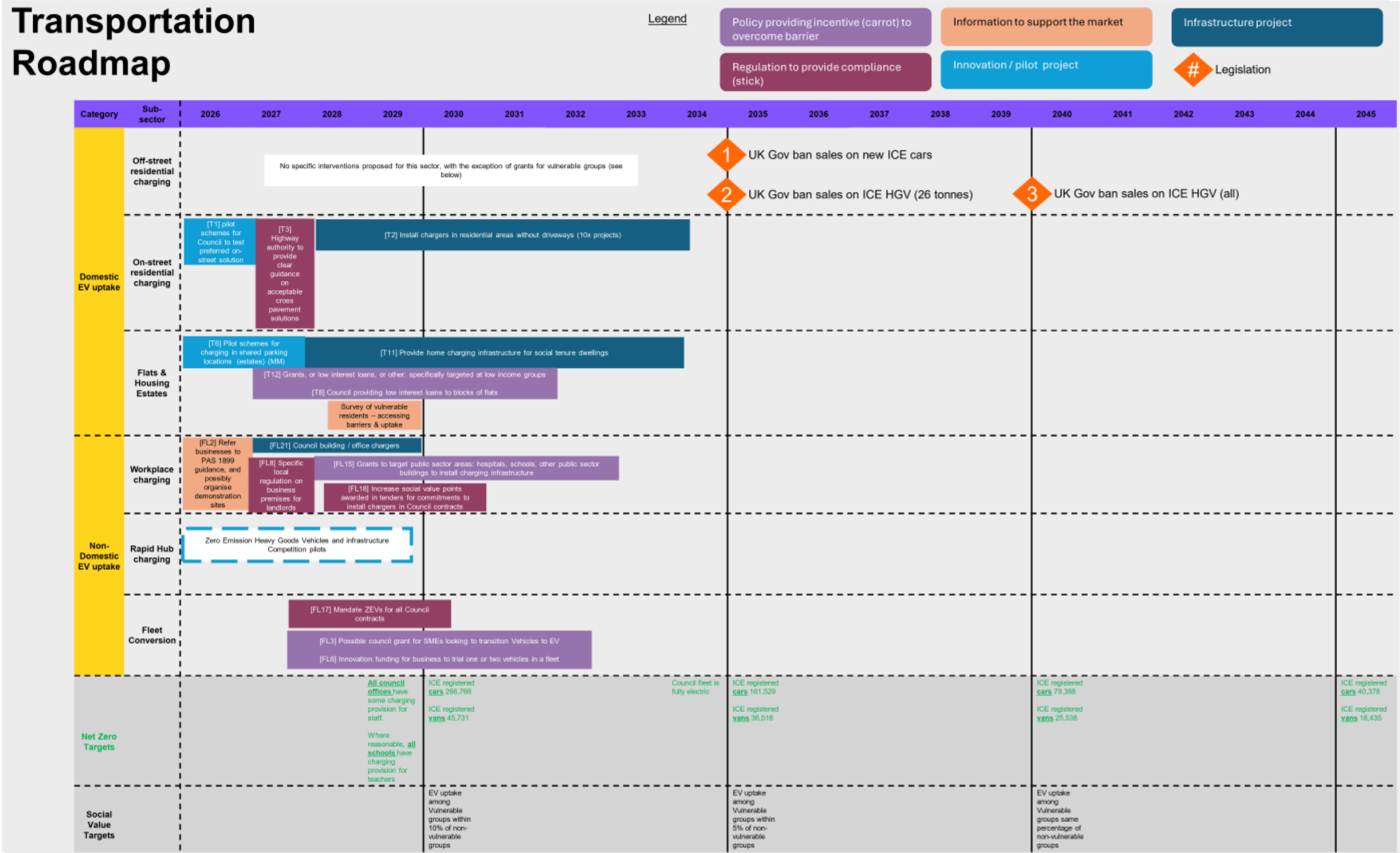
As the emissions from HGV are relatively small and are projected to transition later than cars and vans, the LAEP suggests the best action for the Council is to be ‘grid ready’ for if high powered chargers or hydrogen infrastructure is required. To support that, the LAEP identifies key HGV depots in the region, and services along motorways, to indicate where larger power demands may come in the future necessitating network upgrades.

As one of the core objectives of the LAEP is to **reduce inequality** in the region, and at minimum ensure that the transition to net zero does not increase inequality or leave any portions of society behind, several interventions specifically targeting **vulnerable groups** have been identified. While at the beginning of this section we identified that for individuals who are more cost sensitive, growing the second-hand market of EVs is critically important. As discussed, to date that has been accomplished primarily by fleet operators (businesses) purchasing new EVs. However, we see it that the **Council is better placed trying to directly support vulnerable groups** by financial support to families looking to purchase their first EV in the second-hand market (either by low interest loan, or grant), rather than directly supporting businesses hoping that the trickle-down effect will be a larger second-hand market that vulnerable individuals can access.

8.4.3 Monitoring the plan

As stated previously, this LAEP is a snapshot in time of the current uptake rates and trajectory to net zero. To implement the plan, key milestones have been provided at the bottom of the roadmap (Figure 8.19), setting out what level of vehicle transition is needed, what level of infrastructure, and what specific milestones are needed to make sure social value is delivered and everyone is able to participate in the net zero transition.

Figure 8.19: Transportation Roadmap



9 Local generation

9.1 Existing system

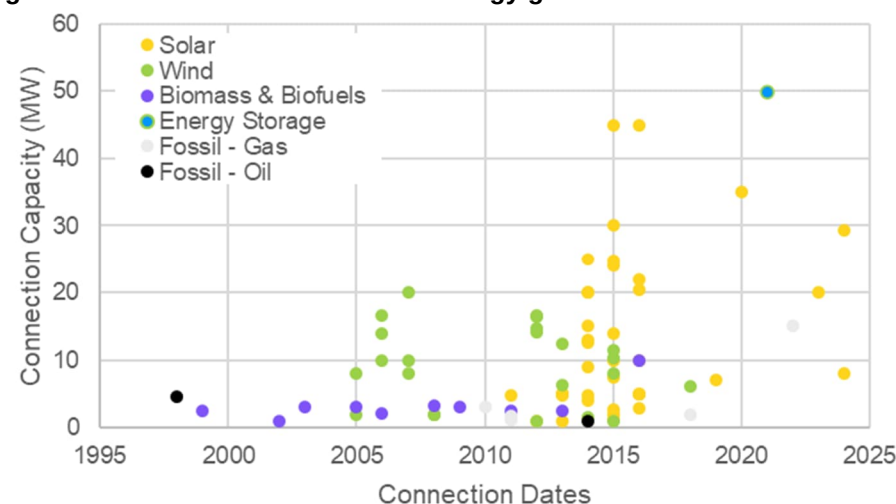
Annual electricity supply for Cambridgeshire broken down into sources and consumer types (see Figure 9.2 overleaf). Approximately 47.5% of the electricity consumed in Cambridge is generated locally, while the remainder is generated elsewhere and imported via UK Power Networks' substations connected to the national transmission network operated by National Grid Electricity Transmission (NGET). The breakdown of electricity generated in Cambridgeshire is dominated by renewables; solar wind and biogas/biomass account for 88.6% of total generation. South Cambridgeshire has the highest number of rooftop solar installations of any county in the UK as of the end of 2024⁷², and Cambridgeshire ranks 3rd for total ground mount and rooftop solar capacity in the UK behind Kent and Wiltshire⁷³. As will be seen in the project pipeline and from local ambition for more energy security, resilience and further emission reductions, renewables particularly solar capacity is expected to increase significantly further.

The Sankey was developed from the 2025 Embedded Capacity Register (ECR) and the 2023 DESNZ MSOA non-domestic and LSOA domestic electricity consumption data sets⁷⁴. We converted installed capacities for generation to annual generation using the same capacity factors as the Department for Energy Security and Net Zero assumes in its Digest of UK Energy Statistics (DUKES)⁷⁵.

The progression of renewable energy generation connections >1MW in Cambridgeshire can be seen in Figure 9.1 from the Embedded Capacity Register available in LAEP+. 425MW of solar was connected between 2013

and 2018 in the solar boom which accounts for 80% of current solar capacity. Wind installations were introduced from 2005. We estimate more than 95% of wind capacity will reach end of life in the next 10 years unless it is re-powered.

Figure 9.1: Historical installation of energy generation



Source: LAEP+ Tool data, combined with Embedded Capacity Register <1MW

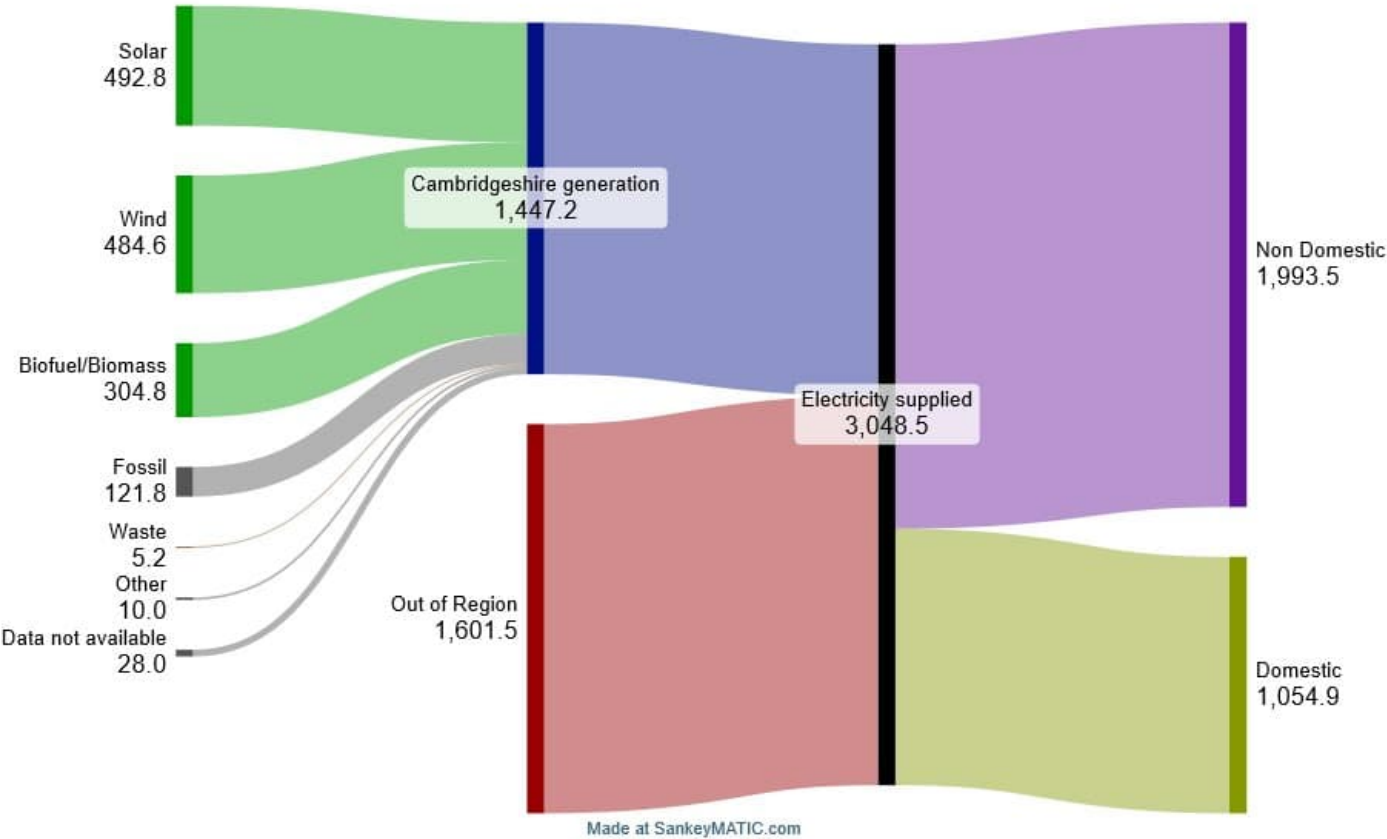
⁷² [How Many Homes In The UK Have Solar Panels? 2025 Statistics - Solar Advice UK](#)

⁷³ [Renewable Energy Planning Database: quarterly extract - GOV.UK](#)

⁷⁴ [Lower and Middle Super Output Areas electricity consumption - GOV.UK](#)

⁷⁵ [Digest of UK Energy Statistics \(DUKES\) - GOV.UK](#)

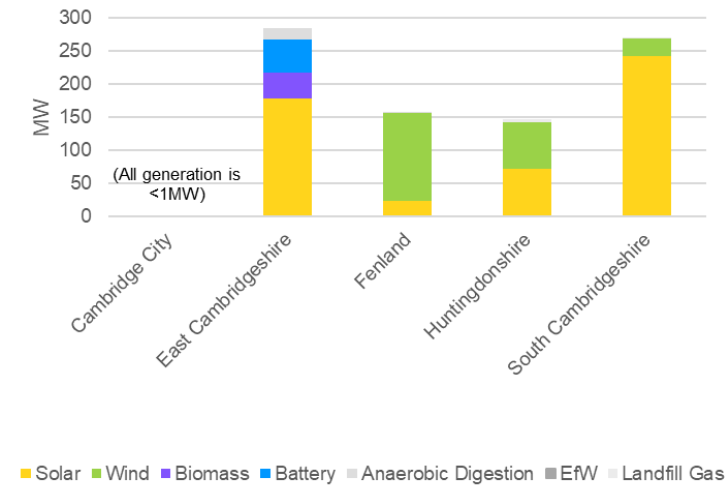
Figure 9.2: 2023 Cambridgeshire electricity generation and consumption (GWh)



Source: Lower and Middle Super Output Areas electricity consumption - GOV.UK and Digest of UK Energy Statistics (DUKES) - GOV.UK

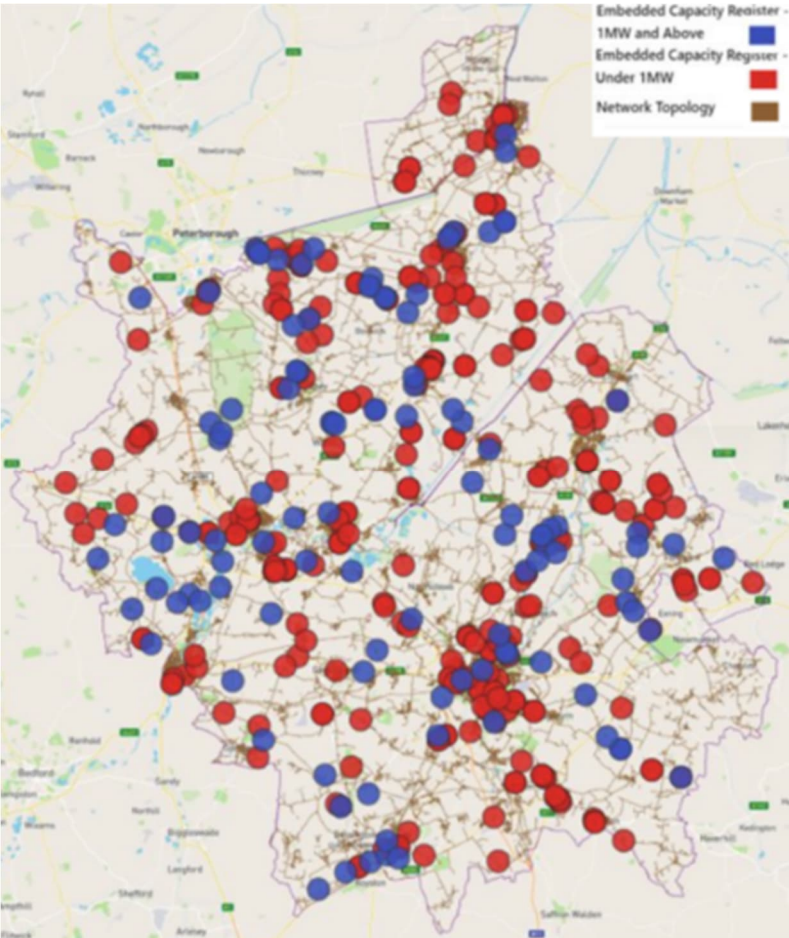
The Embedded Capacity Register (ECR) is a good proxy for the current installed generation since the majority was connected to the distribution network during this period: larger transmission-connected projects are a more recent development in the industry. Most of the existing operational plant connected to the distribution network is in East and South Cambridgeshire, accounting for 65% total renewable capacity. Fenland has 132MW of wind generation, accounting for 58% of all operational wind capacity in the region. Existing generation is dominated by solar and wind, as shown by Figure 9.3. There is some clustering of larger sites (the blue dots 1MW and above in Figure 9.4) but we are unable solely from this raw data to draw any conclusions about acceptability of further developments from a visual amenity perspective.

Figure 9.3: Split of existing distribution-connected generation >150kW by local authority



Source: LAEP+ Tool data, combined with Embedded Capacity Register <1MW

Figure 9.4: Geographic split of generation



Source: LAEP+ Tool data, combined with Embedded Capacity Register

9.2 Intervention Methodology

We treat all generation sited within the region as in scope of the LAEP. Whilst the local authorities cannot control where the energy from plants in the region is consumed, the visual impacts are felt by local residents.

In our analysis we have distinguished between:

- **technology**, since not all technologies are renewable and differing carbon factors will apply to different technologies
- **size**, since pipelines are reported separately for sites <150kW, between 150kW-1MW and >1MW
- **connection type** (transmission-connected or distribution-connected), since the Clean Power 2030 Connections Reform annex applies thresholds to each to transmission and/or the combination of both transmission and distribution (see Section 2.1.3)

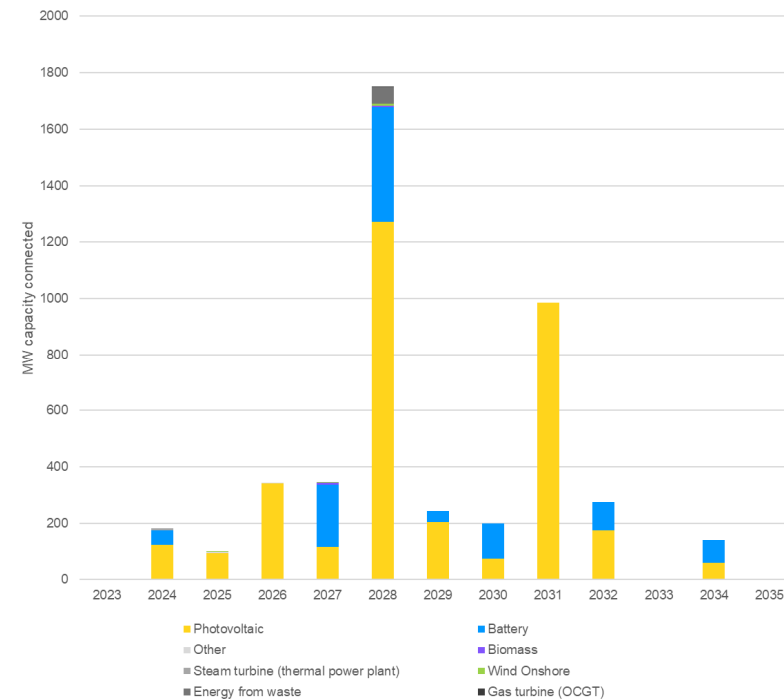
Rooftop solar potential data has been taken from the LAEP+ tool and summarised to show suitable capacity for commercial, residential, and dual use properties. Rooftop solar generation projection for Cambridgeshire was taken from UKPN DFES and grouped to MSOA and Local Authority for each scenario, along with a separation between small and large rooftop installations. All remaining distributed generation projections from the UKPN DFES was processed in the same way.

The 2050 DFES projected capacity has been compared to the LAEP+ potential capacity, split between scenario and residential or commercial roofs. The sector type is based on a rooftop solar installation size assumption (<4kW residential, >4kW commercial). Each generation technology projection in DFES has been compared to the generation connection pipeline with a cumulative result calculated to show if more or less projects are expected. Since the UKPN DFES data only shows distributed generation connections and not transmission connected sites, the Clean Power 2030 Action Plan has been referenced for more aligned comparisons.

9.3 Counterfactual

As stated previously in this report, the Counterfactual scenario represents the best estimate of a 'do nothing' scenario, before the LAEP is implemented. It therefore assumes that all existing national legislation is implemented. While there is nothing legislated that mandates local generation, within the region there are already a number of schemes accepted to connect with a significant capacity, shown in Figure 9.5.

Figure 9.5: Generation connection pipeline



Source: DCO, REPD, ECR<1MW and ECR>1MW

The generation connection pipeline was compiled from by reviewing the database of Development Consent Order (DCO) applications, the Renewable Energy Planning Database and the ECR. The data was manually cleaned for errors and an estimation for length of time till connection based on project status used to create a timeline. We have not validated at this time that the projects were energised in 2024 as planned, which may mean some shifting into later years.

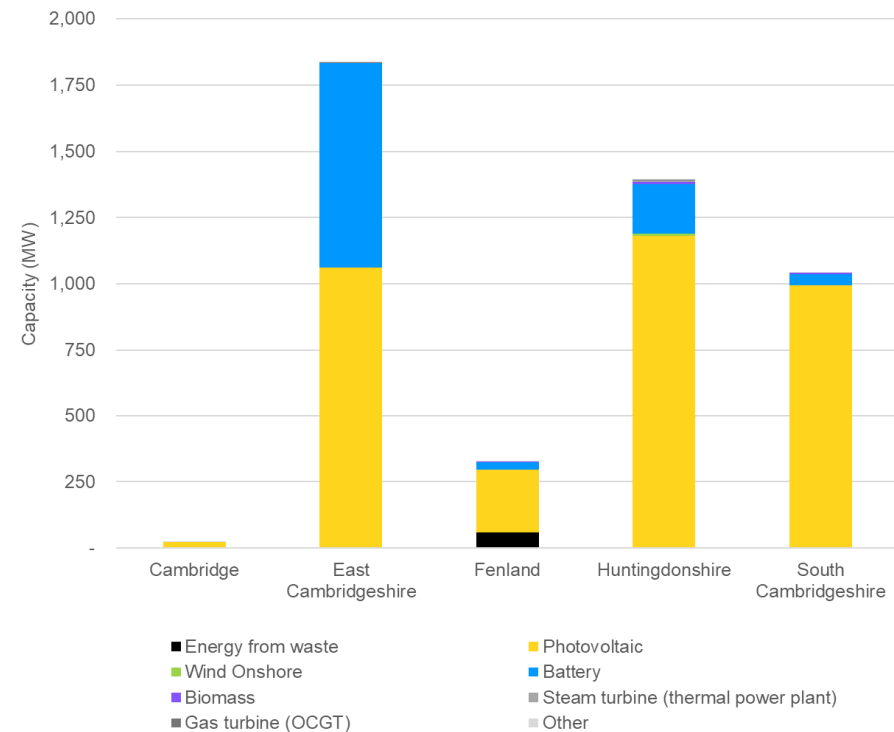
The Connections Reform process being undertaken by NESO (and discussed in Section 2.1.4) commences at midnight on 26 August when all existing connectees are required to provide evidence of their project status and is likely to be ongoing into early 2026. As such – we are not able to pre-judge which projects may be faced with a revised connection date and what level of attrition may result. Our counterfactual therefore assumes all schemes proceed on the timelines shown in Figure 9.5, which in no way prejudices nor replaces the need for such schemes to secure appropriate planning permissions.

Under these assumptions, East Cambridgeshire and Huntingdonshire dominate, each with over 1.3GW in connected pipeline. This is shown in Figure 9.6.

Five schemes across the county are large schemes (defined as following the Development Consent Order (DCO) route to planning or >100MW installed capacity):

- 500MW Kingsway Solar Farm at pre-application in South Cambridgeshire
- 500MW Sunnica Solar Farm with storage in East Cambridgeshire, granted DCO.
- 400MW East Park Solar Farm at pre-application in Huntingdonshire and Bedfordshire
- 400MW Church Road storage accepted to connect in East Cambridgeshire
- 240MW Len Fen Drove Solar Farm accepted to connect in East Cambridgeshire

Figure 9.6: Generation pipeline within each local authority area

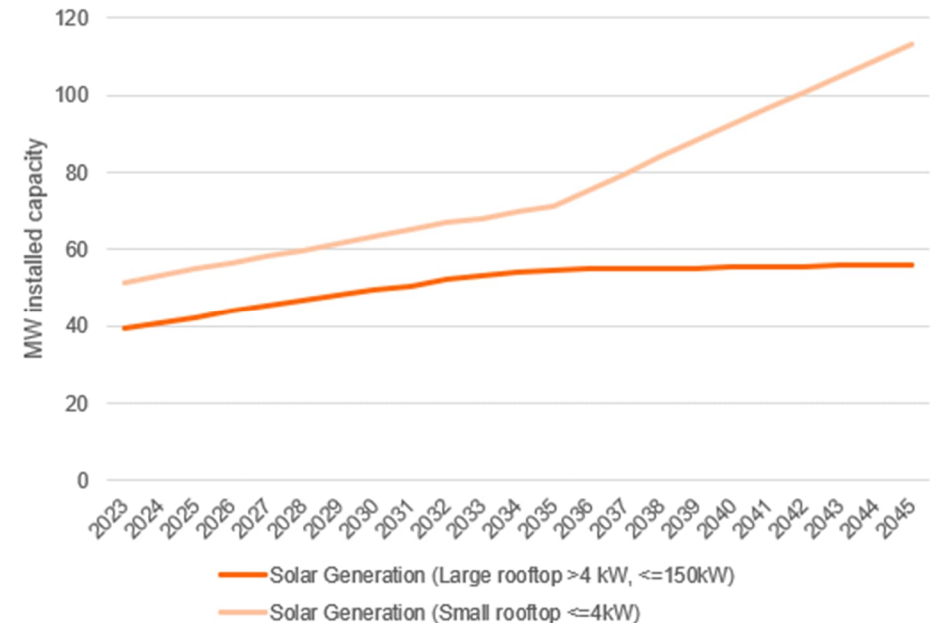


Source: Aggregate pipeline from DCO, REPD, ECR<1MW and ECR>1MW

While the picture shows significant capacity for large ground mounted solar installations, there are a few notable concerns and assumptions from our counterfactual scenario.

- As stated in Section 9.1, the large wind installations in Fenland will come to the end of their service life between 2030 and 2035. It is assumed that the existing wind sites across Cambridgeshire will be recommissioned with new turbines (likely larger and fewer) for net zero scenarios, resulting in the 2045 capacity remaining similar to today. But without active support, wind capacity will decrease in a counterfactual scenario.
- As shown in the existing pipeline, there are projects to increase thermal generation (production from natural gas or biomass feedstocks), which will increase carbon emissions. However, these projects are visually insignificant on the graph due to their very small contribution compared to other generation types. We have assumed these provide minimal future contribution to the generation pipeline.
- While there is no policy mandating installation of rooftop solar on homes, historical trends show that this has been expanding in Cambridgeshire. The counterfactual therefore assumes that residential rooftop solar will continue to expand, for which the uptake rates in DFES have been used (Figure 9.7).

Figure 9.7: DFES counterfactual scenario for rooftop solar uptake



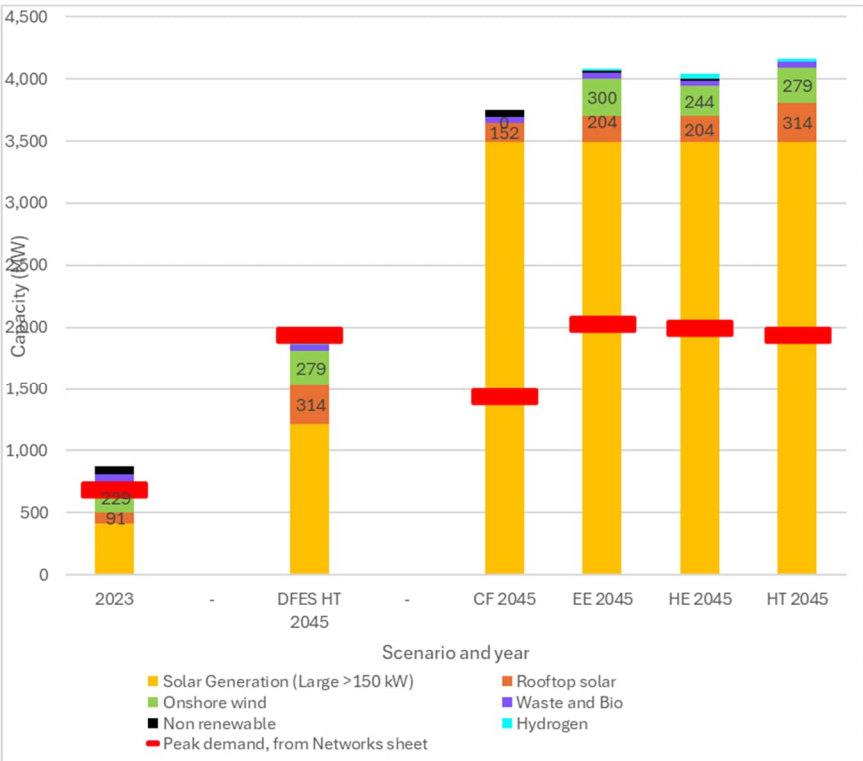
Source: DFES data

9.4 Scenarios

A modified UKPN DFES projected composition of distributed generation across Cambridgeshire is shown below in Figure 9.8 for of the scenarios Electric Engagement (EE), Hydrogen Evolution (HE), Holistic Transition (HT) and the DFES's counterfactual (CF). For ground mount solar installations, the DFES projection for 2045 has been replaced by the current volume of projects in the pipeline for Cambridgeshire. This means the capacity is equal in all scenarios but provide a more realistic view than the DFES values which are on average 3.5 times smaller. The Counterfactual DFES wind projection has

also been removed for 2045 to reflect the lack of projects in the pipeline and expected end of life of existing capacity.

Figure 9.8: DFES and pipeline generation projection by technology and scenario



Source: DFES data, DCO, REPD, ECR<1MW and ECR>1MW, UKPN LTDS. Demand lines shown are for the winter peak demand, and include transition to low carbon technologies and growth in the region as per the “County forecast”. Note that, new data centres or power intensive industries that come forth in the future would increase these demand values.

A convergent start year in 2023 is shown for comparison, totalling 875MW of generation dominated by solar and wind but with some non-renewable sources also present. The DFES Holistic transition scenario is presented as well to show the difference to our modelled versions of each scenario; the key difference being the much larger volume of solar generation currently in the pipeline. In all scenarios total installed capacity will increase out to 2045 with Holistic Transition increasing the most by 476% to 4,164MW. Overlaid onto the generation capacity is the After Diversity Maximum Demand for 2023 and projected values for each scenario in 2045. This value is the peak demand for Cambridgeshire (further described in the following section) and would represent demand during a mid-winter evening. This shows that should the full buildout occur of all the solar projects in the pipeline, the power generating capacity in Cambridgeshire will exceed the winter peak demand.

However, this does not mean that Cambridgeshire can meet all of its energy needs at all times of year. This peak demand shown represents demand during a mid-winter evening, so will not align with the maximum generation capacity of technologies like solar and assumes all primary substations experience their maximum demand at the same time. In the winter, the generation from the very large solar bars will be significantly less, and as a result Cambridgeshire will likely remain a net importer of power, as demonstrated in Figure 9.2 for 2023.

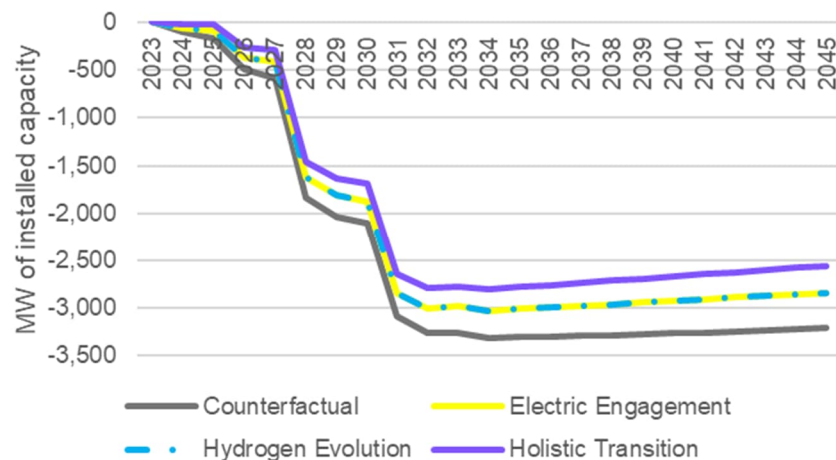
In the summer months, output from the modest wind generation is typically lower, but the generation from solar will be at its peak. Furthermore, the peak demand will likely be lower, as the large loads driven from electric heating will be greatly reduced (albeit cooling loads will dampen the reduction). Nevertheless, it is likely that during the summer months, Cambridgeshire could well be an exporter of energy out of the region. Whether Cambridgeshire will be a net imported or exporter of energy over the course of the year, is analysed in Section 11.

In all scenarios solar continues to dominate local generation, however all scenarios except counterfactual almost entirely phase out non-renewable sources and add a small amount of hydrogen fuelled generation. Of these, the

hydrogen generation is most questionable in the current market. In addition, there is a risk that the onshore wind capacity will in fact decline as represented in the counterfactual instead of being maintained as modelled by DFES. As discussed in section 9.3 this risk materialises if there is a lack of active support in the local plans for repowering existing sites or erecting new onshore wind, due to the energy market pressure from solar/offshore wind and legacy of developers reducing focus on onshore wind due to the moratorium in England under previous governments.

In practice, for all of the technologies save for wind, the existing Connections pipeline discussed in Section 9.3 exceeds the installed capacity projected by DFES, partly because the connections pipeline includes projects connecting at transmission. An example is shown in Figure 9.9.

Figure 9.9: Cumulative difference between the existing pipeline of solar PV in the region and DFES scenarios



Source: UKPN-distributed-generation-scenarios-MSOA-V2 and DCO, REPD, ECR<1MW and ECR>1MW

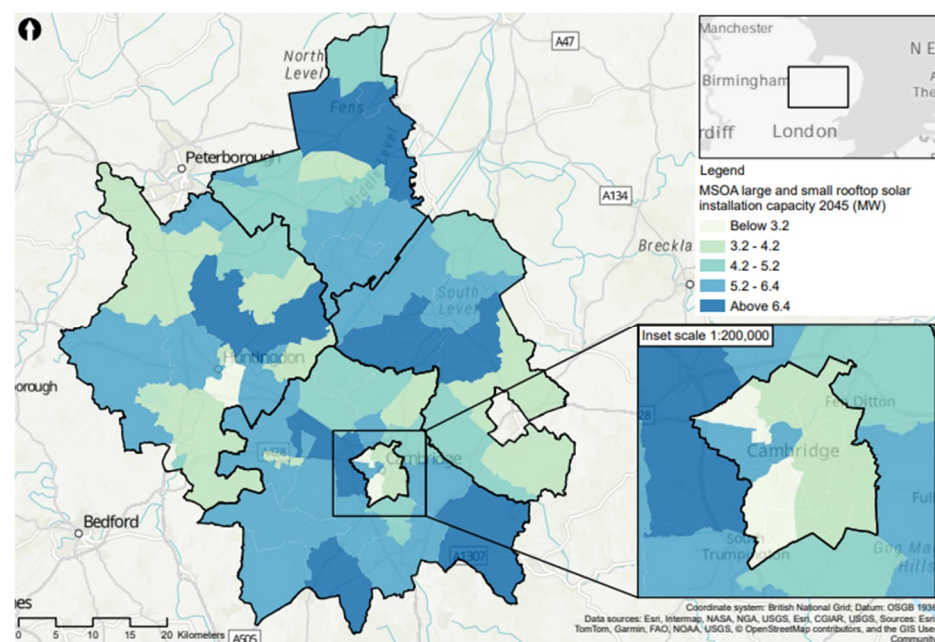
Over 2GW more solar projects are in the pipeline than the DFES projection, with decommissioning rates unlikely to reduce this value much further. There is also however slightly more thermal generation and energy from waste projects than projected which will be increasing the total emission intensity of Cambridgeshire.

We further investigated the Connections Pipeline in comparison to the Clean Power 2030 Action Plan generation requirements discussed in 2.1.3. This document states that by 2035 9,500MW of solar is needed to connect in the Central England region (an area including Cambridgeshire and most adjacent counties) in transmission and distribution. The 3,000MW expected in projects from the current pipeline for Cambridgeshire to 2035 accounts for 32% of total capacity when the land area of Cambridgeshire relative to 'Central England' is approximately 25%, confirming that proportionally, Cambridgeshire is projected to over-produce for the region.

The Battery project pipeline can also be compared to the Clean Power 2030 Action Plan, which states 500MW of transmission connected batteries in Central England by 2035 and 2400MW of distribution connected batteries in the UKPN supply area. The 1000MW of transmission and distribution connected battery projects in the pipeline is difficult to directly compare to these different region sizes, however a rough calculation based on land area implies again that the current pipeline already exceeds the requirements set out by Clean Power 2030.

A further piece of data validation was carried out on the DFES projected rooftop solar generation, which has been spatially represented in Figure 9.10 for 2045 installed capacity for the holistic transition scenario. The LAEP+ tool data for rooftop solar potential split between residential and commercial was compared to the DFES projection split between small and large rooftop installations to represent residential and commercial. This showed that even in the holistic transition scenario only 36% of potential commercial roof capacity and 19% of residential would be used by 2045, meaning the projection scenario is definitely viable.

Figure 9.10: DFES Holistic transition 2045 projection for capacity of rooftop solar installations



Source: Mott MacDonald GIS based on DFES data

Similarly, a final piece of data validation was carried out on the Ground mount solar and wind installations to assess total land availability in Cambridgeshire.

The LAEP+ tool has data assessing a 100m square grid of Cambridgeshire, factoring in constraints such as closeness of urban developments, protected habitats, flood risk, heritage protections and high-quality farmland. It incorporates overall land suitability for large-scale onshore wind, considering both land use and zoning constraints as well as average theoretical wind power density based on typical wind speeds. While the mapping provides a robust spatial assessment, certain site-specific constraints may not be fully captured. Nonetheless, the dataset offers valuable insight into general suitability for renewable energy deployment. In total 442km² of land is identified as suitable for solar (14% of total area) and 288km² for wind (9% of total area). From this the potential capacity is calculated as 89.9GW for solar and 2.4GW for wind. The current pipeline of solar totals 4% of potential capacity and holistic wind projection totals 12% of potential capacity, showing that while the increase in energy generation appears substantial, it represents a very small proportion of the available land in the county.

9.5 Community Energy

Community Energy typically refers to energy generation (most often solar or wind) developed, owned and controlled by community groups⁷⁶. These projects vary in size but are generally below 2MW. For example, a ground mounted solar scheme of this scale would amount to approximately 5,500 panels covering an area roughly equivalent to seven football fields.

Locally there are two larger community energy projects in operation: Reach Community Solar Farm⁷⁷ (0.26 MW) and Gamlingay community wind turbine⁷⁸ (a single 54m tall, 0.33MW wind turbine). Both projects were funded by issuing shares for local community members to purchase and have been in operation for 9 to 11 years respectively, providing both financial benefit to the communities and green electricity to the local network. There have also been several rooftop solar projects delivered: Eco-Pak Ltd Rooftop Solar in

⁷⁶ <https://www.cambridgeshire.gov.uk/asset-library/Community-Energy-Action-plan.pdf>

⁷⁷ <http://www.reachsolarfarm.co.uk/docs/reach-solar-farm-business-plan.pdf>

⁷⁸ <https://www.g-c-t.uk/>

Chatteris (1,500 panels installed by Big Solar Co-op), St Laurence RC Primary School in Cambridge (98 panels installed by solar for schools), St Bedes Sports Hall in Cambridge (178 panels installed by solar for schools).

There have also been some district heat network projects that have been initiated and are still under development: Great Staughton District Heat Network (900 homes), Granchester District Heat Network (280 homes).

More broadly in the UK, community energy projects can vary:

11. Brighton Energy Co-op has helped **deliver EV Charge points** for a flat building, University of Brighton campus location, and primary school and community building. It is notable that in most occasions the co-op had already delivered rooftop solar on some of the buildings where the chargers were located⁷⁹.
12. Brighton & Hove Energy Services Co-op has also helped deliver **multiple low carbon technologies** during the set-up of a new Montessori school. The 19th century existing buildings needed retrofit and had no connection to mains gas. The project undertook fabric upgrades, installed ASHP and GSHP and new radiators, rooftop solar and some energy efficient lighting⁸⁰.
13. Grand Union Community Energy (GUCE) working in south-west Hertfordshire is currently developing a **district heat network project**, aimed to decarbonise heating for 2,000 homes, two schools and several local businesses⁸¹.

This shows the range of projects that the community energy model can deliver, extending beyond solar and wind generation which has to date been the major focus.

⁷⁹ <https://www.brightonenergy.org.uk/2021/04/6-electric-car-charge-points-for-the-university-of-brighton/>

9.5.1 How can community energy support the LAEP?

The two existing community energy schemes in Cambridgeshire have been in operation since 2013 and 2016, and while others are in development, community energy can play a large role in delivering portions of this plan.

Starting with solar generation, the LAEP forecasts a total of 363 MW of rooftop solar to be installed by 2045, of which 35% is estimated to be greater than a 4kW installation (and thus more likely to be in the non-domestic sector). Schools are one potential area where community energy projects could play a role, as evidenced by the schemes already delivered within the area. Whilst community energy schemes partnering with private businesses could be seen as riskier as compared with a public building, such as a school or community building, the example within Fenland demonstrate that it is possible. Another potential opportunity could be large energy users (primarily in the industrial sector), who may be transitioning process loads from gas to electricity (as discussed in Section 7) or who already have high electrical demands. Figure 9.11 shows qualitatively where large existing gas loads may be electrified in Fenland (other district maps are provided in Appendix O).

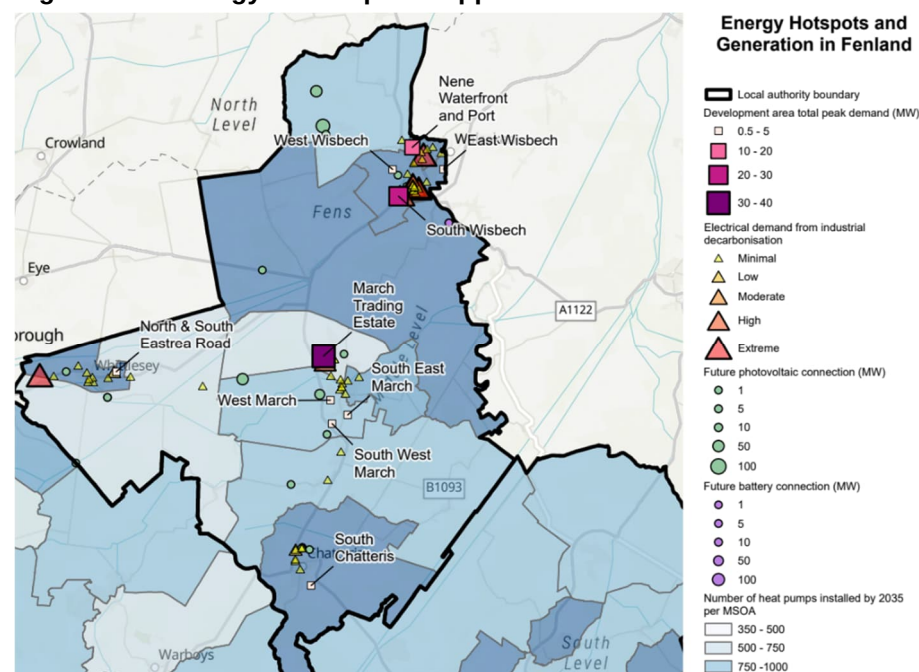
This also shows where new developments are planned. While it is expected that new housing has ASHP and EV charging provided from the outset, mixed use developments or the March Trading Estate comprised primarily of employment area, could be opportunities for community energy to deploy behind the meter generation or storage technologies. Figure 9.11, and the maps provided in Appendix G can also be used to target areas where the existing solar pipeline does not happen to align with where increased electrical demands are expected. March for example, shows significant new developments and electrification of industrial loads, but with no nearby solar project in the pipeline. Chatteris by comparison, does has a solar project

⁸⁰ <https://bhesc.co.uk/blog/solar-power-school-sussex>

⁸¹ <https://energyredress.org.uk/heating-kings-langley>

already within the pipeline, which could align well with the increase in electrical demand expected in the area.

Figure 9.11: Energy heatmap and opportunities in Fenland



Source: Mott MacDonald

It should be noted however, that often community energy schemes need an internal rate of return (IRR) of around 5-6% to be viable, and the feed in tariff

scheme which ran between 2010 and 2019 was a key economic incentive which assisted solar schemes. With it closed to new entrants, larger scale ground mount solar may be more viable for community energy delivery models. Great British Energy has budget to commit £5m of funding alongside Community Energy schemes⁸². Cashflow is a key issue for Community Energy schemes which attract transmission upgrades are unattractive owing to the up-front securities required for transmission upgrades.

Beyond rooftop or ground mount solar, other interventions could be considered. As shown in Section 8, there is a need for public EV charging infrastructure in most communities within the County. However, it is likely that including interventions such as EV Charging may be more economically viable when paired with a behind the meter solar project.

Perhaps an area to watch for community energy will be in the flexibility space. Within the government's Clean Power 2030 Action Plan, there is a need for consumer-led flexibility, increasing from the current 2GW nationwide to 10-12GW by 2030. The majority of this is projected to be via smart EV charging, however 25% is expected to be delivered via residential applicant demand flexibility⁷. One area that community energy could explore, is partnering with some of the future housing developments to add rooftop solar, batteries, and even so far as vehicle to grid chargers; to test whether demand side response could be a viable project. Targeting new builds, might make it easier to get to the scale needed (minimum 1MW to access balancing mechanism markets) to aggregate flexibility and generate revenue streams that are not available on a smaller scale. Community Energy representatives have been some of the strongest advocates for a change to regulations to allow "complex sites" to be created from multiple community assets sitting behind individual meters, and retain full credit for the power they are supplying to those assets; but this remains in an early phase⁸³.

⁸² <https://www.gov.uk/government/news/great-british-energy-to-cut-bills-for-hospitals-and-schools>

⁸³ <https://www.elexon.co.uk/bsc/mod-proposal/p441/>

9.6 Next steps

Cambridgeshire's generation mix is decarbonising faster than the wider GB grid. The pipeline of connections exceeds and therefore negates the effect of modelling different wider scenarios from DFES and may result in more prioritisations for network upgrades as discussed in the following section. The region appears on track to connect the maximum which NESO and National Grid Electricity Transmission can feasibly manage by 2035.

As such, the most critical next step will be the outcomes of the Connections Reform process. We propose the local authorities should:

- **Consider the positives and negatives of being a leader in decarbonising.** Some may see it as a positive that the region's generation fleet is decarbonising sooner than the wider GB grid; others will see it as a negative, taking more than the regions' fair share of generation and possible visual amenity impacts. Encouraging and supporting community energy groups and community led schemes can help alleviate negative public perception and open up more opportunities in planning and financing for generation projects.
- **Recognise that Energy from Waste and similar fossil-fuelled power stations still play a role.** NESO's Pathways to Net Zero includes a contribution from gas and energy from waste to achieving security of supply in the electricity system in 2050⁸⁴. However, it is essential that any existing or future Energy from Waste and fossil-fuelled generation is operated to the highest standards of emissions control and safety, minimising environmental and health impacts. Nevertheless, pursuing other policies (such as waste reduction) may avoid further build-outs of (for example) Energy from Waste.
- **Coordinate their planning policy with the other local authorities within NESO's Central England region.** It is reasonable for the local authorities' Local Plans to be conscious of the cap on solar PV and Battery

storage in their regions between now and 2035 and look for projects to demonstrate strategic benefit and some reasonable burden-sharing of the visual impact across the regions within Central England.

- **Be sympathetic to attrition in the pipeline.** In a similar way that NESO and NGET found workload had increased as a result of a market-led, first-come first-serve approach to connections, local authorities are required to service all applications they receive from developers. However, we propose the local authorities be sympathetic to attrition in the queue and that new schemes will continue to be needed to replace others which fall away for commercial reasons.
- **Take a clear position in the next Local Plan on re-powering of wind farms, particularly in Fenlands.** This could include issuing guidelines to developers on its approach to assessing change of hub height or change of number of turbines; or actively allocating land areas for new wind projects assuming existing sites will not be repowered. Community Energy led schemes, or providing direct community benefit to those near future windfarms will also be important considerations if existing wind farms are re-powered.
- **Help enable community energy delivered projects where possible.** Realising the rooftop solar estimates in the net zero scenarios does require mobilisation of both domestic and non-domestic sector, which community energy projects can help deliver. As batteries become more affordable, and flexible electricity tariffs expand, it is likely that community energy projects that combine interventions – solar, battery, heat – may become more attractive.

⁸⁴ [Future Energy Scenarios: Pathways to Net Zero](#) July 2025

10 Networks, Storage and Flexibility

Government and industry projections⁸⁵ indicate that electricity demand could double or even triple by 2050, driven by new housing, economic growth, and the widespread adoption of electric vehicles and heat pumps. To ensure our communities remain resilient and well-served, the capacity and resilience of the local electricity network must evolve rapidly to meet this rising demand. This chapter outlines the current state of the network, planned infrastructure upgrades, and the anticipated impacts of low carbon technologies, new homes, and business developments on the local electricity system.

10.1 Existing network constraints

Cambridgeshire's electricity distribution is operated by UKPN as part of its Eastern Power Network (EPN) area. The local distribution grid intersects with several Grid Supply Points (GSPs), which are the high voltage connections to the National Grid Transmission converting 400kV or 275kV to the 132kV distribution network.

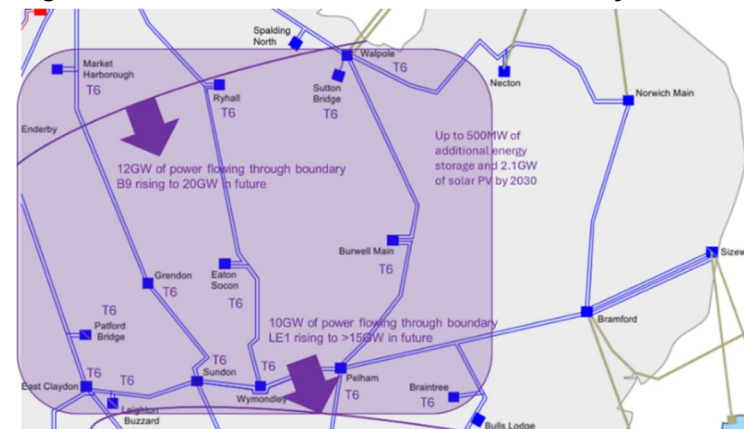
Connecting to the GSPs there are Bulk Supply Points (BSPs), (typically converting 132kV to 33kV), which each serve ~100,000 customers⁸⁶. These in turn connect to primary substations (typically 33kV to 11kV). The primary substations distribute power to the cities, towns and villages of Cambridgeshire and each serve ~20,000 customers. The "last mile" consists of a variety of pole-mounted and ground-mounted distribution substations, converting 11kV to household voltage, each serving up to 1,000 customers.

Cambridgeshire's rapid change of the energy system, due to the growth in domestic and industrial and commercial (I&C) connections, electrification and

renewable energy, will drive the need for major network upgrades whilst wider GB changes to the energy system are driving upgrades to transmission.

Transmission Infrastructure Expansion: Figure 10.1 provides a simplified pictorial view of the operation of the transmission network in the region. Four major overhead line routes pass north-to-south through the wider region. From west to east these are the route from substation Enderby to East Claydon; Market Harborough to Sundon; Ryhall to Wymondley and Spalding North through Sutton Bridge to Pelham. These four overhead line routes represent four of the five routes which cross an invisible line drawn from the Wash to Cardigan Bay in Wales forming a virtual electrical boundary between the Midlands and the South of mainland Britain (known by NESO as the boundary "B9").

Figure 10.1: Pictorial schematic of the electricity transmission network



Source: NESO Electricity Ten Year Statement and NESO Clean Power 2030 Connection Reform Annex

⁸⁵ National Grid ESO (2023). Bridging the Gap to Net Zero

⁸⁶ Customer numbers from Energy Networks Association's (ENA's) Climate Change Adaptation Report submitted to reporting round ARP1

The transmission network in the region supplies the local distribution network but plays a proportionally larger role in transferring power to the south-east and Kent.

Currently, 12GW of power flows across the B9 boundary in its entirety, of which around 10GW flows through the next boundary LE1 shown as a purple curve at the bottom of Figure 10.1. **This represents nearly 25% of the GB's peak demand in 2024 (45GW)**⁸⁷. These flows are predicted by NESO to reach 20 GW and >15GW respectively in future, necessitating reinforcement to create more capacity at the B9 boundary by 2030, and further reinforcement in the 2030s⁸⁸.

A total of 14 substations indicated in Figure 10.1 comprise transmission region T6 known as “Central England” which was discussed in Section 9. Up to 500MW of additional battery energy storage and 2.1GW of additional solar PV may connect to the transmission network in the zone highlighted in Figure 10.1 by 2030. There are six GSPs in Cambridgeshire:

- **Burwell GSP:** 400kV/ 132kV substation on the eastern border of Cambridgeshire. Burwell is a major node supplying Cambridge and East Cambridgeshire Area. In 2021 Burwell was refurbished by National Grid to replace aging infrastructure for reliable power supply⁸⁹.
- **Walpole GSP** at the border with Norfolk: A 400kV / 132kV near Walpole that serves Fenland, Huntingdonshire and East Cambridgeshire. The Walpole Substation expansion is part of National Grid's Great Grid Upgrade and is designed to accommodate new infrastructure that will support future electricity demand and enable connections to renewable energy sources. The project includes upgrades to aging equipment, installation of Super Grid Transformers, and new connections for solar

farms, battery storage, and synchronous condensers, with construction works scheduled through 2026⁹⁰. It also serves **Sutton Bridge**.

- **Eaton Socon GSP:** a 400/132kV National Grid substation located on the western edge of Cambridgeshire, supplies Huntingdonshire and part of South Cambridgeshire. National Grid installed a new Supergrid transformer substation to reinforce the electricity network capacity⁹¹.
- **Pelham** and **Wymondley** are two separate but closely interconnected GSPs. National Grid is expanding⁹² Pelham Substation as part of the North London Reinforcement project by installing two quad booster units and upgrading overhead lines to improve electricity flow, support future energy connections. The substations cover South Cambridgeshire area.

Local Infrastructure Expansion: The distribution network is shown in Figure 10.2. This tends to look like clusters of 33kV overhead lines (and in some cases cables) shown in green in the diagram emanating away from a point where they have been supplied by a BSP. The BSP is then fed from a 132kV spine shown in black, or directly from a connection to the transmission system via a neighbouring GSP.

The regional 33kV networks are not interconnected with one another – in practice, this appears as white space in Figure 10.2. This is a typical engineering design necessary to avoid stressing the switchgear at the lower voltages by exposing it to fault current flowing in from multiple GSPs. However, it creates a natural boundary for power flows between regions and between renewables in one region and demand in another. As such – these clusters of green overhead lines can also be thought of as similar to water catchments, in which power generated and consumed tends to stay within the catchment.

⁸⁷ NESO, <https://www.neso.energy/news/britains-electricity-explained-2024-review>

⁸⁸ NESO [Electricity Ten Year Statement](#)

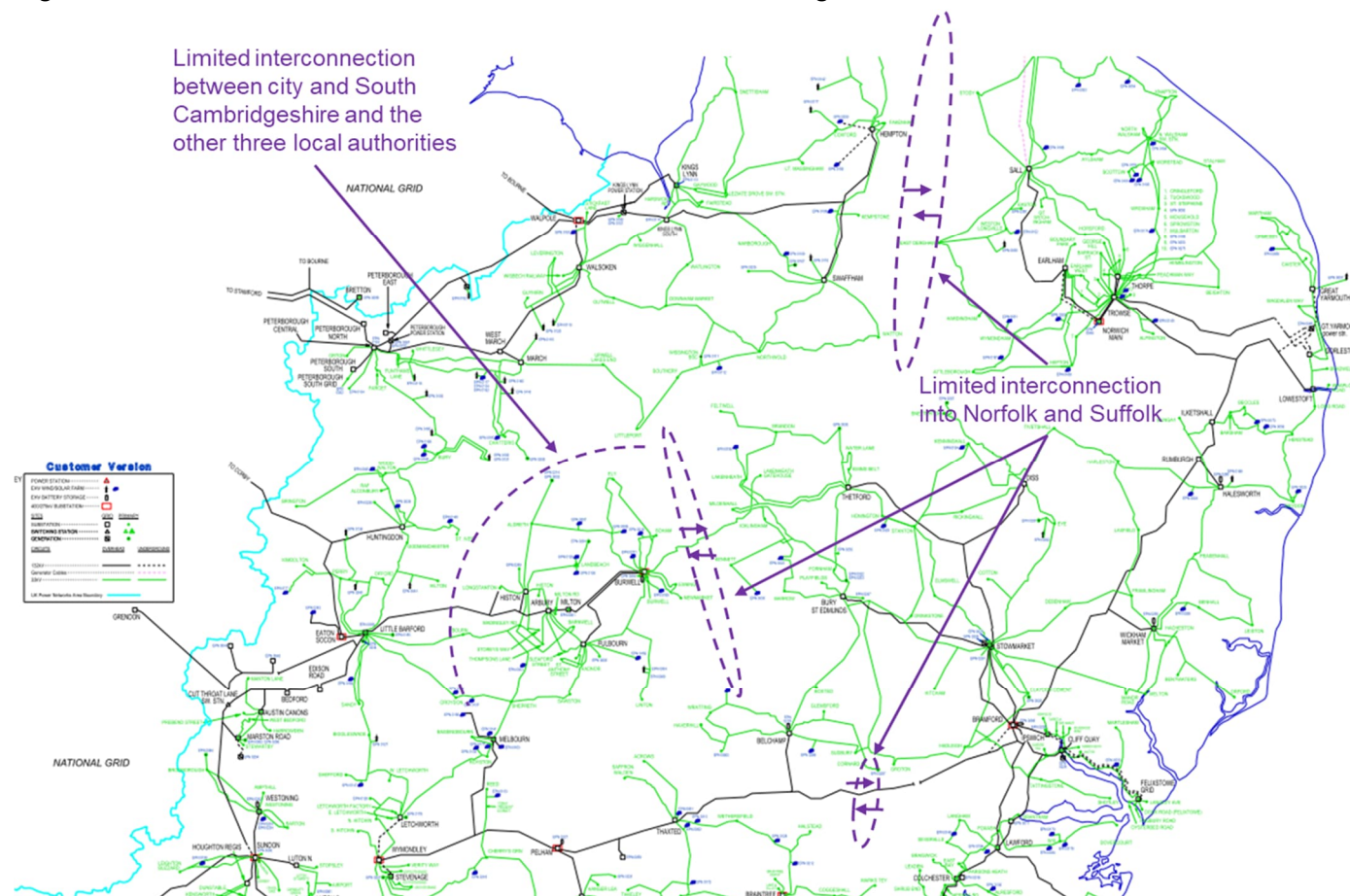
⁸⁹ [National Grid](#), 2021

⁹⁰ [National Grid](#), 2025

⁹¹ [Electrical Contracting News](#), 2021

⁹² [National Grid](#), 2025

Figure 10.2: Schematic of the distribution network in the wider region



Source: UK Power Networks' Long Term Development Statement. Annotations by Mott MacDonald

The distribution network in Cambridgeshire is primarily fed from the substations on the Walpole-Pelham and Ryehall-Wymondley routes discussed in the previous section. There is limited interconnection into Norfolk and Suffolk, comprising only the 132kV line from Pelham to Bramford (shown black running east-west along the bottom of Figure 10.2) and no interconnection at 33kV. One 33kV feeder supplies part of Lakenheath from Burwell.

This means that the transmission network plays the largest role in supplying Norfolk and Suffolk through Norwich Main and Bramford.

It also means that large-scale transmission-connected solar in Norfolk and Suffolk will tend to supply London; and there are limited opportunities for smaller-scale distribution connected solar and wind in Norfolk and Suffolk to supply power to Cambridgeshire.

Separately, there is a similar boundary between Cambridge City and South Cambridgeshire and East Cambridgeshire, Fenland and Huntingdonshire.

Large-scale transmission-connected solar in East Cambridgeshire, Fenland and Huntingdonshire and connecting into the Ryhall - Wymondley "spine" may indeed contribute to supplying the City and South Cambridgeshire as power flows down the spine and into the City from Eaton Socon. However, smaller-scale schemes in East Cambridgeshire, Fenland and Huntingdonshire connecting at 33kV and 132kV, even if geographically on the city boundary, are unlikely to materially contribute to supplying demand in Cambridge City.

UKPN invested £5.5m to upgrade electricity infrastructure in central Cambridge⁹³, installing two new primary (33/11kV) transformers that will enhance power supply reliability for over 12,600 homes and businesses, including Addenbrooke's Hospital. This upgrade, part of the broader £85 million Fulbourn to Sawston programme, is designed to support growing

demand from electric vehicles, heat pumps, and other low-carbon technologies, helping to future-proof the city's energy network. Additionally, two new BSP substations have been approved for funding at Cambridge East⁹⁴ and Trumpington.⁹⁵

10.2 Network impacts

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 - allows network planners to design infrastructure more efficiently, avoiding unnecessary oversizing while still ensuring reliability. ADMD plays a crucial role in assessing the total connected capacity required at substations. By applying the ADMD value to the number of dwellings or technologies modelled, planners can estimate the aggregate peak demand that the substation must be capable of handling. This informs decisions about transformer sizing, cable ratings, and switchgear specifications.

We examine two issues: **firstly**, we approximate the impact arising solely from new commercial and housing developments planned by the local authorities. **This provides a view of the impact on the network from growth alone, both in a high and moderate growth scenario.** **Secondly**, we approximate the impact of the **net zero** plan above, notably **moderate** growth and the uptake in Low Carbon Technologies which replaces existing gas, petrol and diesel consumption in both existing and future homes and businesses (industry excluded).

⁹³ [Electrical Times](#), 2025

⁹⁴ [UKPN](#), accessed 2025

⁹⁵ [Greater Cambridge Partnership](#), 2023

10.3 Impacts of Growth on the network

The Infrastructure Delivery Framework (IDF) report (2024) identifies 55 development schemes across Cambridgeshire, comprising approximately 55,564 planned dwellings and 5.8million square metres of employment floor space. The planned number of dwellings were then uplifted (60% on average), to align with the “County Dwellings” forecast referred to in Section 4. Employment floor space was not uplifted as it represents a very large increase in electrical demand, and is considered conservative as already presented. Furthermore the “County Dwellings” forecast is only for housing, and applying it to the non-domestic sector was not considered appropriate.

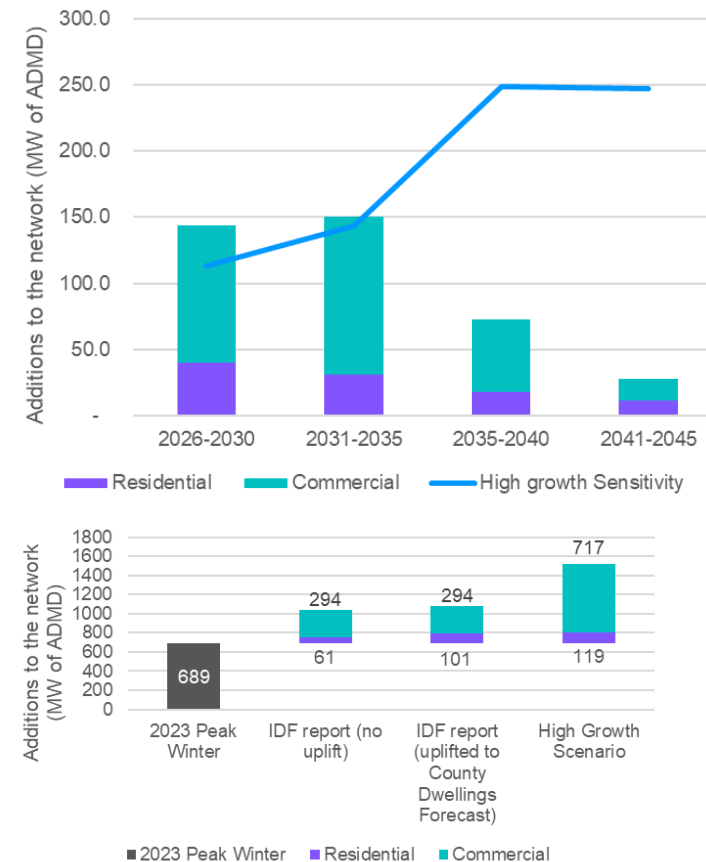
We estimate the remaining residential construction may contribute a diversified peak electricity demand of 101 MW. By contrast, the remaining commercial floor-space represents a significantly higher projected peak demand of ~294MW, driven by the scale of commercial floor area, if fully built out. This is shown in Figure 10.3. Further details of our estimates are provided in Appendix H.

A sensitivity analysis was conducted for a high growth future, as set out in Section 4. From Figure 10.3, we see that the high growth scenario is slightly below the County Dwellings forecast up to 2035, however after 2035 the demand added to the electrical network is significantly higher. While the exact figures have a high degree of uncertainty in them, there are two key messages:

1. **Commercial and Industrial demands are significant:** The impact on the electrical network will be more heavily influence by the non-domestic demands than housing. Efforts should be made to ensure the DNOs have forward visibility of non-domestic growth.
2. **The High Growth forecast has a larger influence after 2035:** for the next 10 years the network will reach capacity more or less at the same time for both growth forecasts, however how large of an increase is

needed (e.g. the size of replacement equipment) is highly sensitive to how much the region will grow after 2035.

Figure 10.3: Top: Estimates of future additional load added in each period. Bottom: Total additions of additional load to 2045



Source: Mott MacDonald analysis

Underpinning the above analysis, several of the 55 developments are underway and partly in construction. Based on the planning permission information we have made assumptions on their construction and energisation dates.

Of the 55 developments, there are 9 developments which add over 10MW additional diversified peak demand as the development (or the remainder of the development) is built out. These are listed in Table 10.1. **The scale of ambition for commercial development of the March Trading Estate is the most significant factor.**

Table 10.1: Cambridgeshire sites with over 10MW Peak Demand

Development Sites (% assumed completed pre-2024)	Dwellings unadjusted*	Commercial floor area (m2)	Est. total Peak Demand (MW)
March Trading Estate (0%)		470,199	40.0
Former Alconbury Airfield and Grange Farm (15%)	6,500	290,492	34.1
West Cambridge (30%)		336,000	31.2
South Wisbech (0%)	750	324,000	28.5
Lancaster Way Business Park (0%)		243,000	20.7
Cambridge Biomedical Campus & Addenbrooke's Hospital Site (0%)		225,955	18.4
St Neots East (0%)	3,820	63,500	13.1
Nene Waterfront and Port (0%)	2,000	119,957	12.8
Northstowe (30%)	9,035	38,147	10.5

Note: The above development sites were informed by the Infrastructure Development Framework, data sourced in 2024. As developments are dynamic and change often, this represents a snapshot in time, and future iterations of the LAEP should reflect the latest developments known by council planning teams.

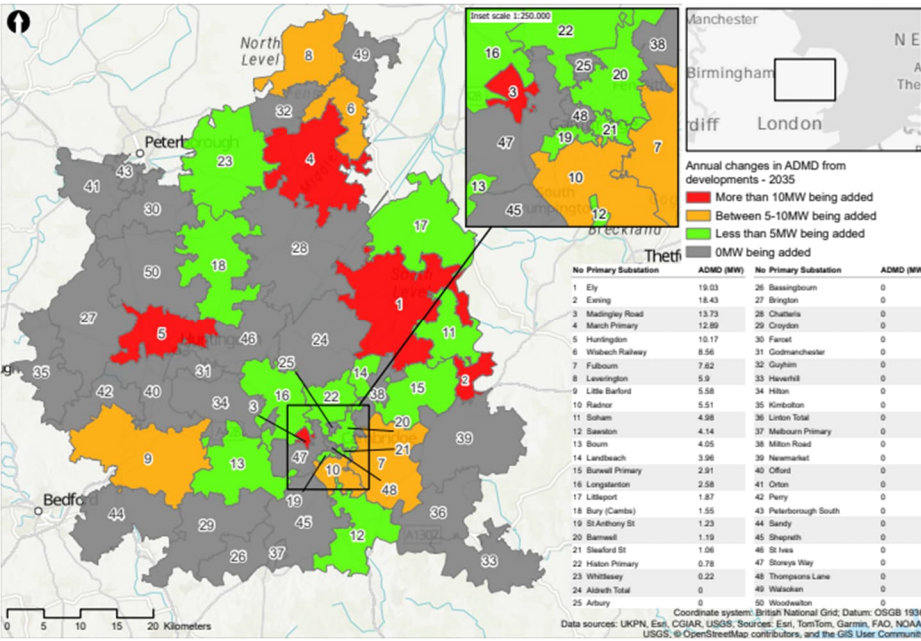
*Unadjusted means these are the original dwellings numbers taken from the IDF, before being uplifted to align with the "County Forecast" growth projection

The above data reinforces the need to maintain accurate updates from developers and build rates, from large developments with non-domestic uses.

10.3.1 Impact on Electrical Infrastructure

The impact of the increased electrical demands for the uplifted IDF build forecast, are displayed for primary substations as maps in Appendix H. The spatial distribution of impact on the network for the period 2031-2035, for example, is shown below:

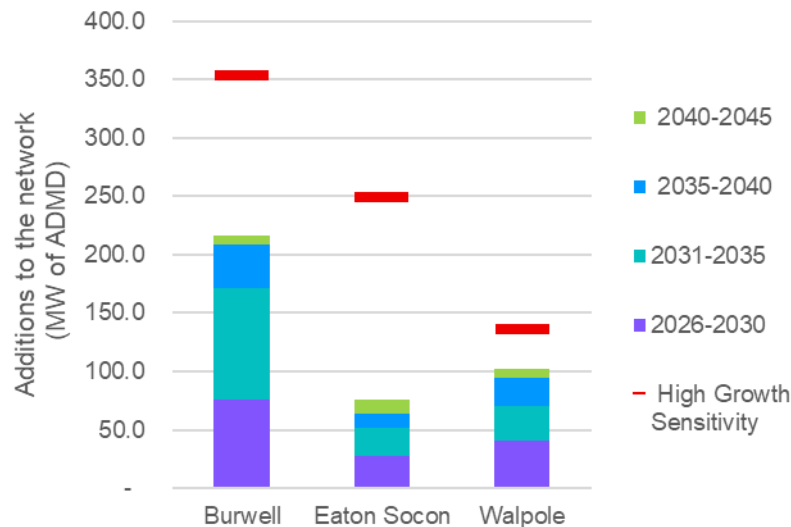
Figure 10.4: Impact of developments built out in the period 2030-35



Source: Mott MacDonald analysis of data in the Infrastructure Delivery Plan uplifted to align with "County Dwellings" Forecast

Sites close to construction are assumed to have been included in the planned peak demand and headroom reporting of UKPN. Nevertheless, the remaining ambitions may bring pressure on the GSPs at Burwell, Eaton Socon and Walpole as shown in Figure 10.5. The high growth sensitivity analysis is shown for illustrative purposes, which would help inform discussions with National Grid Electricity Transmission and the National Energy System Operator (NESO).

Figure 10.5: Estimates of future additional load by GSP



Source: Mott MacDonald analysis, "County Dwellings" Forecast and high growth sensitivity.

10.4 Low Carbon Technologies

The previous section analysed the impact on the network from growth (employment and homes) alone. This section models ADMD for low carbon technology (LCT) adoption across Cambridgeshire region in domestic and

non-domestic buildings. The effects of improvements in domestic appliance energy efficiency in homes, and therefore the consequential impact on the heating demand and heating technology sizing, have been excluded from the modelling.

To model the ADMD of the aggregate of LCTs, the scenario technology deployments described in previous sections, were added per served primary substation. For further detail on technology-specific modelling and uptake rates calculation see Sections 6 Low carbon heating and Section 8 Transport. A commentary on how we reviewed and calibrated the findings is available in Appendix H.

Industrial decarbonisation is omitted from the analysis for two reasons. Firstly, predicting when that decarbonisation might occur in the future is difficult, as it is a hard to abate sector and many industries unlikely to have firm plans and timelines related to how process loads will be electrified. Secondly, determining a peak electrical demand number from the data available, SIC Codes and annual gas consumption, is too coarse to draw meaningful conclusions from. However, the scenarios modelled below include a 15% increase in domestic and 17% increase in non-domestic connections (these growth rates are included in the DFES scenarios as default for ASHP and EVs). Therefore while the analysis in this section excludes industrial decarbonisation of existing industries and district heat networks, the inclusion of an element of growth helps balance this out. It is therefore considered a good indication of the impact on the network, from transitioning the existing system to low carbon alternatives.

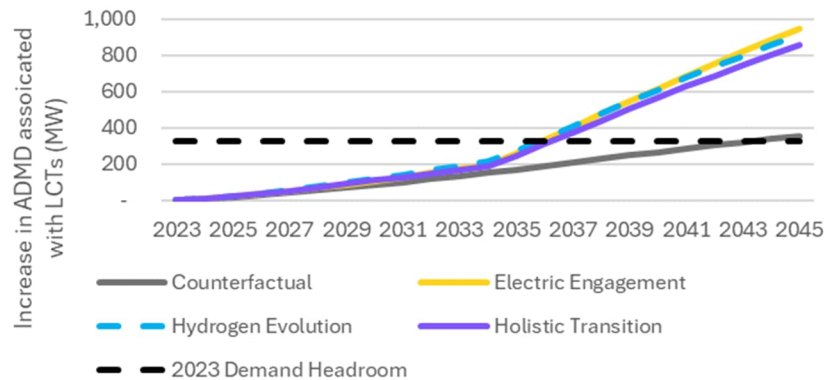
The projected network impact outlined below provides a compelling case that the transition to LCTs alone are sufficient to justify network upgrades. The additional capacity needed for industrial decarbonisation can be subject to more detail review between UKPN and the specific businesses, at the time of network planning.

Table 10.2: Estimated increase in ADMD across Cambridgeshire attributable to adoption of electric heating and electric vehicles

Scenario	2030	2035	2040	2045	Annualised Growth (MW)
Counterfactual	84	168	265	352	14
Electric Engagement	103	259	617	949	39
Hydrogen Evolution	117	273	609	911	37
Holistic Transition	109	244	565	856	35

As expected, the counterfactual shows the lowest demand growth rate of approximately 14MW annually, compared with the 35-40MW/annum for Net Zero compliant scenarios. Notably the Holistic Transition scenario has the lowest ADMD increase of the net zero scenarios. This is shown graphically on the below graph.

Figure 10.6: Cambridgeshire aggregated ADMD increases (MW)



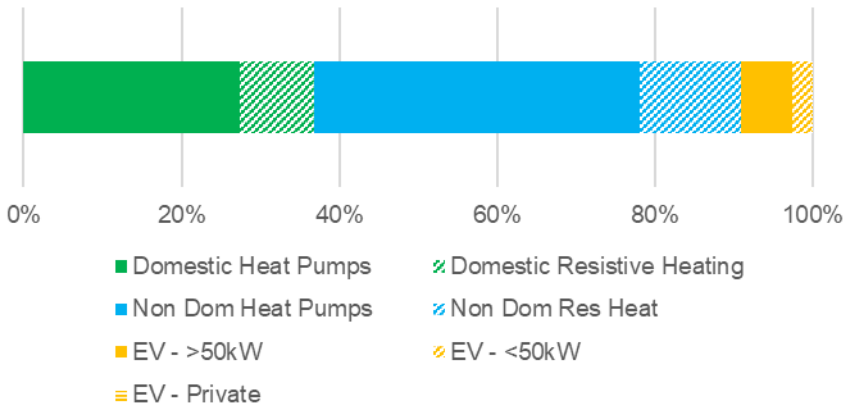
Source: Mott MacDonald ADMD analysis based on DFES technology uptake for heating and County Dwellings forecast for EVs

⁹⁶ The demand headroom is taken from the UKPN 2025 Network Development Plan.

Figure 10.6 demonstrates ADMD increases for the Cambridgeshire area as it compares with the 2023 UKPN demand headroom, reported as 325MW⁹⁶. Electric engagement and Hydrogen Evolution breach the available capacity in 2035-36 while Holistic Transition creates an extra year of headroom. Due to the low uptake rates of LCTs the Counterfactual only breaches headroom in 2043.

Finally, the percentage split of ADMD increases between the technology types is illustrated in Figure 10.7. Unsurprisingly, for both domestic and non-domestic sectors we see the electrification of heat driving most of the demand increase (note electrification of process loads is not included as estimating this is highly site specific and outside the scope of the LAEP).

Figure 10.7: Percentage split of domestic ADMD in 2045 Electric Engagement



Source: Mott MacDonald ADMD analysis based on DFES technology uptake for Electric Engagement (medium uptake growth profile)

10.5 When will electrical reinforcement be needed

A core output of the LAEP is estimating where and when electrical reinforcement will be needed. Completing this task is challenging, as the above analysis shows that there are a multitude of forecasts depending on the pace of the net zero transition, coupled with a multitude of forecasts on how quickly the region will grow.

When will electrical reinforcement be needed?

Table 10.3 below, shows when headroom will be breached as a whole in the region, for the following scenarios.

Table 10.3: Network scenario descriptions

Scenario	Includes Growth?	Includes NZ transition?
Counterfactual	Yes – conservative	Limited
Growth only (County Forecast)	Yes – conservative	No
Holistic Transition	No*	Yes – Full
High Growth no LCT	Yes – High	No
High Growth and HT	Yes – High	Yes – Full

Note: *As stated earlier, these scenarios do contain an element of growth within them but the exclusion of industrial process loads transition to non-fossil fuel alternatives and district heat networks cancels this out. For this illustrative comparison they are therefore considered not to include growth.

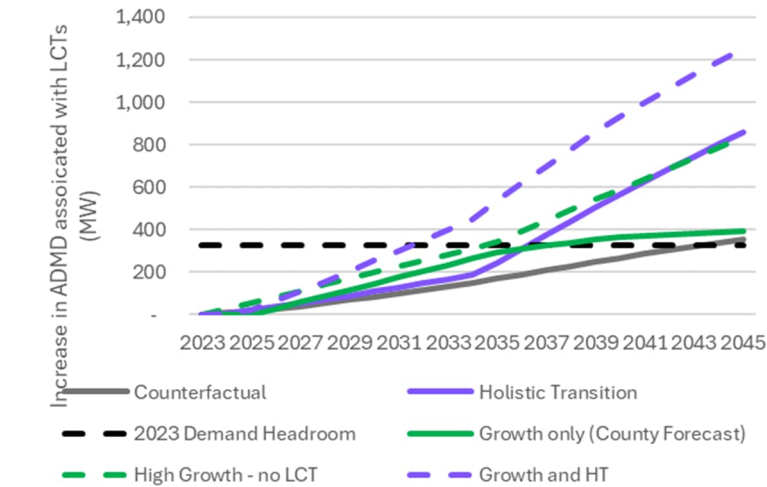
Some notable points are provided below:

- The proportion of increased electrical demand that relates to conservative growth (new housing and employment areas) is relatively small. For both the Counterfactual and Growth Only forecasts, headroom is not breached until the late 2030s.
- The variability between growth scenarios is significant, as already discussed in the preceding sections but further illustrated here. This impact primarily occurs after 2035.

- The transition to net zero (holistic transition line) results in approximately the same impact on the network as the high growth forecast, albeit the impact is delayed (breaching headroom later). This is important, as the electrical network will first be a blocker to growth, before it impedes on the transition to net zero.
- The impact on the network from both high growth and full transition to net zero could be significant. This shows a near 1,200MW of demand being added, which is considerable considering the 2023 peak demand recorded by UKPN was 689MW.

Regardless of the accuracies in forecasting the future, this analysis provides a robust case for proactive investment in distribution network upgrades, as electrical demand will exceed current infrastructure provision.

Figure 10.8: Cambridgeshire aggregated ADMD increases – Net zero and Growth Scenarios



Source: Mott MacDonald analysis

Where will electrical reinforcement be needed?

As stated earlier, Cambridgeshire is served by 50 primary substations. Each substation has had electrical demand added to it and compared against its existing headroom in 2023. Figure 10.9 illustrates Mott MacDonald's estimate of headroom at primary substations in 2035 for the holistic transition scenario. Headroom values within the inset table are provided in Megawatts (MW). Each substation is colour-coded using the standard RAG rating:

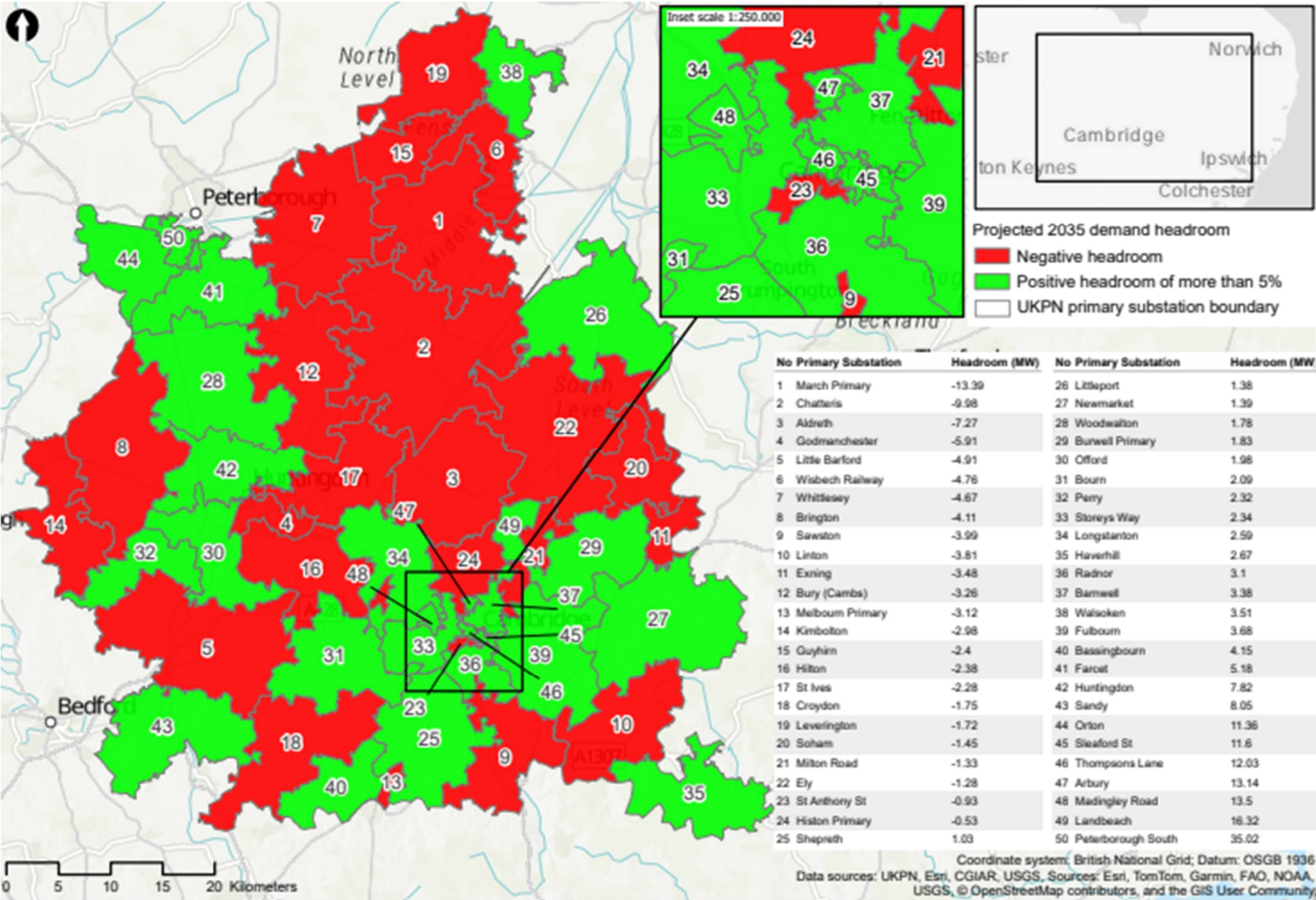
- Green indicates more than 5% spare capacity,
- Amber represents a positive headroom of less than 5%, and
- Red signifies negative headroom, where demand exceeds available capacity.

The figure highlights existing network pinch points, underscoring areas where the infrastructure is already constrained. These projections reinforce the need for targeted reinforcement to support future demand and enable low-carbon

technology deployment. As shown in the underlying data in Figure 10.10, the existing headroom is exhausted in all but South Cambridgeshire by the late 2030s (in the holistic transition scenario). In some cases, the threshold value of 5% remaining capacity is exhausted within 1-2 years, which is faster than a reinforcement could realistically be carried out.

Figure 10.10 also shows a high growth sensitivity column, indicating how many years later a primary substation will breach in a high growth scenario. As shown, in most cases the high growth scenario would breach primary substations earlier than the holistic transition scenario, and for many substations there are no differences. **This reinforces the finding shown in Figure 10.8, that growth of the region is the larger driver of electrical network constraint instead of net zero.**

Figure 10.9: Overview of substation spare capacity (“headroom”) in 2035 under a Holistic Transition scenario



Source: Mott MacDonald estimates

Figure 10.10: Estimate of Headroom at Primary Substations – Holistic Transition Scenario with High Growth Sensitivity

DFES Substation Coverage	Local Authority	Primary Substation - LTDS Name	Primary Substation	GSP Substation	Scenario	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	High Growth Sensitivity - additional years before breach	
	Cambridge	Barnwell Primary 11kV	Barnwell	Barnwell	Holistic Transition	6.8	5.90	6.60	6.53	6.34	6.15	5.86	5.60	5.40	5.15	4.97	4.74	3.36	1.95	0.27	-1.18	-2.77	-4.18	-5.57	-6.96	-8.36	-9.55	-10.74	-11.21	-11.71	-12.17	-12.58	-12.94	-2	
	Cambridge	Fulbourn 11kV	Fulbourn	Fulbourn Grid 132/11	Barnwell	Holistic Transition	13.5	13.51	13.70	12.23	14.34	10.85	10.08	9.26	8.63	7.87	7.04	6.44	3.64	1.32	-1.83	-4.72	-7.86	-10.34	-13.07	-15.77	-18.25	-20.82	-23.38	-24.45	-25.27	-26.45	-27.63	-28.81	1
	Cambridge	Milton Rd Primary 11kV	Milton Road	Barnwell	Holistic Transition	1.7	1.71	1.59	1.56	1.21	1.05	0.74	0.58	0.40	0.21	-0.08	-0.11	-1.33	-2.86	-3.88	-5.14	-6.38	-7.38	-8.52	-9.47	-10.45	-11.34	-12.23	-12.53	-13.47	-13.23	-13.55	-13.38	-6	
	Cambridge	Storeys Way Primary 11kV	Storeys Way	Barnwell	Holistic Transition	6.3	6.36	6.91	6.75	5.45	5.25	4.85	4.54	4.32	4.05	3.82	3.49	2.34	1.17	0.05	0.16	2.34	-0.32	-4.21	-5.88	-7.58	-8.81	-7.65	-6.07	-6.56	-8.12	-8.86	-9.88	-2	
	Cambridge	Histon Primary 11kV	Histon Primary	Barnwell	Holistic Transition	7.4	7.34	6.77	6.34	5.77	5.23	4.63	3.94	3.22	2.69	2.08	1.42	-0.53	-2.67	-4.82	-7.07	0.35	-13.38	-13.43	-13.43	-17.08	-19.23	-21.14	-22.87	-23.15	-23.91	-24.98	-25.28	1	
	Cambridge	Arbury Grid 11kV	Arbury	Barnwell	Holistic Transition	15.8	15.88	15.71	15.53	15.38	15.12	15.03	14.67	14.49	14.44	14.34	13.88	13.14	12.26	11.18	10.31	9.28	8.49	7.65	6.83	6.07	5.18	4.46	4.25	3.94	3.64	3.40	3.28	0	
	Cambridge	Radnor Primary 11kV	Radnor	Barnwell	Holistic Transition	9.3	9.51	9.89	8.73	8.55	7.71	7.10	6.52	6.06	5.75	5.12	4.74	3.11	0.99	-0.91	-2.70	-4.47	-6.12	-7.80	-9.43	-10.88	-13.14	-13.63	-13.94	-14.46	-14.84	-15.08	-15.46	0	
	Cambridge	Stearford St Primary 11kV	Stearford St	Barnwell	Holistic Transition	13.8	14.08	14.03	14.06	13.83	13.75	13.42	13.32	13.18	13.11	13.03	12.88	11.80	10.17	9.00	7.89	7.15	6.40	5.68	5.53	5.23	5.33	5.35	5.50	4.87	4.89	4.54	4.18	-13	
	Cambridge	St Anthony St Primary 11kV	St Anthony St	Barnwell	Holistic Transition	9.3	9.34	9.11	9.02	8.30	6.88	6.18	6.20	6.27	6.28	6.43	6.40	6.83	-1.48	-1.88	-2.38	2.82	-3.73	-3.85	-3.87	-4.34	-4.53	-4.72	-4.87	-5.10	-5.37	-5.57	-5.51	-4	
	East Cambridgeshire	Bunwell Primary 11kV	Bunwell Primary	Bunwell	Holistic Transition	4.5	4.45	4.28	4.15	3.88	3.83	3.66	3.34	3.19	2.98	2.63	2.47	1.81	1.08	0.34	-0.40	1.12	-1.97	-2.74	-3.43	-4.10	-4.86	-5.63	-6.03	-6.15	-6.47	-6.71	-6.85	-1	
	East Cambridgeshire	Newmarket Primary 11kV	Newmarket	Bunwell	Holistic Transition	4.8	4.43	4.22	3.97	3.78	3.47	3.31	2.98	2.77	2.58	2.38	1.88	1.39	0.69	-0.13	-0.82	1.55	-2.28	-3.18	-3.77	-4.52	-5.22	-5.96	-6.36	-6.78	-7.19	-7.64	-7.78	0	
	East Cambridgeshire	Ely Primary 11kV	Ely	Bunwell	Holistic Transition	10.4	10.81	9.25	8.58	7.72	6.77	5.85	5.02	4.19	3.28	2.37	1.23	-2.28	-4.35	-7.38	-10.48	-13.68	-16.58	-18.43	-22.43	-25.27	-28.18	-30.88	-32.28	-33.82	-34.98	-36.28	-36.82	-3	
	East Cambridgeshire	Chatteris Primary 11kV	Chatteris	Walslop	Holistic Transition	5.3	5.18	4.40	4.18	3.77	2.77	2.54	4.38	6.27	5.38	4.68	7.81	8.88	12.44	14.98	-17.35	-19.83	22.18	24.53	26.88	-29.04	-31.25	-33.64	-34.54	-35.56	-36.40	-37.31	-37.88	-1	
	East Cambridgeshire	Soham Primary 11kV	Soham	Bunwell	Holistic Transition	7.1	6.81	6.33	5.68	5.34	4.51	3.84	3.07	2.54	1.77	1.11	0.40	-0.45	-0.82	-0.86	-10.24	-12.24	-14.38	-16.35	-18.48	-20.31	-22.27	-23.82	-23.88	-24.56	-25.42	-25.72	-26.28	-2	
	East Cambridgeshire	Exning Primary 11kV	Exning	Bunwell	Holistic Transition	2.4	2.31	2.06	1.88	2.75	2.77	2.85	2.82	3.02	3.15	3.17	3.23	3.48	-0.08	-0.08	-0.05	-4.15	-4.56	-4.88	-4.85	-5.05	-5.26	-5.47	-5.78	-5.85	-5.88	-5.88	-6.18	-6.25	0
Adresth T1 (for reference)	East Cambridgeshire	Adresth Primary 11kV	Adresth Total	Bunwell	Holistic Transition	4.5	4.45	4.28	4.15	3.88	3.83	3.66	3.34	3.19	2.98	2.63	2.47	1.81	1.08	0.34	-0.40	1.12	-1.97	-2.74	-3.43	-4.10	-4.86	-5.63	-6.03	-6.15	-6.47	-6.71	-6.85	0	
Adresth T2	East Cambridgeshire	Littleport Primary 11kV	Littleport	Walslop	Holistic Transition	5.0	4.88	4.64	4.44	4.23	3.97	3.68	3.44	3.06	2.82	2.57	2.18	1.52	0.40	-1.28	2.12	-3.01	-3.85	-4.82	-5.57	-6.41	-7.18	-7.56	-7.91	-8.34	-8.58	-8.85	-8.85	1	
	Fenland	Whitlesey Primary 11kV	Whitlesey	Walslop	Holistic Transition	3.3	3.40	2.38	2.35	1.82	1.10	0.45	0.14	-0.77	-1.84	-3.00	-2.87	-4.67	-6.68	-5.54	-10.78	-12.31	-14.38	-16.41	-18.18	-20.00	-21.84	-23.78	-24.48	-25.28	-25.98	-26.78	-27.18	1	
	Fenland	Walsoken Grid 11kV	Walsoken	Bunwell	Holistic Transition	9.0	8.98	8.52	8.15	7.82	7.43	6.96	6.47	6.04	5.57	5.23	4.74	3.52	2.28	0.82	0.50	-1.82	-3.05	-4.28	-5.52	-6.86	-7.72	-8.82	-9.28	-9.78	-10.34	-10.87	-10.82	5	
	Fenland	Wisbech Railway Primary 11kV	Wisbech Railway	Walslop	Holistic Transition	0.3	0.27	-0.01	-0.43	-0.88	-1.18	-1.51	-1.94	-2.48	-3.78	-3.28	-3.78	-4.78	-5.98	-7.22	-8.37	-9.68	-10.78	-11.84	-12.88	-14.02	-15.08	-16.14	-16.88	-17.18	-17.88	-18.14	-18.36	0	
	Fenland	March Primary 11kV	March Primary	Walslop	Holistic Transition	2.4	0.88	0.82	1.87	2.88	3.48	3.72	6.72	8.84	8.84	8.38	10.45	13.58	16.64	20.28	23.78	27.17	30.52	33.78	37.08	40.17	43.34	46.54	47.87	49.38	50.78	52.18	52.58	0	
	Fenland	Levington Primary 11kV	Levington	Walslop	Holistic Transition	6.0	5.67	5.23	4.75	4.13	3.83	3.04	2.38	1.84	1.15	0.68	0.11	-1.72	-3.43	-5.15	-6.83	8.88	10.18	11.74	-13.38	-14.88	-16.38	-17.77	-18.51	-19.18	-20.10	-20.82	-21.18	0	
	Fenland	Guyhirn Primary 11kV	Guyhirn	Walslop	Holistic Transition	-0.07	-0.07	-0.84	-0.52	-1.57	-1.18	-1.34	-1.46	-1.65	-1.75	-1.90	-2.03	-2.40	-2.78	-3.18	-3.55	3.95	-4.33	-4.72	-5.12	-5.51	-5.94	-6.32	-6.51	-6.68	-6.88	-7.08	-7.18	0	
	Huntingdonshire	Woodwalton Primary 11kV	Woodwalton	Eaton Sacen	Holistic Transition	6.0	5.84	5.68	5.44	5.12	4.71	4.32	4.06	3.81	3.47	3.12	2.73	1.78	0.94	-0.12	-1.12	-2.12	-3.12	-4.12	-5.12	-6.12	-7.12	-8.12	-9.12	-10.12	-11.12	-12.12	-13.12	0	
	Huntingdonshire	Perry Primary 11kV	Perry	Eaton Sacen	Holistic Transition	2.7	2.87	3.52	3.45	3.28	3.31	3.12	3.08	2.95	2.87	2.78	2.58	2.32	1.98	1.58	1.22	0.88	6.48	8.34	6.72	-0.58	-0.92	-1.12	-1.27	-1.52	-1.42	-1.45	-1.44	-2	
	Huntingdonshire	Offord Primary 11kV	Offord	Eaton Sacen	Holistic Transition	6.4	6.32	6.01	5.72	5.47	5.24	4.75	4.32	4.01	3.68	3.34	2.98	1.88	0.88	-0.83	1.08	2.02	-2.84	-3.98	-4.87	-5.78	-6.88	-7.48	-7.82	-7.88	-7.88	-8.64	-8.64	-3	
Huntingdon 11 Grid GT&A	Huntingdonshire	Huntingdon Grid 11kV	Huntingdon 11 Grid	Eaton Sacen	Holistic Transition	18.4	18.18	15.85	15.28	14.75	14.54	13.32	12.61	12.07	11.54	10.85	10.27	7.82	5.24	2.73	0.51	2.88	-3.88	-7.45	-9.93	-12.17	-14.48	-16.75	-17.38	-18.38	-19.28	-20.18	-20.18	-1	
	Huntingdonshire	St Ives Primary 11kV	St Ives	Eaton Sacen	Holistic Transition	9.3	9.03	8.53	7.87	6.98	6.28	5.17	4.20	3.43	2.49	1.84	0.84	-2.28	-5.63	-8.93	-12.88	-15.61	-18.12	-22.58	-25.82	-29.88	-31.61	-34.64	-35.17	-36.68	-37.78	-38.85	-38.85	-7	
	Huntingdonshire	Brington Primary 11kV	Brington	Eaton Sacen	Holistic Transition	-2.8	-3.85	-3.72	-3.58	-3.38	-3.27	-3.10	-3.42	-3.18	-3.17	-3.73	-3.80	-4.13	-4.38	-4.80	-5.02	5.28	5.63	-5.98	-6.28	-6.57	-6.87	-7.18	-7.11	-7.41	-7.55	-7.73	-7.68	0	
	Huntingdonshire	Farret Primary 11kV	Farret	Walslop	Holistic Transition	9.7	9.54	9.43	9.09	8.71	8.42	8.08	7.72	7.35	7.11	6.72	6.40	5.18	3.95	2.83	1.40	0.11	-1.17	-2.84	-3.68	-4.88	-6.08	-7.12	-7.48	-7.88	-8.88	-8.88	-8.48	-1	
	Huntingdonshire	Orton Primary 11kV	Orton	Walslop	Holistic Transition	11.8	11.85	11.88	11.78	11.70	11.88	11.88	11.63	11.60	11.54	11.54	11.47	11.38	11.24	11.13	10.98	10.88	10.71	10.55	10.43	10.27	10.15	10.08	9.98	9.88	9.88	9.88	9.81	9.88	0
	Huntingdonshire	Hilton Primary 11kV	Hilton	Eaton Sacen	Holistic Transition	1.6	1.58	1.51	1.55	0.78	0.48	0.18	-0.18	-0.48	-0.87	-1.18	-1.55	-2.38	-3.27	-4.38	-5.12	-6.22	-7.02	-7.88	-8.94	-9.81	-10.78	-11.54	-11.78	-12.15	-12.45	-12.67	-12.85	-4	
	Huntingdonshire	Godmanchester Primary 11kV	Godmanchester	Eaton Sacen	Holistic Transition	0.2	0.12	0.21	-0.43	-1.03	-1.44	-2.11	-2.68	-3.53	-3.88	-4.02	-4.48	-5.93	-7.83	-8.33	-10.88	-12.48	-13.63	-15.48	-16.88	-18.18	-19.53	-20.78	-21.23	-21.84	-21.87	-22.34	-22.45	-1	
	Huntingdonshire	Little Barford 11kV	Little Barford	Eaton Sacen	Holistic Transition	1.8	1.56	4.96	4.33	3.54	2.75	1.90	1.03	0.34	-0.74	-1.35	-2.17	-4.81	-8.02	-11.52	-14.88	-17.18	-20.04	-23.18	-26.38	-29.82	-31.47	-34.08	-34.33	-35.78	-36.51	-37.31	-37.46	-3	
	Huntingdonshire	Kimbolton Primary 11kV	Kimbolton	Eaton Sacen	Holistic Transition	2.3	2.48	2.33	2.52	2.34	2.18	2.01	2.65	2.71	2.74	2.77	2.82	2.88	3.18	3.38	3.52	3.78	3.94	4.09	4.27	4.48	4.68	4.82	4.91	4.98	5.05	5.11	5.07	0	
Bury (Cambs) T2	Huntingdonshire	Bury Primary 11kV	Bury (Cambs) Total	Eaton Sacen	Holistic Transition	2.7	2.58	2.38	1.82	1.17	1.15	0.71	0.12	-0.27	-0.88	-1.28	-1.78	-2.38	-3.08	-3.88	-4.88	-5.88	-6.88	-7.88	-8.88	-9.88	-10.88	-11.88	-13.87	-15.13	-17.11	-18.78	-20.45	-22.41	-4
Peterborough South Grid 11 Main BB	Huntingdonshire	Peterborough South Grid 11kV	Peterborough South Grid 11	Walslop	Holistic Transition	30.7	30.68	30.65	30.61	30.54	30.50	30.45	30.39	30.35	30.27	30.18	30.10	30.02	30.05	30.02	30.05	30.02	30.05	30.02	30.05	30.02	30.05	30.02	30.05	30.02	30.05	30.02	30.05	30.02	0
Linton T2	South Cambridgeshire	Linton																																	

10.6 Impact of Negative Headroom on Net Zero

As shown in the previous section, any net zero compliant scenario will result in 'negative headroom'. Negative headroom indicates that the projected ADMD exceeds the available network capacity at the substation level. In other words, the infrastructure is no longer sufficient to accommodate the expected load. This breach signals the need for reinforcement measures such as substation upgrades, or deployment of flexibility solutions to avoid constraints, maintain reliability, and support continued connections to the network.

Network constraints have direct consequences for how quickly and affordably new connections can be made to the electricity network. When substations are operating beyond their capacity, new connection requests, whether for new or existing domestic, new industrial or commercial connections, or LCT installations, may be delayed or queued until reinforcement works are completed. This can slow down the pace of electrification, decarbonisation and urban expansion, particularly in areas with high growth or ambitious Net Zero targets.

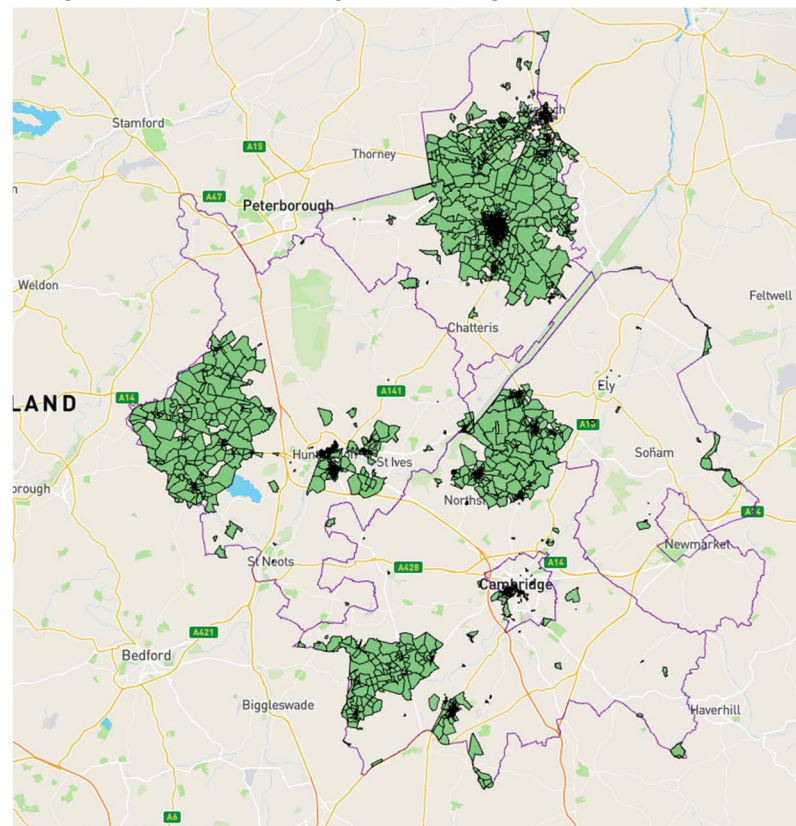
Financially, the breach of headroom often triggers the need for costly infrastructure upgrades. These may include installing new transformers, expanding substation capacity, or reinforcing feeder circuits. Under current regulatory frameworks, some of these costs may be passed on to the connecting customers, especially if the reinforcement is deemed customer-specific rather than strategic. For example, a large industrial site may apply to the DNO for additional electrical capacity, so that an industrial process and heating could be decarbonised. If this would cause a breach at the primary substation, and therefore negative headroom, a portion of the cost to upgrade the network infrastructure could be passed to the individual customer. Furthermore, the customer will need to wait for the DNO to carry out this work

before the additional electrical capacity is released, potentially delaying the plan to align with network availability.

In areas with persistent constraints, alternative approaches such as flexibility services or demand-side management may be considered to defer or reduce the need for capital investment. UK Power Networks has recently tendered for Demand Side Response at Croydon, Brington, March and Aldreth⁹⁷, each covering a material geographic region, as shown in Figure 10.11.

⁹⁷ See details for Tender Round 10 and Tender Round 11 at the UK Power Networks DSO [Tender Hub](#)

Figure 10.11: Overview of regions in which UK Power Networks has sought Demand Side Response during recent tender rounds



Source: Your Local Net Zero Hub, filtered for competition pot "Demand

To put this in the context of the load growth shown above:

- the largest sources of flexibility are licenced generators, with Octopus and RWE Renewables each contracting sites with >10MW of flexibility on a day-ahead basis, and short duration contracts (previously known as "Dynamic" contracts).
- the total quantity of MWs offered under long-term contracts was 7MW. These long-term contracts have pre-scheduled time windows for demand response (previously known as "Peak reduction" contracts).

As such, flexibility appears to be a successful means of deferring investment but **will not remove the need for the investment given the scale of development in the region.**

10.7 Next Steps

Cambridgeshire's forecasted growth and transition to net zero will require upgrades to the existing network infrastructure. On the generation side, large scale solar installations and battery projects may also require network enhancements to facilitate grid connections and balancing supply and demand.

We propose the local authorities should:

- **Work with UKPN to secure targeted reinforcements for new housing.** The analysis in this section highlights existing network pinch points, in particular that the existing headroom in the network will be exhausted from the conservative growth forecasts within the LAEP. Increased and regular communication between the Local Authorities and UKPN can assist in ensuring UKPN have the most advanced notice to plan network upgrades. The Local Authority could also go so far as to seed fund the necessary grid connections to provide certainty to developers, with examples of Sunderland City Council and Ebbsfleet Development Corporation playing this role, and Warrington Borough Council also considering this previously. **Alternatively, the local authorities can work collaboratively with UKPN to develop the evidence required to secure full Ofgem funding for**

infrastructure investment, as the Greater Cambridge Partnership did locally for Cambridge East and Trumpington infrastructure.

- **Sharing of planned growth plans with UKPN.** The infrastructure delivery framework (IDF) captured development sites within the planning pipeline. This demand increase for the domestic portion of the sites in the planning pipeline is estimated to be 60MW, whereas the high growth scenario forecasts a demand increase of 119MW. That additional ~60MW is currently 'invisible' to the DNO, as it hasn't yet entered the planning system. A key next step would be the district councils working with the DNOs urgently to plot spatially where this additional demand is likely to materialise and when, so that network improvements are sized correctly.
- **Ensure high standards for new builds.** Given that growth will have a larger impact on the electrical network than the transition to net zero, ensuring building standards in the region are strict and build in efficiency from the outset is crucial. Stricter building standards with regards to peak electrical consumption, building efficiency, and demand side response, can help mitigate the impact new buildings, housing and non-domestic, will have on the grid.
- **Consider pilots, like zero bill homes.** Pilots could be encouraged between energy suppliers and developers to deliver innovative new homes as part of future development. Octopus Energy is trialling this approach with their Zero Bill Homes initiative, with a "130 home development in Bedfordshire planned for Zero Bills"⁹⁸. Demonstrators like this, delivered in the next 10 years, could prove to be important local case studies for the potentially large amount of growth in 2035 onwards.
- **Monitor ability of businesses to secure electricity grid increases.** Actively participate in existing business fora or convene a dedicated forum focussed on infrastructure which allows Local Authorities to hear directly from both businesses and from UK Power Networks about how smaller

demand increases and new connections are being served and any blockages in the system.

- **Develop a planning policy and locations for energy intensive data centres and labs.** The local authorities could help steer new energy intensive industries and commercial space to locations conducive with the supporting infrastructure (primarily water and energy). One approach could be starting with a call for sites for data centres, to understand what developers are currently planning. These sites could then be reviewed against an established set of criteria (including availability of grid connection and adequate water supply), so that sites may possibly be allocated for this use. This should be a coordinated effort with UKPN and NESO, so that developers may be incentivised to develop sites where they best suit the underlying infrastructure.

⁹⁸ <https://octopus.energy/blog/100k-zero-bills-homes-by-2030/>

11 System wide results: carbon and energy

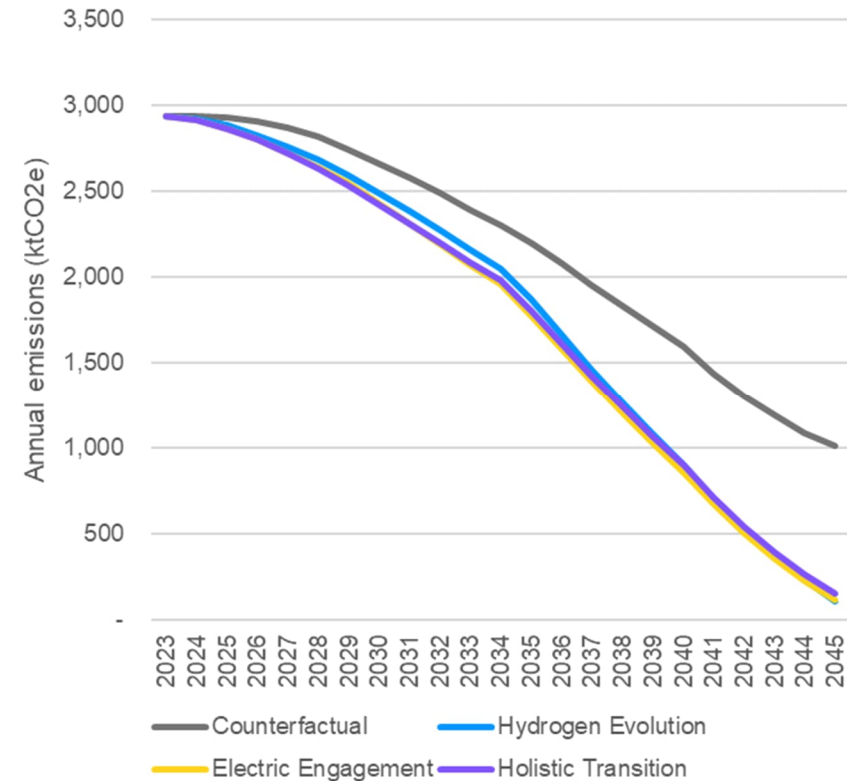
This section summarises the carbon results at the county level, and the energy system at county level in 2045. Intervention specific carbon reductions (e.g. for transport, heat, etc), are provided in the previous sections. This section aggregates the findings.

11.1 Carbon results

A summary and discussion of the cumulative effect on emissions of all interventions discussed in this report is presented here. Specifically, the effect of fabric retrofits, heat networks, heat pumps, other electric heating, EV car uptake, and high and low temperature process load decarbonisations contribute. Carbon reductions have been calculated based on the changes in fuel and electricity consumption resulting from the modelled uptake of low carbon technologies presented in each previous section of the report.

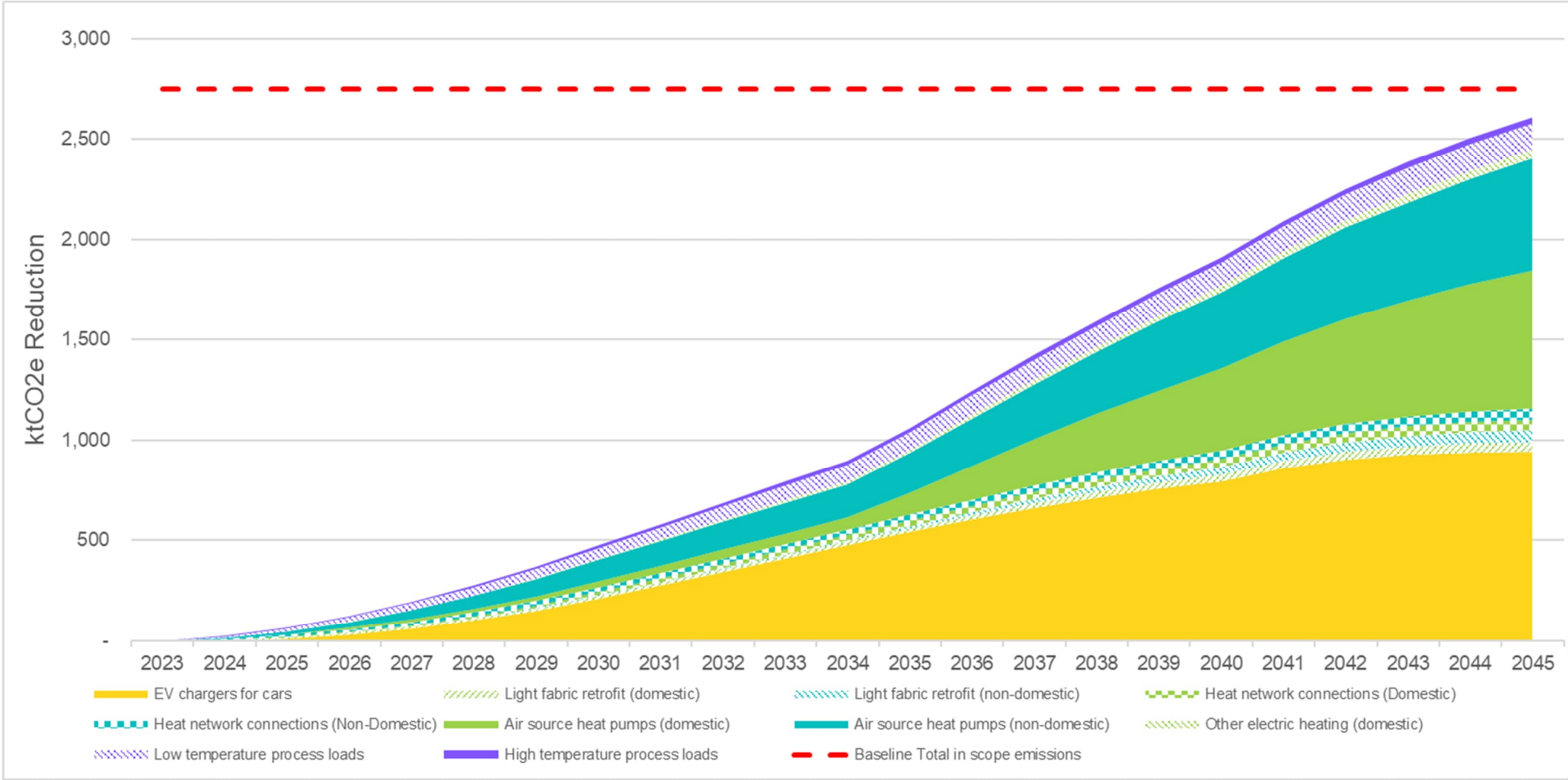
Figure 11.1 shows the total annual carbon emission per scenario. As can be seen the three net zero scenarios are all roughly equal by 2045, reducing emissions by ~2.8Mt CO₂e, with the counterfactual falling well short of net zero. As expected, the counterfactual scenario (“do nothing”) results in net zero not being achieved by 2045, with approximately 1Mt CO₂e of residual emissions. Perhaps more surprisingly, the net zero compliant scenarios do not reach net zero by 2045 either, highlighting that to reach net zero some form of carbon drawdown, or offsetting, will be required. These residual emissions are predominantly from through traffic on trunk roads and will likely decarbonise as part of the UK-wide effort to reach net zero. However, as these emissions fall outside the scope of the LAEP, they appear as residual emissions (Refer to Appendix F for more details).

Figure 11.1: Cambridgeshire annual emissions by scenario



A breakdown of emission reduction contribution by intervention has been displayed for the Holistic transition scenario in Figure 11.2. The largest single intervention contribution is from the transition of conventional ICE cars to EVs (35% of total emission reductions), with the next biggest being the connection of air source heat pumps in domestic then non-domestic properties, replacing existing gas or other fossil fuel-based heating methods (27% and 22% respectively of total emission reductions).

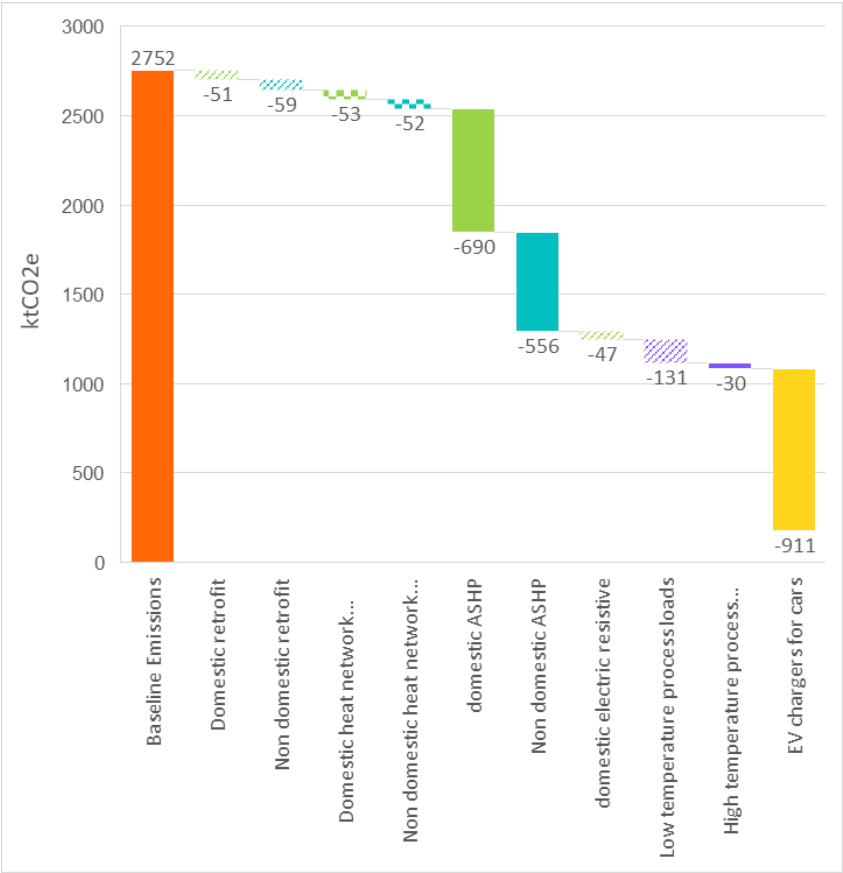
Figure 11.2: Annual Cambridgeshire emission savings in the holistic scenario split between each type of intervention



Source: Mott MacDonald

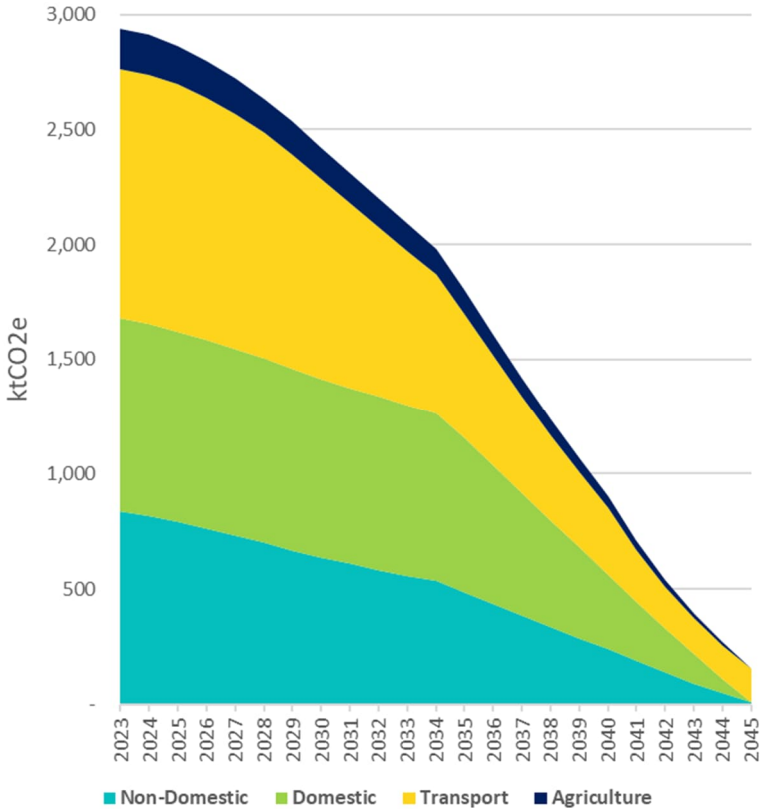
The total reductions from each intervention type can also be seen in a waterfall chart below in Figure 11.3.

Figure 11.3: Total Emissions reduction by intervention type



The resultant Cambridgeshire emission reduction using the holistic transition scenario, from the present-day baseline by sector is presented in Figure 11.4.

Figure 11.4: Holistic transition Cambridgeshire emission reduction by sector



It can be seen that despite the domestic, non-domestic and agricultural sectors dropping to negligible amounts (as mentioned earlier in Table 1.1, the agricultural sector emissions being accounted for here, only include fuel use for buildings and don't include livestock, land management or liquid fuel consumption for farming equipment). The largest amount of residual emissions is in transportation, with the total county wide emission reduction being 93.7% from 2023 to 2045. As stated previously, this is owing to through traffic on trunk roads which is outside the scope of the LAEP (Refer to Appendix F for more details).

The decarbonisation of heat through electrification produces a negligible amount of residual emissions due to the electricity grid still having a very small carbon factor post decarbonisation (0.001kgCO₂e/kWh from 2040 according to Green Book projections). Some emissions also remain from high temperature process loads, as any green hydrogen consumption is likely to have a higher carbon factor compared to the decarbonised electricity grid as outlined in section 7.

These residual emissions should be sequestered through measures such as re-wilding, peatland restoration and tree planting. The LAEP does not plan for addressing these residual emissions through sequestration. However, a quantification is provided of the likely residual emissions from the county's energy system that will need to be sequestered to reach net zero. These actions should be picked up by future updates to the region's Local Nature Recovery Strategy (LNRS)⁹⁹.

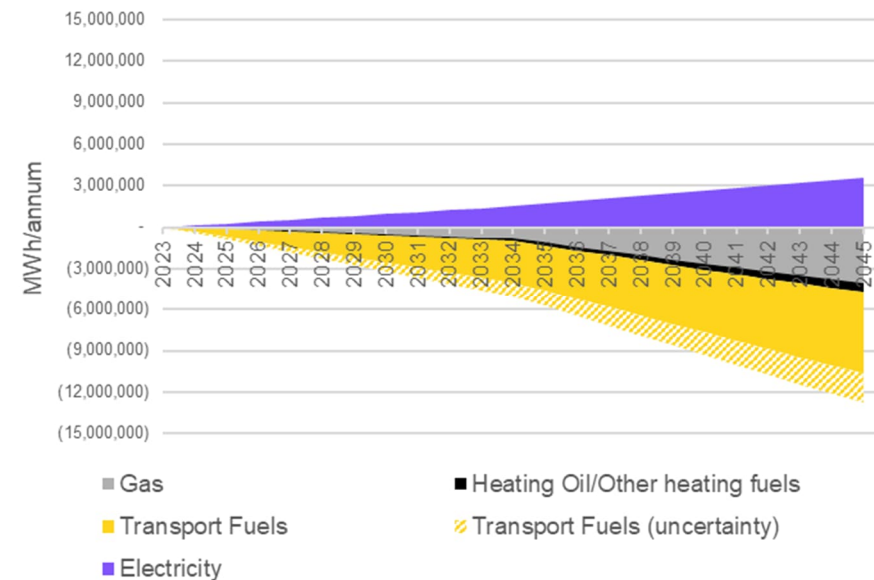
11.2 Energy

An overall energy system breakdown is presented in this section, combining growth in the region, the modelling in the generation section with the energy

transition and savings modelled for the interventions described in the carbon section.

This energy change from reduced gas, oil and other fuels consumption and increased electricity usage, is presented for the holistic transition in Figure 11.5.

Figure 11.5: Holistic transition total annual Cambridgeshire energy usage of electricity, gas, oil and other fuels



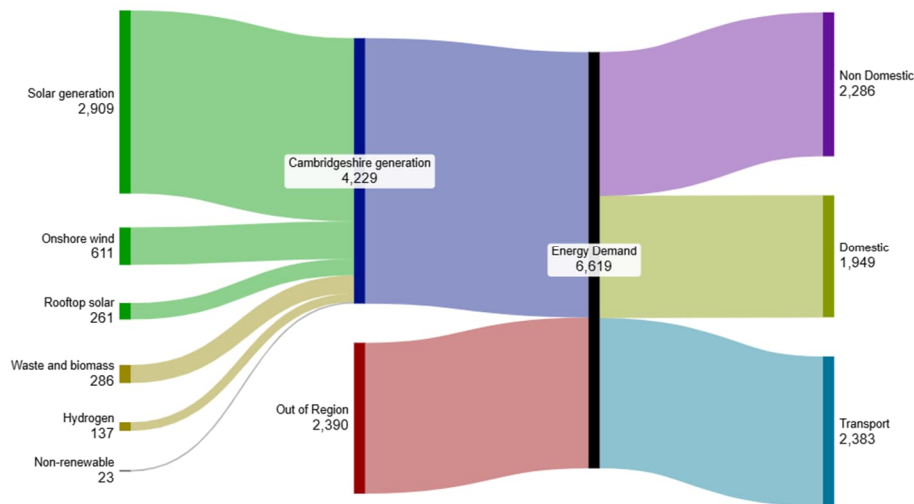
Source: Mott MacDonald analysis. Note that the transport fuel has been linearly phased out based on the 2023 baseline and may not 1:1 match the pace of EV uptake

⁹⁹ [Cambridgeshire and Peterborough Local Nature Recovery Strategy | Cambridgeshire County Council](#)

Specifically for electricity, a Sankey diagram has been created for the Holistic Transition scenario in the same style as the baseline diagram presented in this report for comparison. This is shown in Figure 11.6. The significant changes are:

- A shift from just under half of the electricity generated in the region to closer to 2/3rd of electricity generated in the region (albeit this is subject to our comments in Section 10 that this self-supply is not guaranteed and will be dependent on network conditions and where renewables are specifically connected to the network),
- The adoption of electricity as a major transport fuel.
- A more than doubling of energy demand in the region.

Figure 11.6: Holistic transition electricity Sankey diagram (GWh/annum)



Source: Mott MacDonald analysis

11.3 Scenario Comparison & Preferred Scenario

The previous sections of this report have analysed three net zero compliant scenarios. These scenarios represent different potential pathways to net zero, recognising there is significant uncertainty in what regulatory changes may occur in the next 20 years, what rate of uptake of new technologies may occur, etc. The scenarios should therefore be viewed as potential futures, rather than prescribed implementation roadmaps.

As stated in section 4, the UKPN Distribution Future Energy Scenarios have been used as a base, with minor adjustments made to reflect local priorities and conditions. For a full description of assumptions, the DFES methodology document should be referred to. Table 11.1 provides a summary of the key assumptions between the scenarios modelled. Table 11.2 provides the key infrastructure results per scenario, giving a comprehensive summary of the previous intervention specific Sections in this report. Finally, Table 11.3 summarises the key results per scenario, which is then used to select a preferred scenario.

Table 11.1: Summary of Scenario Assumptions

Parameter	CF	EE	HE	HT
Carbon Reduction Target	None	2045		
Growth	15% increase in Domestic Connections, 17% increase in non-domestic connections			
Fabric Upgrades	Low uptake. Minimal improvements beyond those required for MEES.	High uptake. Assumes most homes install required fabric measures when installing a heat pump.		
Heating	Assumes gas boiler ban does not come into law. Heat pump uptake increases slightly in 2030s.	All heat decarbonised by 2045. Significant heat pump uptake in 2030s, assuming gas boiler ban is implemented and energy prices re-balanced.		
District Heat Network connections	<10% of Cambridge homes, minimal elsewhere	~5% of homes by 2045	Lower than EE/HT	~5% of homes by 2045
Industrial Low-Temperature Process Loads	Remain on fossil fuels	Fossil fuel use fully converted to electricity		
Industrial High-Temperature Process Loads	Remain on fossil fuels	All fossil fuel use transitioned to hydrogen		
Transport Modal Shift	0% modal shift			Approximate 6% reduction in vehicle miles
Cars and Vans Decarbonisation	100% of car and van sales BEV by 2035	100% of Car sales BEV / PHEV by 2030. 100% of van sales BEV / PHEV by 2035		
HGV Decarbonisation	Ban of ICE HGVs <26t in 2038, >26t in 2043	Ban of ICE HGVs <26t in 2033, >26t in 2040		Ban of ICE HGVs <26t in 2033, >26t in 2038
Role of Hydrogen in transport decarbonisation	None: BEV HGVs expected to be the dominant fuel source, with Fuel Cell Electric Vehicles not expected until much later, if at all			
Rooftop PV	Low uptake defined by DFES	Medium uptake defined by DFES		High uptake defined by DFES
Ground mount solar	Ground mount solar presently in the pipeline ~3.5MW			
Onshore Wind	Declines as existing sites reach end of life	Maintained or repowered		

Table 11.2: Summary of Scenario Infrastructure

Parameter	CF	EE	HE	HT
Thermal demand % reduction domestic	None	12%	10%	13%
Thermal demand % reduction non-domestic	None	9%	8%	9%
Domestic Air Source Heat Pumps	Only 20% of homes have a low carbon heat supply in 2045.	230,000	235,000.	235,000
Domestic Direct Electric Heating		25,000	20,000.	15,000
Non-Domestic Air Source Heat Pumps	Only 20% of buildings have a low carbon heat supply in 2045.	20,000	13,000	19,000,
District Heat Network connections		1300	860	1300
Publicly accessible EV chargers	45,748	53,306	53,579	48,356
Rapid or high-powered EV chargers (>50kW)	13,653	15,841	15,841	14,227
Rooftop PV (MW)	152	204	204	314
Largescale solar (MW)	3,496	3,496	3,496	3,496
Largescale wind (MW)	0	300	244	279
Electrical Demand increase (MW)	352	949	911	856
Year existing regional headroom is exceeded	2044	2036	2036	2037

Table 11.3: Summary of Scenario Results

Parameter	CF	EE	HE	HT
Cumulative carbon emissions (ktCO ₂ e)	49,936	40,079	41,113	40,521
2045 electrical demand increase (MW)	352	949	911	856
CAPEX (£m)	-	3,276	2,725*	3,361
Carbon impacts (£m)	-	3,485	3,147	3,534
Consumer Bills (£m)	-	992	527	1,184
Air Quality (£m)	-	59	54	60
Employment creation (£m)	-	5,366	4,513	5,690

Note: *the cost of hydrogen infrastructure (either local or national) is not included in this estimate.

Based on the above, we consider that the Holistic Transition is the preferred scenario. While the CAPEX required is higher than in the other net zero scenarios, it delivers greater benefits, saves more carbon, and has the lowest impact on the electrical network.

It must be re-iterated however, that the selection of the Holistic Transition scenario demonstrates the potential future that provides the greatest benefit, and therefore we utilise this preferred scenario when presenting costing results and comparing against growth scenarios. It does not represent a prescriptive implementation roadmap to follow.

12 Economic assessment

The capital investment required to decarbonise Cambridgeshire is likely to be substantial. However, deploying the right mix of technologies could enable a transition that not only supports local economic growth, but also delivers benefits that may offset these costs.

This chapter provides a high-level assessment of the benefits associated with capital expenditure across the three scenarios considered in this LAEP and presents an indication of the potential economic contribution that such investment could make to the Cambridgeshire economy.

12.1 Overview of results

- **In present value terms¹⁰⁰ anticipated capital expenditure (CAPEX)** estimates for scenarios are £2.7 billion (Hydrogen Evolution), £3.3 billion (Electric Engagement) and £3.4 bn for the Holistic Transition scenario, which is considered the preferred scenario. **In a high growth future, this number could be as high as £5.0 billion, although the increase in capex would be financed by developers.**
- **This is additional CAPEX above the assumed £3.4 billion spend of the counterfactual scenario**, of which £2.9 billion relates to ground mount solar and EV infrastructure that is assumed to occur under any scenario
- **Without high growth, around 85% of the present value CAPEX is expected to be funded by a combination of business and resident capital supported by grants**, and circa 15% brought forward by private developers. **In a high growth future, the developer contribution would increase to 48%, assuming that developers would finance net zero assets in new builds.**
- **In the Holistic transition scenario, the bulk of additional spend is on domestic air source heat pumps (£1.3 billion) and non-domestic air source heat pumps (£868 million)** which we anticipate would be paid for by a combination of private residents and public funding.
- **Discounted benefit estimates associated with deploying technologies in the holistic transition scenario include:**
 - **Carbon savings:** £3.5 billion (discounted) in carbon reduction driven primarily driven by the deployment of air source heat pumps.
 - **Air quality improvements:** £60 million (discounted) of benefits to human health, productivity, wellbeing, and the environment due to improvements in air quality.
 - **Impact on bills:** £1.2 billion (discounted) savings from utility bills which are reduced due to self-generation (rooftop solar), fuel switching to lower-cost technologies, and reduced energy demand through retrofit measures. Considering sensitivities around energy prices, it can be anticipated this amount will vary to deliver savings between £677 million and £2.2 billion depending on energy price fluctuations.
- **Substantial economic activity could be generated for the area from the transition.** Assuming installation and fitting of these technologies are carried out by workers within Cambridgeshire, it can be estimated that the aggregate annual economic contribution from the transition could amount to up to £5.7 billion under the Holistic Transition scenario.

¹⁰⁰ All values are discounted at 3.5% per HM Treasury guidance, unless stated otherwise

Table 12.1: Summary results, real, present value, 2025, £m, Holistic transition costs and benefits vs. counterfactual

	Holistic Transition
CAPEX (including developers)	3,361
Impact on bills	1,184
Carbon impacts	3,534
Air quality improvements	60
Gross Value Added (GVA) in 2045	337
Annual aggregated GVA to 2045	4,534
Additional CAPEX from developers in a "high growth" future	1,629

12.2 Approach to analysis and key considerations

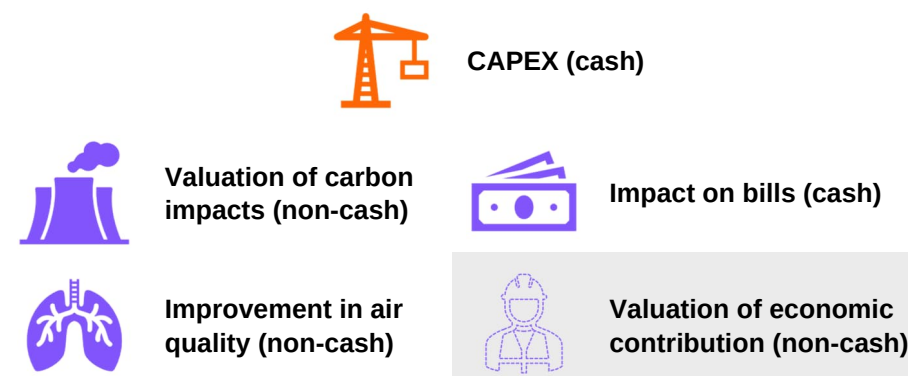
For the three transition scenarios, we estimate capital expenditure alongside welfare enhancing benefits and economic contribution, derived from the following core inputs:

- Modelled installation volumes
- 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 2045 - both discounted and undiscounted - for net zero technologies deployed under three scenarios: Electric Engagement, Holistic Transition, and Hydrogen Evolution, each assessed relative to a 'do minimum' counterfactual.

Undiscounted CAPEX is provided to show the total financial outlay required to 2045, without adjustments for risk or the time value of money. Discounted CAPEX is presented in line with HM Treasury Green Book best practice, by accounting for the 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 – as well as a high-level estimate of economic contribution associated with CAPEX is presented.



When interpreting the analysis, a number of 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

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 OPEX 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 (2022) social discounting schedule to convert future streams into present values, reflecting time preference¹⁰¹. To capture the full operational lifespan of all assets, the model extends beyond 2045 by the longest asset life (42 years for light fabric retrofit) resulting in a final operational year of 2086

In all scenarios, new installations are assumed to occur up to 2045, reflecting the target year for achieving net zero. Any assets reaching the end of their operational life before 2045 are replaced, making 2045 the final year for new installations. The appraisal period is then extended beyond 2045 as needed, to account for the full operational lifespan of assets installed in the final year, ensuring a comprehensive assessment of long-term impacts.

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, we apply AACE Class 4 accuracy ranges (–20% to +50%), which are appropriate for early-stage, high-level estimates. **In addition, indicative CAPEX for net zero assets in new builds in a high growth scenario is further estimated and presented separately, to provide additional context of CAPEX that developers might finance if high growth in housing and non-domestic development is realised.** 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, non only. Household expenditure on maintenance, servicing, or replacement are excluded.

12.2.5 Benefits associated EV charge point 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 (2022) have been applied including for the discount rate, price profiles, 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

¹⁰¹ Cash benefits reduce actual expenditure or release cash that can be reallocated elsewhere such as direct financial savings, revenue generation, and avoided costs.

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

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.

Table 12.2: Key assumptions used in the Economic assessment

Assumption	Description
Discount rate	A social time preference discount rate of 3.5% applied across costs and benefits, aside from air quality impacts which use a health discount rate of 1.5% per the HM Treasury's Green Book (2022).
Carbon price	The HM Treasury's Green Book (2022) 'Medium' carbon price profile adjusted 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 (2022) price forecast escalated to 2025 values using OBR's GDP deflator.
Non-domestic utility prices (electric, gas)	HM Treasury's Green Book (2022) 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 (2022) '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 (2022) 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

12.3 Detailed results

12.3.1 Capital expenditure for achieving net zero

In terms of discounted present values, the Holistic Transition scenario requires the highest additional CAPEX – relative to the counterfactual. Excluding technologies, we expect could be brought forward by private developers.

CAPEX is presented in three ways:

- **Excluding anticipated developer-funded interventions:** Covers only measures expected to be funded by residents, the public sector or by private businesses on their own estate and operations.
- **Including anticipated developer-funded interventions:** Incorporates interventions considered commercially viable due to the scale and potential for revenue streams. These interventions can be anticipated to be brought forward by private developers based on precedent, and include heat networks, large scale electricity generation and EV charging networks.
- **High growth scenario:** includes indicative additional CAPEX for a high population and economic development forecasts. These are the theoretical additional cost for net zero assets that developers would finance through building new housing and commercial property.

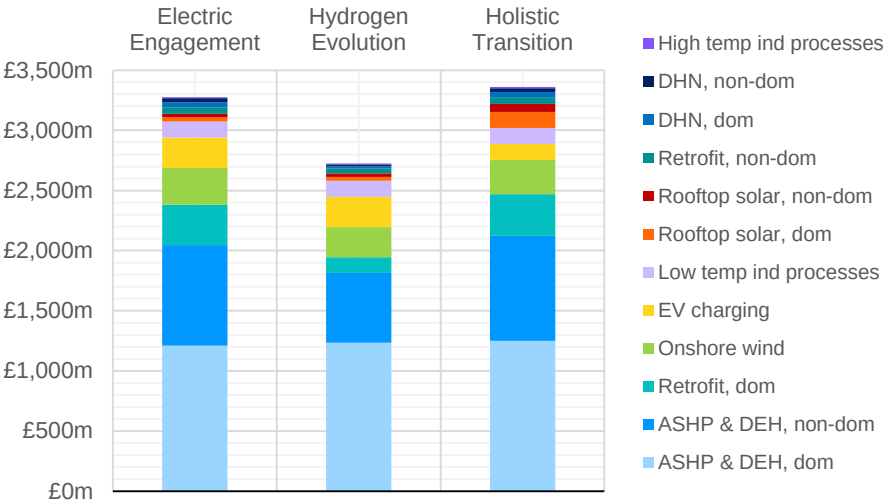
All CAPEX figures are shown as incremental to the counterfactual, representing the additional investment required over and above a baseline. Where an intervention shows zero additional CAPEX, costs are equivalent to the counterfactual (zero).

- **Domestic air source heat pumps and direct electric heating represent the largest single area of expenditure excluding interventions assumed to be developer-funded:** Expenditure required sits around £1.3 billion across the scenarios.
- **In the Counterfactual scenario, a baseline cost of £3.4 billion is estimated.** This counterfactual cost materially relates to capital expected to be brought forward by developers for ground mount solar developments (£1.9 billion) that are committed in planning pipelines, and public EV charging infrastructure (£1.1 billion). Other costs in the counterfactual are low volumes of fabric retrofit and air source heat pump installations. The CAPEX for the net zero scenarios is presented as additional investment relative to this baseline.
- **In the Holistic Transition, of the £3.4 billion CAPEX spend, £497 million is estimated to be brought forward by developers** for EV infrastructure, heat networks and onshore wind. This represents 15% of the total incremental cost vs the counterfactual.

- **In a high growth future, £1.6 billion** additional CAPEX would be required for low carbon aspects of residential and commercial developments. This cost would be expected to be financed by developers, and incorporated into subsequent sale values. This additional investment would be required for heating, EV charging and rooftop solar, and is illustrated in figure 12.2.

Figure 12.1 shows the CAPEX by scenario and intervention. The Holistic Transition has the greatest CAPEX by approximately £85 million compared to Electric Engagement. Hydrogen Evolution has the lowest CAPEX, driven by its lower spend on non-domestic heating and domestic retrofits.

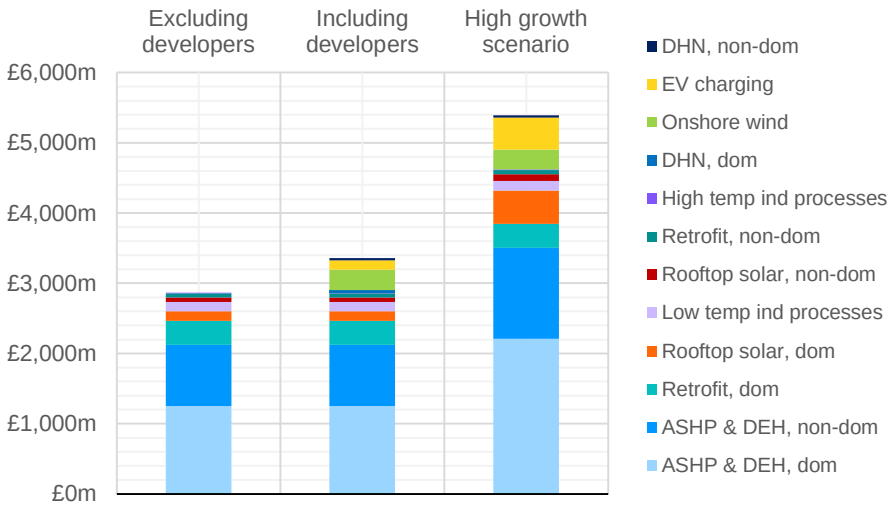
Figure 12.1: CAPEX vs counterfactual, by scenario, real, discounted, 2025



¹⁰² AACE Class cost estimates are part of a five-tier classification system developed by AACE International to standardise cost estimating practices across industries. Class 4

Figure 12.2 presents the CAPEX by intervention for the Holistic Transition scenario, including the high growth scenario.

Figure 12.2: CAPEX vs counterfactual, Holistic Transition, real, discounted, 2025



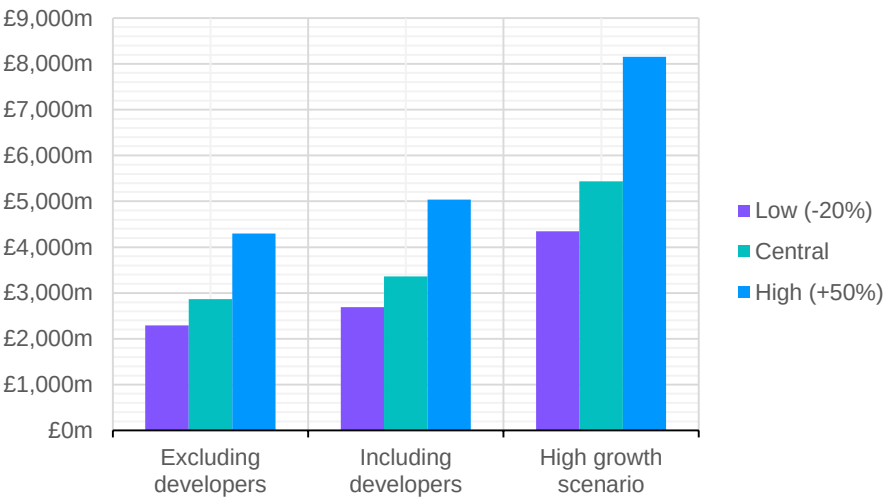
To capture ranges in accuracy in CAPEX estimates, we have applied a confidence interval in line with AACE Class 4¹⁰² expected accuracy ranges. This includes:

- **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.

support feasibility studies, alternative selection, and preliminary budget approvals and have an accuracy range of +50% and -20%.

Our accuracy ranges are shown in Figure 12.3.

Figure 12.3: CAPEX excluding developers vs counterfactual with confidence intervals, Holistic Transition, real, discounted, 2025



High growth scenario

As discussed in the Section 4, how fast the region will grow in population and employment is unknown. However, should the County grow by as much as some predict, it represents a large opportunity for the County. This High Growth Sensitivity assumes dwellings and new commercial and industrial floor space will grow as set out in Section 4.

With regards to Low Carbon Technologies, we assume that the new buildings will be built to a higher standard, EPC B or better, and therefore will not require fabric upgrades in the future. We also assume that all new builds will be built with ASHP. While this is consistent with the Future Homes Standards, it is likely over-optimistic for the non-domestic sector, however, presents a

best case scenario to provide an order of magnitude estimate of the investment needed.

For rooftop solar, an average array size of 3 kWp size per dwelling has been assumed and applied to 85% of the dwelling growth assuming 15% of the new dwellings will be flats. While the 3 kWp array may seem on the small side, it is unlikely that every new non-flat dwelling will have PV installed on the roof, so it is considered a conservatives estimate. For non-domestic, an average array size of 4.1kWp was assumed and applied to all new non-domestic buildings. While the size is very small, the percentage of new buildings installing rooftop solar will be much smaller than domestic dwellings and is consider sufficiently conservative for this exercise.

Finally, for EV chargers, the same assumptions have been used regarding ratios of public chargers needed per EV on the road as was used in the Holistic Transition and other net zero scenarios.

It should be emphasised that these assumptions need to be sufficiently coarse and conservative to complete this sensitivity analysis. The outputs are meant to be a rough order of magnitude, to help inform stakeholders of the volume of investment that might be driven from developers in a high growth future. Several potential action items emerge, which are highlighted at the end of this chapter.

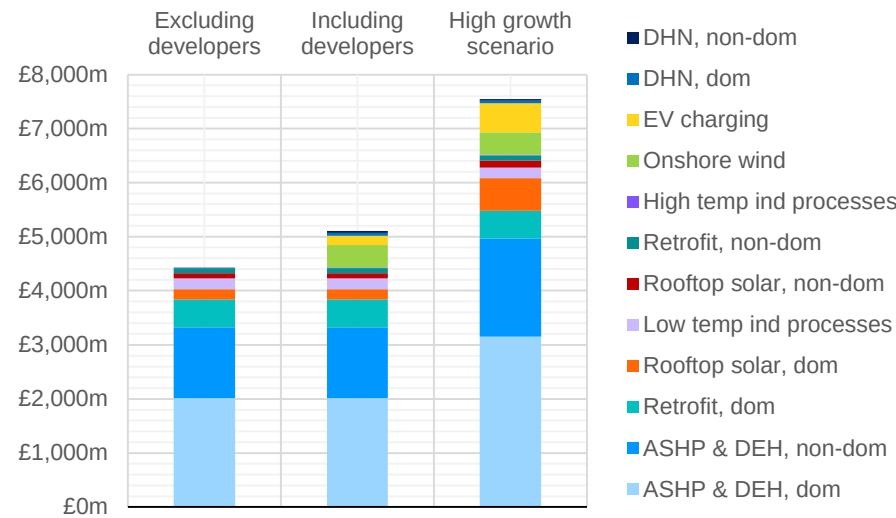
If a high growth scenario is undertaken the indicative additional CAPEX would be £1.6 billion This additional expenditure would be absorbed by developers as part of the overall development cost. It excludes other major development expenses such as land acquisition, building construction, and related activities.

Undiscounted CAPEX

Figure 12.4 shows the undiscounted CAPEX which refers to the total capital expenditure without applying any discounting for the time value of money. It is useful to see the real financial commitment required to deliver the

interventions. These values are referenced in the Funding and Finance section below.

Figure 12.4: CAPEX under Holistic Transition vs counterfactual, real, undiscounted, 2025

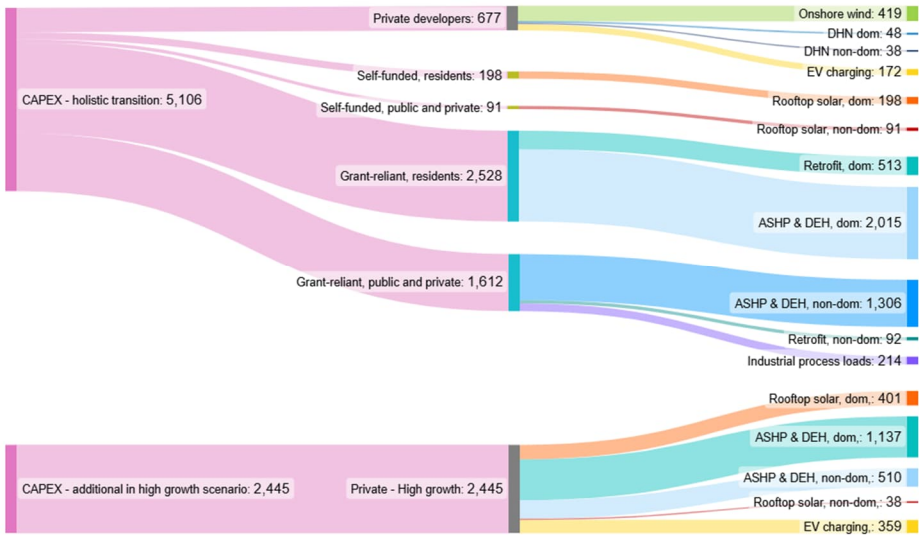


CAPEX – who might pay?

Whilst many interventions still require public support, private developers are increasingly crowding into the market to roll out commercially viable interventions and projects.

Figure 12.5 outlines the capital interventions identified by funding type and intervention category. It summarises the expected sources of finance whether private capital, self-funding by residents or building owners, **or where interventions are typically reliant on government grants for investment to be made. The additional capex in a high growth scenario is also included, which is expected to all be met by private developers.**

Figure 12.5: Potential funding and financing mapping to undiscounted CAPEX in the Holistic Transition



Private developer funding

This includes onshore wind, district heat network connections, and shared/public EV charging. These are interventions where clear commercial models exist and could be provided by private developers. Investment is expected to come primarily from developers and infrastructure investors, with some technologies partially supported by revenue stabilisation mechanisms (e.g., CfDs for onshore wind). Evidence indicates growing private investment in public EV charge points through concession models, and that building connections to District Heat Networks are typically funded by property developers or owners, subject to zoning and incentive frameworks, while network infrastructure itself often requires blended public–private finance.

The potential additional CAPEX under the High Growth Scenario would be absorbed by developers as part of the overall development cost. Private

developers will play a pivotal role in delivering the infrastructure and technologies assumed in the additional High Growth Future scenario. If population and employment growth materializes as projected, developers will be responsible for integrating low-carbon measures such as air source heat pumps, rooftop solar, and EV charging infrastructure into new residential and non-domestic buildings.

Self-funded, residents

These systems are considered financially viable at the household level, supported by reduced installation costs, zero VAT on solar panels and batteries, and access to Smart Export Guarantee tariffs. This includes domestic rooftop solar PV.

Self-funded, public and private

This includes rooftop solar PV installations on non-domestic buildings such as commercial premises, industrial facilities, and public sector assets. It is expected that these are self-funded by the building owners or operators due to the proven payback of investment.

Grant-reliant, residents

These interventions require support through government grants and subsidy schemes under current conditions, due to challenges over financial paybacks. These schemes could cover full or partial costs of insulation upgrades, low-carbon heating systems, and electric heating replacements. Eligibility is based on income, benefits, and property energy performance, with local authorities playing a key role in identifying qualifying homes and coordinating delivery.. The value of interventions in this category are significant and illustrate the need for continued central government support to reduce up-front costs of measures, supplier innovation to bring down costs, and energy market reform to make these interventions cost effective through lower electricity prices. **To note, the CAPEX figures presented are the total costs of the interventions that are typically reliant on grants, and do not estimate the proportion of funding that could come from public grants in the future.**

Grant-reliant, public and private

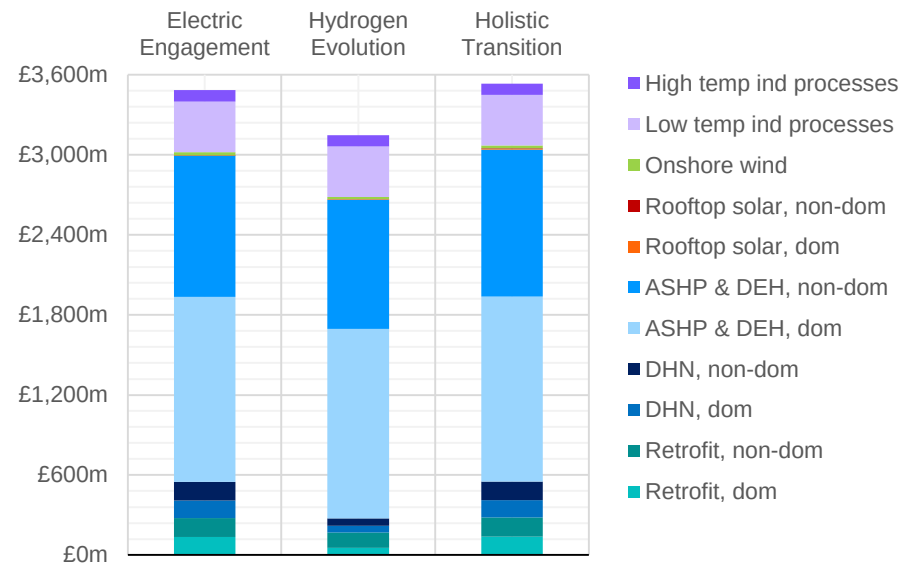
These interventions likely rely on external grant funding. Funding is expected to come from national schemes. These measures are capital-intensive and often not commercially viable without subsidy, particularly in older or energy-intensive buildings. This includes non-domestic fabric retrofit, non-domestic air source heat pumps and direct electric heating, and industrial process loads.

12.3.2 Carbon impacts

All three scenarios deliver substantial carbon savings compared to the counterfactual. Key findings include:

- **Holistic Transition achieves the highest carbon reduction impact:** This is valued at £3.5 billion, followed closely by Electric Engagement (£3.5 billion) and Hydrogen Evolution (£3.1 billion).
- **Air source heat pumps and direct electric heating are the most impactful intervention:** Carbon savings are driven primarily by these technologies (70%) valued at a total of around £2.5 billion.

Figure 12.6: Carbon savings vs counterfactual, real, discounted, 2025



12.3.3 Air quality improvements

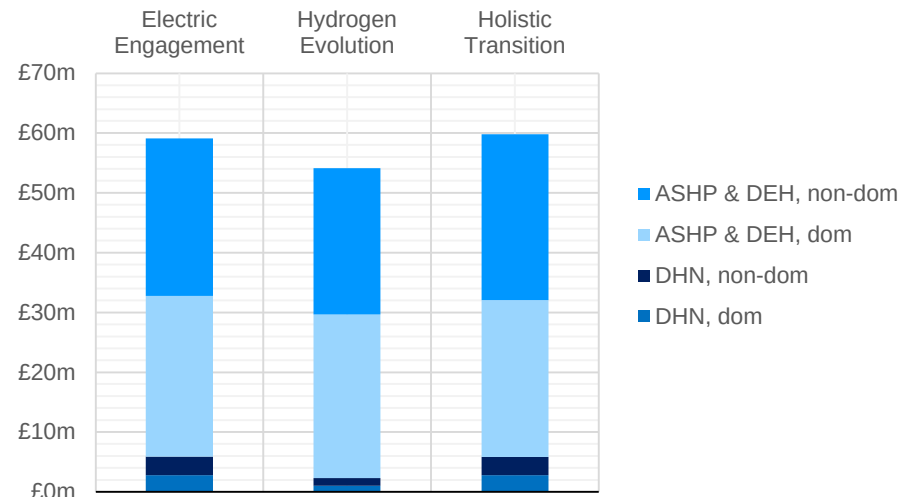
Air quality improvements are driven by decreased burning of oils and gas which produce harmful particulates and nitrogen oxides (NO_x), including nitrogen dioxide (NO₂), a key pollutant affecting air quality. Our assessment finds that the impacts are limited; however, they still serve as an indicator of welfare improvement because the avoided cost is associated with human health. Air quality improvement is valued at between £54 million to £60 million across scenarios.

Based on our analysis, air source heat pumps deliver the greatest air quality improvement: Non-domestic air source heat pumps provide the highest air quality benefits across all scenarios, with values ranging from £24 million to

£28 million – given non-domestic ASHP displaces oil burning heating in some instances.

Figure 12.7 presents the breakdown of air quality improvements by scenario and intervention.

Figure 12.7: Air quality improvements vs counterfactual, real, discounted, 2025



Air quality improvements typically stem from reduced internal combustion engine (ICE) mileage, which lowers NO_x emissions compared to electric vehicles (EVs). While public EV charge points are intended to support greater EV usage relative to ICE vehicles, the extent of this displacement cannot be directly evidenced. Therefore, we do not report benefits from ICE mileage reduction in the above analysis. However, under an illustrative scenario assuming charge points directly drive EV uptake, earlier adoption enabled by public charging infrastructure could yield up to £188 million in benefits across the transition.

12.3.4 Bill savings

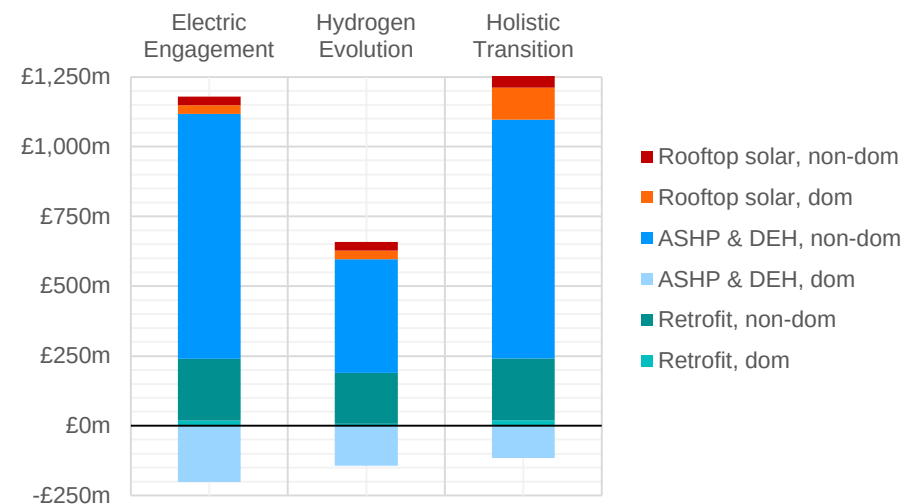
According to our assessment, substantial energy bill/expenditure savings could result from the transition.

- **The Holistic Transition scenario** delivers the greatest impact, with total savings estimated at **£1.2 billion**.
- Heating technologies may increase or reduce bills depending on context: **Domestic air source heat pumps and direct electric heating** are expected to raise bills on aggregate (Figure 12.8), as the greater cost of current and forecast electricity tariffs over gas tariffs outweigh efficiency gains.
- **Non-domestic air source heat pumps and direct electric heating reduce bills in aggregate**, due to the significant proportion of non-domestic buildings that are heated through direct electric heating that are assumed to move to ASHPs. The saving reflects the higher COP performance of an ASHP vs direct electric heating, although if a building is switching from gas then there is likely to be a cost increase. Bill impacts are complemented by significant bill savings from non-domestic retrofit, although the financial case for this is often challenging.
- **Generation technologies**, particularly rooftop solar PV, deliver savings from avoided grid electricity purchase costs. Domestic PV provides the largest benefit—up to **£115 million** under Holistic Transition compared to **£31 million** in other scenarios—thanks to on-site generation displacing grid electricity.
- Importantly, **combining technologies** (e.g., ASHPs with PV and battery storage where viable) can mitigate cost impacts by offsetting higher electricity consumption with self-generation, improving affordability and reducing fuel-poverty risk.
- **Onshore wind generates revenues, which could translate into savings on bills for commercial and public sector electricity users.** This could be achieved through sale of electricity through PPAs where the electricity price is lower than the retail market price. Assuming this

arrangement, under the Holistic Transition scenario, onshore wind could generate **£13 million in bill savings**. Given the commercial viability of wind generation, we expect these technologies to be financed by private developers. As a result, they are excluded from the total bill impact assessment and instead considered as additional revenue streams for developers.

Figure 12.8 presents the breakdown of bill savings by scenario and intervention.

Figure 12.8: Savings impact on bills vs counterfactual, real, discounted, 2025



12.3.5 Sensitivity approach

The sensitivity analysis focuses on the impact of energy price volatility which is an important consideration given the unpredictable nature of energy markets. The analysis involves adjusting oil, gas, and grid electricity prices

using the low, medium, and high trajectories outlined in HM Treasury's Green Book (2022). Oil and gas prices are used in the appraisal to estimate the financial savings from replacing oil and gas boilers respectively. Grid electricity prices inform the additional operating costs associated with air source heat pumps.

The spark gaps of the two scenarios are presented below, and compare to the central scenario spark gap ratios (electricity/gas variable price) of x4.2 for domestic and x3.8 for non-domestic sectors. The scenarios presented are not forecasts, but illustrations of the possible ranges of outcomes applying HM Treasury guidance for ranges of assessment for utility prices. These ranges would likely be driven by movements in the wholesale market or UK energy market reform. While these factors are uncertain and out of the control of local government, it is valuable to understand the range of possible outcomes, based upon price ranges supported by central government. Spark gap ratios in the central scenario and sensitivity scenarios are held throughout the model period, with minor fluctuations.

Two scenarios were assessed:

1. **Favourable scenario (A):** High oil and gas price, and a low electricity price. This scenario averages a spark gap ratio (electricity/gas variable price) of x2.5 for domestic and x1.6 for non-domestic sectors. This spark gap is maintained from 2026.
2. **Unfavourable scenario (B):** Low gas and oil price, and a high electricity price. This scenario averages a spark gap ratio (electricity/gas variable price) of x6.6 for domestic and x9.8 for non-domestic sectors. This spark gap is maintained from 2026.

12.3.6 Sensitivity analysis results

Under all scenarios, savings are still realised in aggregate, however, the variation is significant. The favourable scenario increased bill reductions by £1.0 billion, whereas the unfavourable scenario resulted decreased bills by

approximately £50 million. Table 12.3 shows the full results of the sensitivity analysis

In the favourable scenario, all interventions that replaced grid electricity through onsite generation experienced a negative impact. This was due to the reduced attractiveness of onsite generation, which now offset a cheaper grid electricity. In contrast, interventions such as fabric retrofits and air source heat pumps delivered positive gains.

In the unfavourable scenario, the dynamics reversed. A high electricity price made interventions that replaced grid electricity 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 oil and gas.

Table 12.3: Utility prices sensitivity analysis results, real, discounted, 2025, £m

	Impact on bills			Variance	
	Central	A	B	A	B
Fabric retrofit, domestic	19	30	13	+11	(6)
Fabric retrofit, non-domestic	222	294	194	+72	(28)
Heat network connections, domestic	-	-	-	-	-
Heat network connections, non-domestic	-	-	-	-	-
Air source heat pumps and direct electric heating, domestic	(115)	330	(383)	+445	(268)
Air source heat pumps and direct electric heating, non-domestic	856	1,342	634	+486	(221)
Rooftop solar PV, domestic	115	108	122	(7)	+7
Rooftop solar PV, non-domestic	74	70	82	(4)	+7
Ground mount solar PV	-	-	-	-	-
Onshore wind	13	13	15	(1)	+1
EV charging (excl. vehicle benefits)	-	-	-	-	-
Low temperature industrial processes	-	-	-	-	-
High temperature industrial processes	-	-	-	-	-
Total	1,184	2,186	677	+1,002	(507)

12.3.7 Economic Contribution – Gross Value Added (GVA)

The transition to net zero offers opportunity for employment, and localised economic activity. Assuming those responsible for installing and maintaining what is needed for the transition are employed locally, the aggregate level of economic contribution could range between £4.5 to £5.7 billion up to 2045.

The economic contribution is driven by the value of CAPEX spend, therefore the interventions with the highest CAPEX will drive the greatest contribution. Under the Holistic Transition Scenario, domestic air source heat pumps and

direct electric heating have the greatest CAPEX and could support an aggregate £2.4 billion in GVA to 2045 given the number of households which would require installation and maintenance services.

12.4 Next steps

This chapter provides a high-level assessment of the economic implications of decarbonising Cambridgeshire, focusing on capital investment, benefits, and funding pathways across three 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:

- Building on the current capital expenditure and benefit assessment, **the next stage should expand to a full Cost-Benefit Analysis at a project level, for projects.** This would 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.
- **A deep dive on funding and financing pathways would be beneficial for prioritised investments.** 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. 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. We understand that the Peterborough Accelerated Net Zero (PANZ) may be a vehicle towards identifying these opportunities.
- **Consider the optimal approach to Section 106 contributions and the Community Infrastructure Levy.** From the high growth sensitivity analysis it is clear that there is significant investment that could arise from developers, presenting an opportunity for contribution towards electrical network infrastructure, public charge points, or many of the other communal actions highlighted in this report.
- **Ensuring new development is well coordinated.** New developments may bring opportunities for developing heat networks that could benefit surrounding existing houses, or public EV infrastructure (such as fast charging hubs) that could benefit the existing surrounding community. This could help drive the most value out of private developer funding, to support the transition to net zero.

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

13 Implementing the plan

This chapter outlines the implementation strategy for the Cambridgeshire LAEP, presenting a sequenced pipeline of priority projects to support strategic planning and investment in energy infrastructure to support economic growth. The approach ensures a transition toward a more sustainable, low carbon and resilient system that is inclusive, maximising local benefits and aligning with national and regional policy objectives

13.1 Implementation strategy

The previous sections have highlighted key projects or initiatives that could be implemented for each intervention area. However, the LAEP is only a plan at a snapshot in time, and what may appear as priority project / intervention now will change in the future.

To that end, we recommend the LAEP implementation follow these guiding principles:

1. **Adaptive phased delivery:** Interventions identified within this plan have been sequenced to deliver early wins, enable system readiness, and sustain progress toward net zero by 2045. The plan should be reviewed regularly and adapted as needed, with the long list of options provided in the appendix reviewed and added to as necessary.
2. **Spatial prioritisation:** This plan has highlighted a diverse set of needs across the County – hotspots for industries, hotspots for public EV charging, etc. Selecting which areas or sectors should receive interventions first is outside the scope of this LAEP, but this LAEP provides the basis for which the **Districts, the City, Cambridgeshire County Council, and the Cambridgeshire & Peterborough Combined Authority** can conduct their own prioritisation. Targeted action in priority zones, such as areas

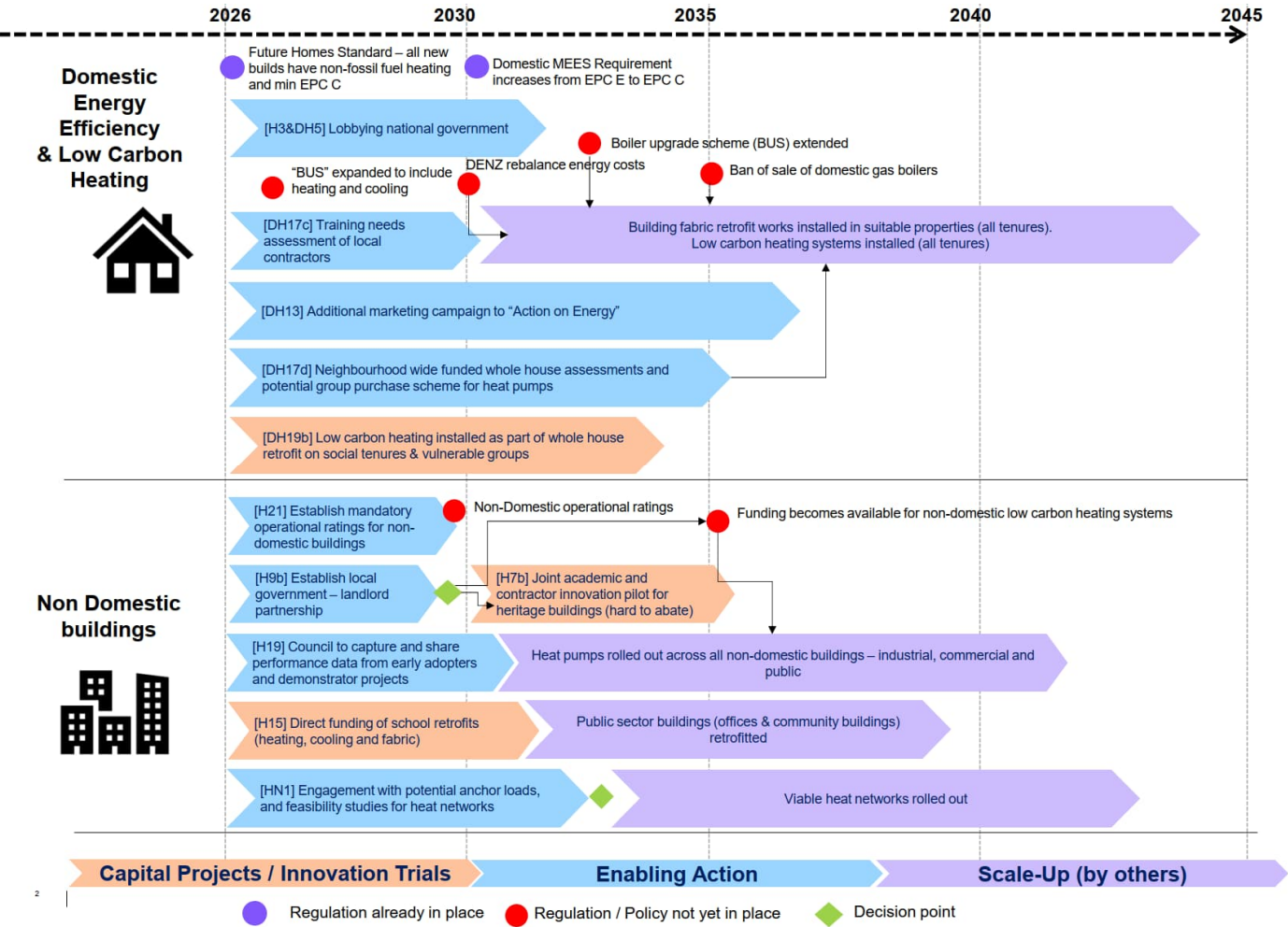
with high fuel poverty, low EPC ratings, or grid constraints, will ensure resources where they yield the highest benefits.

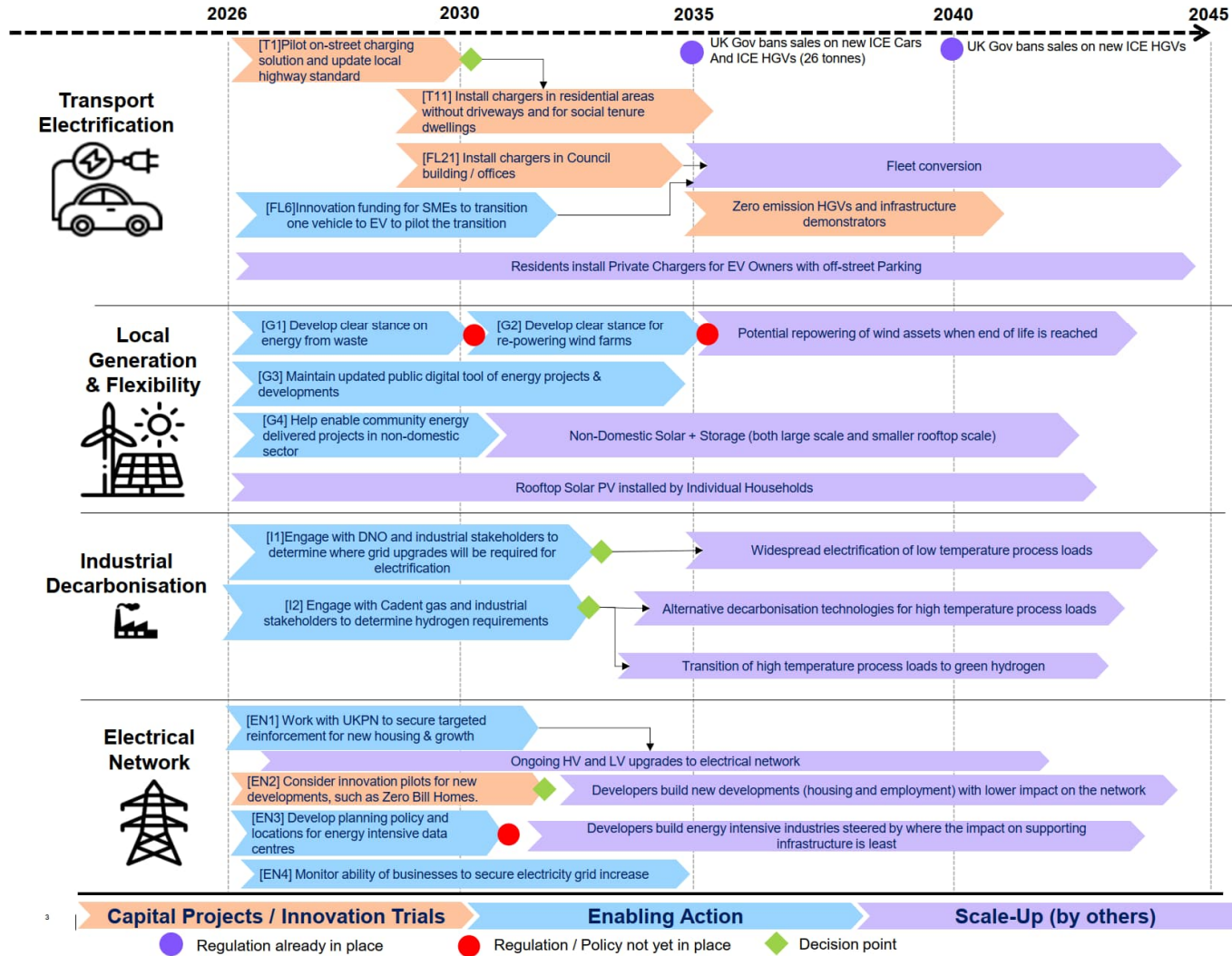
3. **Stakeholder collaboration:** Successful delivery of any of the projects in this LAEP will require delivery through ongoing engagement with UK Power Networks, **NESO**, businesses, community groups, and institutional partners. Community Energy groups are also likely to feature as an important delivery model.
4. **Monitoring and adaptation:** This plan has set out key performance indicators and milestone dates, so that progress will be tracked with flexibility to respond to new data, policy changes, and technological developments.

13.2 Phased decarbonisation pathway

A decarbonisation pathway for Cambridgeshire is outlined below, combining capital projects, enabling actions, and scale-up measures across key sectors. **Actions in this section are dependent on funding model development as outlined in Section 12.**

Figure 13.1: Phased Summary Decarbonisation Pathway





Note: More projects and interventions are shown in the relevant intervention sections. This is a summary high level plan, which only highlights key projects.

The plan is structured around a sequenced pipeline of interventions, grouped by indicative delivery phase. This approach allows early actions to build momentum, address immediate needs, and lay the groundwork for more complex or high-impact measures in later years. The pipeline also reflects where the council can exert direct control, enable delivery, or influence wider change.

13.2.1 Short-term (2025–2030): Foundations and Early Delivery

The short-term actions focus on practical, high-impact measures that can be delivered using proven technologies and put in place the enabling environment for later scale-up. **The following pages elaborate on the top three projects in each thematic area, including project number references with further elaboration provided in the project tables in the appendices and the preceding sections of this report.**

Many of the actions below rely on behavioural changes in residents and landlords, as well as a supply chain that has the adequate skills and resources to respond to the demand. These risks and mitigations to them are discussed later in this section.

For the medium and long term, the decarbonised pathway (Figure 13.1) provides actions that could be taken and expected scale up to be driven by others. As the growth of the area and the energy sector are rapidly changing, reviewing the plan in shorter increments is recommended. After implementing the short-term priorities, re-assessing what has been effective or areas that need further support, will identify the most appropriate actions for the medium and longer term.

Heating: Domestic Sector

Action 1: [DH17c] Assess training needs of local contractors, and support during accreditation

Collaborative approach with local installers, assessing their gaps and training needs, providing funding for them to take on apprentices and upskill, as necessary. Supporting local contractors specifically, to gain national accreditation. It was recognised that local supply chains are important, because for the domestic sector, the work is often too small for competent installers to travel long distances for work.

Reference: (CISL, 2025, p8)

Convening Lead

Combined Authority

Risks & Dependencies

Limited engagement from local contractors due to time constraints. Shortage of apprentices and skilled workers.

Collaborators

Local installers, academic institutions, industry groups

Co-Benefits

Creates opportunities to increase local employment.

Action 2: [DH13] Additional marketing campaign to “Action on Energy”

Leverage the work done to date on Action on Energy. Further engage residents through further awareness campaigns to access the information there. Enhance and supplement the information already on the platform as needed.

Reference: (CISL, 2025, p7)

Convening Lead

County Council

Risks & Dependencies

Limited engagement from the public. Public awareness remains low.

Collaborators

District Councils

Co-Benefits

Stimulates demand for local contractors.

Action 3: [DH19b] Low carbon heating installed as part of whole house retrofit on social tenures & vulnerable groups

Council directly intervenes and installs fabric upgrades and ASHP (via a delivery partner), to vulnerable groups. Specifically target people who are lower income, suffer from medical conditions, or would generally disproportionately benefit from improved indoor temperature comfort. Fund could be eligibility based, allowing the Council to decide who to fund, and direct others to the range of other incentives available

Reference: (Mott MacDonald)

Convening Lead

District Councils & Housing Associations

Risks & Dependencies

Insufficient funding availability. Shortage of competent and accredited installers.

Collaborators

Local installers

Co-Benefits

Reduces fuel poverty and improves health outcomes.

References: Cambridge Institute for Sustainability Leadership , 2025. Delivering Retrofit at Scale Together. [cisl - better_homes_report_2025.pdf](#)

Heating: Non-Domestic Sector

Action 1: [H9b] Establish local government – landlord partnership

Create a partnership with the landlords of business parks, research parks, industrial estates, etc. Many of the office buildings, and industrial businesses, likely fall into this category, and targeting the commercial landlord for open discussions on what is needed to transition whole estates will help accelerate the change.

Reference: (Mott MacDonald)

Convening Lead

County, City or District Councils

Collaborators

Commercial landlords, property developers

Risks & Dependencies

Low engagement from large business park owners and landlords, reducing the effectiveness and uptake of proposed solutions and incentives.

Co-Benefits

Creates a platform to address grid constraints, expand EV charging, and support fabric upgrades.

Action 2: [H15] Direct funding of school retrofits (heating, cooling and fabric)

Capital programme of work from public sector specifically aimed at decarbonising public sector buildings – schools.

Reference: (Mott MacDonald)

Convening Lead

County Council

Collaborators

Education sector, community energy groups

Risks & Dependencies

Insufficient funding availability, particularly where older buildings or constrained sites require high-cost interventions.

Co-Benefits

Improves thermal comfort and learning outcomes during hot summer months while delivering reduced operational costs for schools.

Action 3: [H21] Establish mandatory operational ratings for non-domestic buildings

Introduce a local bylaw which requires this on non-domestic buildings. A rating system like this would mean that better performing buildings, will fetch higher rents from tenants and therefore incentivise landlords to invest. In parallel tenants will be able to know this before leasing a space, and will therefore increase demand for these spaces. Example cited is the NABERS scheme in Australia.

Reference: (UKGBC, 2020, p5)

Convening Lead

Combined Authority

Collaborators

Industry Groups (e.g. UKGBC), Academic institutions, Building regulations, landlords

Risks & Dependencies

May require national-level action rather than delivery by a combined authority. Local bylaw may be needed to enforce phase-out of gas boilers in non-domestic properties. Market signals may remain too weak to create a premium for higher-performing buildings. Landlords may still be unwilling to invest.

Co-Benefits

Incentivises higher-performing non-domestic buildings without transferring costs to the public sector.

References: UK Green Building Council, 2020. Unlocking the barriers to low carbon heat: an industry view. <https://ukgbc.org/wp-content/uploads/2020/09/UKGBC-Industry-Paper-on-Low-Carbon-Heat-FINAL.docx>

Non-Domestic Heating, Heat Networks, Industrial Decarbonisation

Action 4: [DH20b] Joint academic and contractor funding for heritage listed homes and non-domestic buildings

A partnership approach for heritage domestic buildings. Utilising industry and academia to generate innovative solutions for this hard to abate proportion of the domestic and non-domestic property stock. Could also help train local contractors on how to work on these specific building types.

Reference: (CISL, 2025, p7)

Convening Lead

County Council

Collaborators

Academic institutions, contractors, industry groups (UKGBC), residents

Risks & Dependencies

Limited availability of skilled contractors. Insufficient funding. Businesses or residents may be unwilling to decant operations or tolerate disruption.

Co-Benefits

Enables sustainable retrofit of heritage buildings and reduces future retrofit costs through shared standards, case studies, and lessons learned.

Action 1: [HN1] Engagement with potential anchor loads, and feasibility studies for heat networks

Launch feasibility study and district heating zoning review in high heat-density clusters such as Cambridge and other urban centres, anchored by public sector buildings and major employers / energy users. Feasibility studies and engagement with anchor loads will inform future expansion, with consideration for integrating cooling systems to enhance climate resilience

Reference: (Mott MacDonald)

Convening Lead

Combined Authority

Collaborators

District or City Councils, Developers, Large businesses / industries, DESNZ

Risks & Dependencies

Lack of available finance or upfront capital. Reluctance of parties to enter into long-term agreements.

Co-Benefits

Reduced pressure on the supply chain for individual ASHP installations. Lower heating costs for connected businesses and residents. Opportunities to pilot heat-as-a-service models.

Action 1: [I1] Engage with DNO and industrial stakeholders to determine where grid upgrades will be required

The facilitation of communication between these key stakeholders will enable the transition away from fossil fuels by ensuring that local infrastructure is ready for the required fuel switching. The local gas network operator, and other hydrogen providers operating locally, can ensure that there is enough supply for high temperature process loads moving away from natural gas. This initial action is likely facilitating discussions so that plans can be shared early and connections made between relevant stakeholders.

Reference: (Mott MacDonald)

Convening Lead

County Council

Collaborators

UKPN, NGED, Large businesses, landlords of non-domestic estates, developers

Risks & Dependencies

Without forward planning to shift large industrial low-temperature loads to electric heating, businesses may face higher costs and longer lead times when attempting to transition.

Co-Benefits

Ability to coordinate network upgrades with nearby developments, potentially reducing overall costs. Opportunities for new or expanded heat network solutions.

References: Cambridge Institute for Sustainability Leadership , 2025. Delivering Retrofit at Scale Together. [cisl - better homes report 2025.pdf](#)

Transportation

Action 1: [T1] Pilot on-street charging solution and update local highway standard

The Council could select a neighbourhood to trial a number of the on-street parking solutions for residents as part of a trial. This could then inform the preferred solution to be deployed more broadly and inform highway authority policy updates.

Reference: (Mott MacDonald)

Convening Lead

County Council

Risks & Dependencies

Must align with the CPCA EV strategy. Potential liability for cross-pavement charging solutions. Unclear accountability for ongoing maintenance. Risk of increased on-street clutter.

Collaborators

Combined Authority, District and City Councils, Local Contractors

Co-Benefits

Reduces barrier to EV adoption for certain user groups.

Action 2: [T11] Install chargers in residential areas without driveways and for social tenure dwellings

Capital project for housing associations - providing EV charger provision to social tenures. Could explore DBO arrangement although would require price control to ensure lower operating costs are passed onto tenants.

Reference: (Mott MacDonald)

Convening Lead

County Council

Risks & Dependencies

A design-build-operate model would require a public procurement process. Tariff setting must be carefully managed to ensure consumer protection.

Collaborators

Cambridge City Council, Housing Associations, Local contractors

Co-Benefits

Delivers positive outcomes for lower-income households. Can act as a replicable model for private rented flat complexes and housing estates.

Action 3: [FL6] Innovation funding for SMEs to transition one vehicle to EV to pilot the transition

For a business who is unsure how switching to an EV would impact their business model (e.g. delivery staff having to charge on route), grant / innovation funding provided to allow them to trial one vehicle or part of the fleet, before transitioning the whole fleet

Reference: (Mott MacDonald)

Convening Lead

Combined Authority / County Council

Risks & Dependencies

Limited risk, as support is primarily financial. Minimal dependency on wider decarbonisation activities.

Collaborators

Funding avenues through central government

Co-Benefits

Supports small and medium enterprises who often face greater barriers to accessing capital in transitioning their fleets.

Generation

Action 1: [G2] Develop clear stance on re-powering of wind

This could include issuing guidelines to developers on its approach to assessing change of hub height or change of number of turbines; or actively allocating land areas for new wind projects assuming existing sites will not be repowered. Community Energy led schemes, or providing direct community benefit to those near future windfarms will also be important considerations if existing wind farms are re-

Reference: (Mott MacDonald)

Convening Lead

Combined Authority / County Council

Collaborators

District and City Councils

Risks & Dependencies

Without a clear preference / endorsement from the planning authority, existing wind sites may be decommissioned and re purposed to another land use type that can utilise the grid connection.

Co-Benefits

May encourage repowering of existing wind sites, increasing locally generated renewable energy. Could help ensure EMW development is permitted in a balanced and appropriate way.

Action 2: [G3] Maintain updated public digital tool of energy projects & developments

During the stakeholder engagement workshops as part of the LAEP, one key idea recommended was the concept of a visible map or digital tool, where businesses and residents can see proposed energy projects in their area. This might allow synergies and partnerships to organically develop, or for more coordinated engagement and capacity requests to UK Power Networks. By providing access to this information, independent actors can collaborate directly without the need for the local authorities to manage centrally.

Reference: (CAG, 2025)

Convening Lead

Combined Authority

Collaborators

Developers, large businesses, District and City Councils, DNO

Risks & Dependencies

Risks this becoming an administrative burden, or that without a significant awareness campaign the tool is not used.

Co-Benefits

Enables new private developments and generation projects to integrate more effectively with existing communities.

Action 3: [G4] Help enable community energy delivered projects in non-domestic sector

Realising the rooftop solar estimates in the net zero scenarios does require mobilisation of both domestic and non-domestic sector, which community energy projects can help deliver. As batteries become more affordable, and flexible electricity tariffs expand, it is likely that community energy projects that combine interventions – solar, battery, heat – may become more attractive.

Reference: (Mott MacDonald)

Convening Lead

Combined Authority

Collaborators

Existing Community Energy Groups (e.g. Big Solar Coop), Developers, Existing businesses

Risks & Dependencies

Risk supply chain capacity becomes constrained and prices rise. Unable to get sufficient participation from residents (cost of living rises, lack of affordability, lack of awareness of schemes or ability to participate)

Co-Benefits

Residents feel more engaged and can benefit financially from the net-zero transition. Reduced electrical demand at the point of connection, resulting in lower energy bills.

References: CAG Consultants, 2025. Stakeholder engagement as part of the production of this LAEP

Network

Action 1: [EN1] Work with UKPN to secure targeted reinforcement for new housing & growth

Local Authority seed funds the necessary grid connections to provide certainty to developers. Examples of Warrington Borough Council, Sunderland City Council, Ebbsfleet Development Corporation playing this role. Alternatively, the local authorities can work collaboratively with UKPN to develop the evidence required to secure full Ofgem funding for infrastructure investment, as the Greater Cambridge Partnership did locally for Cambridge East and Trumpington infrastructure.

Reference: (Mott MacDonald)

Convening Lead

Combined Authority

Risks & Dependencies

Without proactive planning and investment in the network, new developments may face increased wait times and higher costs for grid connections

Collaborators

UKPN, NGED, Developers

Co-Benefits

Network reinforcement can be delivered more efficiently, as the DNO gains clearer visibility of upcoming demand and can optimise upgrades accordingly.

Action 2: [EN2] Consider innovation pilots for new developments, such as Zero Bill Homes.

Pilots could be encouraged between energy suppliers and developers to deliver innovative new homes as part of future development. Octopus Energy is trialling this approach with their Zero Bill Homes initiative, with a “130 home development in Bedfordshire planned for Zero Bills” . Demonstrators like this, delivered in the next 10 years, could prove to be important local case studies for the potentially large amount of growth in 2035 onwards

Reference: (Octopus, 2024)

Convening Lead

Combined Authority

Risks & Dependencies

Dependent on energy suppliers or prospective home buyers being willing to enter into the agreement.

Collaborators

Energy suppliers, Developers

Co-Benefits

Helps mitigate pressure on the electrical network, particularly in high-growth scenarios beyond 2035.

Action 3: [EN3] Develop planning policy and locations for energy intensive data centres

The local authorities could help steer new energy intensive industries and commercial space to locations conducive with the supporting infrastructure (primarily water and energy). One approach could be starting with a call for sites for data centres, to understand what developers are currently planning. These sites could then be reviewed against an established set of criteria (including availability of grid connection and adequate water supply), so that sites may possibly be allocated for this use. This should be a coordinated effort with UKPN and NESO, so that developers may be incentivised to develop sites where they best suit the underlying infrastructure.

Reference: (Mott MacDonald)

Convening Lead

Combined Authority

Risks & Dependencies

Data centres may be proposed in locations where energy or water infrastructure is insufficient, creating a dependency on extensive and costly off-site reinforcement to enable development.

Collaborators

UKPN, NGED, NESO, Developers, Water Companies, Academic institutions

Co-Benefits

Creates opportunities for power purchase agreements with nearby solar arrays.

References: Octopus Energy, 2024. 100,000 Zero Bills homes by 2030. [100k Zero Bills homes by 2030](#) | Octopus Energy

13.3 Spatial Focus Zones

Spatial analysis has identified priority zones where targeted interventions can deliver the greatest impact for decarbonisation, social equity, and system efficiency. These areas should be reviewed in further detail, and prioritised where appropriate by District and City Councils during implementation:

- **Fuel Poverty and Low EPC Ratings:** Rural areas in Fenland and East Cambridgeshire, and specific neighbourhoods in Cambridge City, exhibit high levels of fuel poverty and poor energy performance. Priority MSOAs include parts of Fenland (e.g., Wisbech, March, Chatteris, Whittlesey), East Cambridgeshire (e.g., Soham, Littleport, Ely outskirts), North and East Cambridge City (e.g., Abbey, East Chesterton, King's Hedges) and selected MSOAs in Huntingdonshire and South Cambridgeshire with high concentrations of older, hard-to-treat homes.
- **Grid Constraints and Electricity Headroom:** Electricity network capacity is a key determinant for the pace and location of electrification measures. Analysis of grid utilisation (Section 10, Figure 10.10) identifies that South Cambridgeshire retains grid headroom into the late 2030s, making it suitable for early electrification. In contrast, substations in Cambridge City, Fenland, and East Cambridgeshire face early constraints, requiring proactive reinforcement and potentially some demand side response. *Actual headroom will of course differ depending on connection queues, delivery of new developments, and investments in the network.*
- **District Heating Potential:** High-density urban areas and clusters of public buildings in Cambridge City, South Cambridgeshire, Fenland, and Huntingdonshire are well-suited for communal heating networks. The industrial decarbonisation hotspots mentioned below may also present opportunities for district heating.
- **Industrial Decarbonisation:** Industrial clusters in Whittlesey, Wisbech, Isleham, Fordham & Chippenham, Duxford, Whittlesford & the Abingtons, Huntingdon and St Neots are priorities for electrification and preparation for hydrogen transition.

See Appendices for maps indicating potential priority areas, and the methodology used. Each intervention area: heating, transportation, generation, etc; has its own appendix.

13.4 Stakeholder Collaboration

Most of the transition to net zero, will depend on a multitude of stakeholders acting in synergy. It is unlikely that the County Council, City Council, or District Councils will have the financial capital to directly fund most of the transition and infrastructure needed. In that regard, stakeholder engagement will be a key activity to help implement the LAEP.

Local planning authorities can collaborate with developers to gather more accurate information on energy demands for new developments, enabling early identification of required grid upgrades. This approach helps accelerate delivery and ensures alignment with local plans and growth priorities.

During the stakeholder engagement workshops as part of the LAEP, one key idea recommended was the concept of a visible map or digital tool, where businesses and residents can see proposed energy projects in their area. This might allow synergies and partnerships to organically develop, or for more coordinated engagement and capacity requests to UK Power Networks. By providing access to this information, independent actors can collaborate directly without the need for the local authorities to manage centrally.

As recommended earlier in the Network Impacts section, the County can play a key role in ensuring continued coordination between UK Power Networks, and NESO. *This coordination should extend across the Combined Authority area, possibly through the Cambridgeshire & Peterborough Combined Authority.* Part of this could be ensuring UK Power Networks has the most up-to-date information on growth and decarbonisation in the area and supporting alignment so that network investments from UKPN and NESO keep pace with regional needs.

Lastly, transitioning the heating system and improving the building fabric of non-domestic buildings, will likely require a landlord/local authority partnership to generate the incentives and regulations needed for change. Similarly, expanding the reach of community energy in the area can help rollout rooftop solar, batteries and other energy efficiency measures, while keeping local residents engaged and directly benefiting from the transition to net zero.

13.5 Monitoring

Robust monitoring and reporting should be put in place to track progress against key performance indicators (KPIs) for emissions reduction, energy demand, social outcomes, and investment. The roadmaps provided within this report, and the calculations supporting this LAEP, provide key measures such as number of fabric improvements, number of heat pumps, and percentage of EV uptake required to meet the plan. Some national datasets can be used, such as vehicle registration data to track EV uptake, or air source heat pump uptake under the Boiler Upgrade Scheme. For trickier measures to track, such as building fabric upgrades and heating system changes in the non-domestic sector, other bespoke systems or central portals could be developed (an idea proposed by the Cambridge Institute for Sustainability Leadership in their Better Homes Report 2025).

Regular reporting will enable the local authorities and its stakeholders, to adapt the implementation strategy as needed, respond to emerging challenges, and ensure that the benefits of the transition are realised across all communities in Cambridgeshire. **While this should be proportionate to available resources and make use of existing datasets to minimise burden, the approach must be reviewed and enhanced over time as capacity and data availability increase, ensuring continuous improvement and greater effectiveness.**

13.6 Key Risks and Assumptions

Below is a list of the primary risks to growth and net zero within the region

No/ RAG	Sector	Risk	Impact	Mitigation
1	Heating	DESNZ fail to re-balance energy costs, and/or the government fails to put a ban on sale of new fossil fuel boilers by 2035.	One or both of these measures are required to decarbonise heating. All net zero scenarios assume a ban on fossil fuel boilers by 2035, and then the transition to net zero happens as existing gas boilers are naturally replaced with ASHP.	H3 and DH5: Strong lobbying to national government for this change
2	Heating	The Government removes or ends early the Boiler Upgrade Scheme subsidies, and other subsidies for fabric upgrades	As shown in the economic modelling section, switching to low carbon heating systems relies on grant funding given where prices currently are. Removal of these subsidies would leave to a slow down on low carbon heating uptake and fabric upgrades.	
3	Network	Electrical network upgrades fail to keep pace with development or the net zero transition	Businesses, looking to switch large loads – such as gas heating for estates to electric, or industrial loads – would face barriers to their projects and potentially large costs rendering business case justification difficult. Developers face long delays and wait times, before being able to build houses or connect new generation to the network.	EN1 and EN4: Continued work with DNO to keep growth forecasts up to date, as well continued discussion with businesses to monitor their ability to secure electricity grid increases.
4	Heating / Network	New Build housing and non-domestic buildings are not built to net zero standards or a high level of efficiency.	All net zero scenarios assume new homes after 2025 are built with low carbon heating and will not require future fabric upgrades. If standards are not enforced and new builds have gas boilers, it will put pressure on an already constrained supply chain for the existing housing stock. It also might lead to larger impact on the electrical network.	Ensure high building standards for new builds, and relevant policy is in place to prevent retrofits being required later.
5	Heating	Supply chain is unable to meet the increased demand for fabric upgrades and ASHP installation	Residents face increased costs for new heating systems or fabric upgrades, and difficulty in finding competent contractors and advice. This could de-motivate residents and delay the net zero transition.	DH17c: Training needs assessment of local contractors
6	Heating	Non-domestic landlords do not cooperate with the change.	Gas consumption from the non-domestic sector is significant, and often requires landlords to invest in assets they do not occupy. Without landlord cooperation, the nondomestic sector is unlikely to transition at the pace required.	H12: Local government regulation for phase out of gas heating. H21: Mandatory operational ratings for non-domestic sector

No/ RAG	Sector	Risk	Impact	Mitigation
7	Heating	Residents are unwilling to thermally improve their houses	These include affordability and funding availability, supply chain limitations, lack of engagement from some landlords, high levels of disruption for some measures, and high technical complexity in some homes which need a specific tailored approach. The impact is paying more for heating, likely not switching to ASHP, or installing higher powered low carbon heating creating greater pressure on the network.	DH13: additional marketing campaign to “Action on Energy” DH17d: Neighbourhood wide funded whole house assessments and potential group purchase schemes.
8	Transport	Government cancels or delays ban to ICE vehicle sales.	All net zero scenarios assume 100% of car sales are BEH or PHEV by 2030, and for vans 2035. A delay to this would increase the cumulative carbon emissions (carbon budget), but is still likely to achieve net zero assuming a 10 year average replacement rate on cars and vans.	Deliver transportation interventions listed earlier, to remove the barriers to EV adoption, thus reducing reliance on the regulatory mandate.
9	Transport	Certain residents are left out of the EV transition – lower income residents or those living in flats or without off-street parking	This could arise from the Highway authority not approving cross pavement charging solutions, due to safety liability, maintenance, on-street clutter, etc. Also, no targeted grants for low-income individuals to purchase EVs over ICE equivalents. The impact would be those with financial means and off-street parking will naturally make the shift, but it will lead to an inequitable net zero transition.	T12: Grants, or low interest loans, or other: specifically targeted at low-income groups T8: Council providing low interest loans to blocks of flats
10	Transport	Heat network pilot is delayed, due to delay in securing anchor load agreements and financing	Larger cost burden placed on businesses or households to bear the full cost of transitioning to net zero.	HN1: Engagement with potential anchor loads, and feasibility studies for heat networks

14 Conclusion

This chapter presents the key conclusions and recommended actions emerging from the Cambridgeshire LAEP.

The Cambridgeshire LAEP provides a robust, evidence-based framework pathway to support the County's growth and transition to net zero carbon emissions by 2045. The LAEP has been developed through a process of data acquisition, scenario modelling, stakeholder engagement, and spatial analysis, and is aligned with national, regional, and local policy objectives.

The analysis demonstrates that:

- **Network constraints are a critical barrier:** All net zero scenarios result in negative headroom at substations by the late 2030s, necessitating proactive upgrades and flexibility solutions to support continued connections and enable the deployment of low-carbon technologies.
- **Significant emissions reductions are achievable:** Net zero compliant scenarios reduce county-wide emissions by approximately 93.7% by 2045 compared to 2023, with the largest contributions from electrification of transport and heating, supported by energy efficiency improvements and local renewable generation.
- **A fabric-first approach is essential:** Improving the energy efficiency of buildings, particularly through fabric upgrades, is a key enabler for cost-effective heat decarbonisation and grid stability.
- **Low carbon heating is a major lever for decarbonisation:** The majority of domestic and non-domestic buildings in the county currently use fossil fuels for space heating and hot water. The LAEP demonstrates that a rapid and sustained increase in the uptake of low carbon heating technologies, primarily air source heat pumps, supported by ground source heat pumps and district heat networks will be required to meet net zero targets.

Addressing barriers such as upfront costs, supply chain capacity, and public awareness will be essential.

- **Transport decarbonisation is critical:** The shift to EVs is projected to deliver the largest single emissions reduction, accounting for about 35% of total reductions. While EV uptake is expected to accelerate, ongoing reliance on internal combustion engine (ICE) vehicles, particularly in for those without off-street parking and for vans, buses and HGVs, means improved public charging infrastructure, and innovation in low-carbon freight remain necessary. Modal shift and active travel are also recognised as important, though the largest driver of decarbonisation remains the transition from ICEs to low-carbon fuel types.
- **Industrial decarbonisation is achievable but requires targeted action:** The majority of low temperature industrial process loads are assumed to be electrified, while high temperature loads will likely require a transition to hydrogen. The plan models an 89.8% reduction in industrial process load emissions by 2045, with the remaining emissions primarily from high temperature processes using green hydrogen. The importance of all industrial companies in Cambridgeshire having a decarbonisation plan is emphasised, and the need for ongoing innovation and support for fuel switching is highlighted.
- **Local generation is expanding rapidly:** Cambridgeshire's generation mix is decarbonising faster than the wider GB grid, with renewables, particularly solar and wind, dominating local generation. The pipeline of connections for solar PV and battery storage exceeds the requirements set out in the Clean Power 2030 Action Plan for the region, and by 2045, Cambridgeshire is projected to locally generate 65% of the energy consumed. The plan highlights the importance of continued support for community energy groups, and notably that several of the existing wind farms will come to the end of their design life during the next 20 years, with the planning authorities needing to take a view on whether to re-power or find an alternative source of local green electricity.

- **The transition requires substantial investment:** Estimates for capital expenditure range between £2.7bn and £3.4bn (excluding developer-led interventions). These investments are offset by benefits including carbon savings, air quality improvements, and bill savings, improved health outcomes, job creation, and reduced fuel poverty.
- **Residual emissions will remain:** The largest amount of residual emissions in 2045 is in transportation, primarily from through traffic on trunk roads, which is outside the scope of the LAEP. Some emissions also remain from high temperature industrial process loads, as any green hydrogen consumption is likely to have a higher carbon factor compared to the decarbonised electricity grid.

In summary, net zero by 2045 is technically feasible for Cambridgeshire, but only with coordinated action across all sectors and sustained investment.

Beyond reducing emissions, this approach guarantees future energy needs with security, resilience, and affordability for communities. By following the next steps outlined, Cambridgeshire can lead the way in local energy transformation, delivering environmental, economic, and social benefits for current and future generations.

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A. Emissions & Energy Baseline Assumptions

Please refer to the following documents:

- Energy system baseline and modelling scenarios for Cambridgeshire technical note titled 100122102-MMD-XX-XX-REP-Z-0001
- Baseline Model titled 100122102-MMD-XX-XX-SCH-Z-0001

B. Scenario Approach Rationale

B.1 Process of scenario selection

Scenarios for Local Area Energy Planning can be defined as:

- Using Standardised Scenarios, consistent with regional planning (Top-Down): LAEPs can leverage the industry standard scenarios. A prime example is using UK Power Networks' Distribution Future Energy Scenarios (DFES), which are based on the NESO Future Energy Scenarios Pathways (FESP).
- Developing Bespoke, Local Scenarios via Stakeholder Input (Bottom-Up): Alternatively, scenarios can be developed using local stakeholder input and local stakeholder priorities for the analysis. In this approach local authorities, large energy users, community organisations and businesses can help define the future pathways that reflect local ambitions and constraints. Typically, stakeholders are requested to comment on, express a preference between, or combine or tailor a set of "strawman" futures about how policy and consumer appetite have developed. Stakeholder inputs can identify local drivers that impact local energy system that are not covered by the differences in the standardised Scenarios, as above.

As discussed in Section 4, following discussion with the steering group¹⁰³, a top-down approach, based on the DFES forecasts was selected as the scenario approach. This section provides a brief discussion of the alternative scenario modelling approach (bottom up), not selected.

Advantages of the DFES-based Scenarios

Addresses Local Authority Capacity Constraints: Not all local authorities have the capacity, funding, or available technical resource to gather local datasets based on the bespoke energy scenarios. DFES offers a ready-made developed dataset, based on extensive stakeholder engagement, that levels the playing field and enables participation in strategic energy planning.

Addresses Variation in Local Datasets: DFES provides a standardised, regionally coherent set of projections for technology uptake. This consistency is important when comparing or aggregating plans across neighbouring authorities or aligning with regional infrastructure strategies. Local datasets can vary widely in quality, coverage, and update frequency. DFES fills gaps where local data is unavailable or unreliable, ensuring that projections are still grounded in robust regional modelling.

Standard Framework Used across Industry: Using DFES as a common foundation simplifies stakeholder engagement, as national and regional organisations are already familiar with its structure and assumptions. It allows local authorities to focus their limited resources on validating and refining projections rather than building them from scratch. DFES aligns with national energy scenarios and distribution network planning, making it easier to integrate local plans into wider decarbonisation strategies.

Industry-recognised Methodology: DFES methodology and assumptions are publicly available and regularly updated, offering transparency for decision-makers and stakeholders.

Eventually, the DFES were selected as the basis for analysis and modelling, providing a structured framework to assess future energy system pathways in Cambridgeshire.

¹⁰³ The discussion was based on a proposal for local scenarios put forward by Mott MacDonald in document "CCC LAEP - Scenarios Proposal" issued on 13/06/2025

B.2 Future scenarios modelling approach

The modelling has been undertaken at varying levels of spatial granularity, reflecting the availability and resolution of underlying data sources. Where detailed datasets were accessible, projections have been developed at the Lower Super Output Area (LSOA) and Middle Super Output Area (MSOA) levels to capture localised patterns of energy demand and technology uptake. In other cases, particularly where data was limited or aggregated, modelling has been conducted at the broader Local Authority level to ensure coverage and consistency across the study area.

Table B.1: Modelling Granularity per Technology Area

Technology Category	Modelling Granularity
Domestic Connections	LSOA & Local Authority levels While there is a projected dataset on customer connections down to LSOA area as well as available dataset of electricity and gas demand breakdown by LSOA for domestic sector, the population projections from Cambridgeshire County Council are at Local authority level
Non-Domestic Connections	MSOA Level DFES dataset of projected I&C connections is at MSOA level as it is applied to the Gov UK data on non-domestic MSOA electricity and gas demand
Low Carbon Heating – Heat Pumps	LSOA level for domestic and MSOA level for non-domestic
Low Carbon Heating – District Heat Networks	LSOA and Local Authority Levels due to DFES dataset of district heat network connections projection based on LSOA level, and
Rooftop Generation	LSOA level
Distributed Generation	MSOA level

Technology Category	Modelling Granularity
Vehicle Type	Local Authority Level and LSOA breakdown for EVs
EV Charging	LSOA breakdown for EV Charging

Table B.2: Summary of Datasets Used

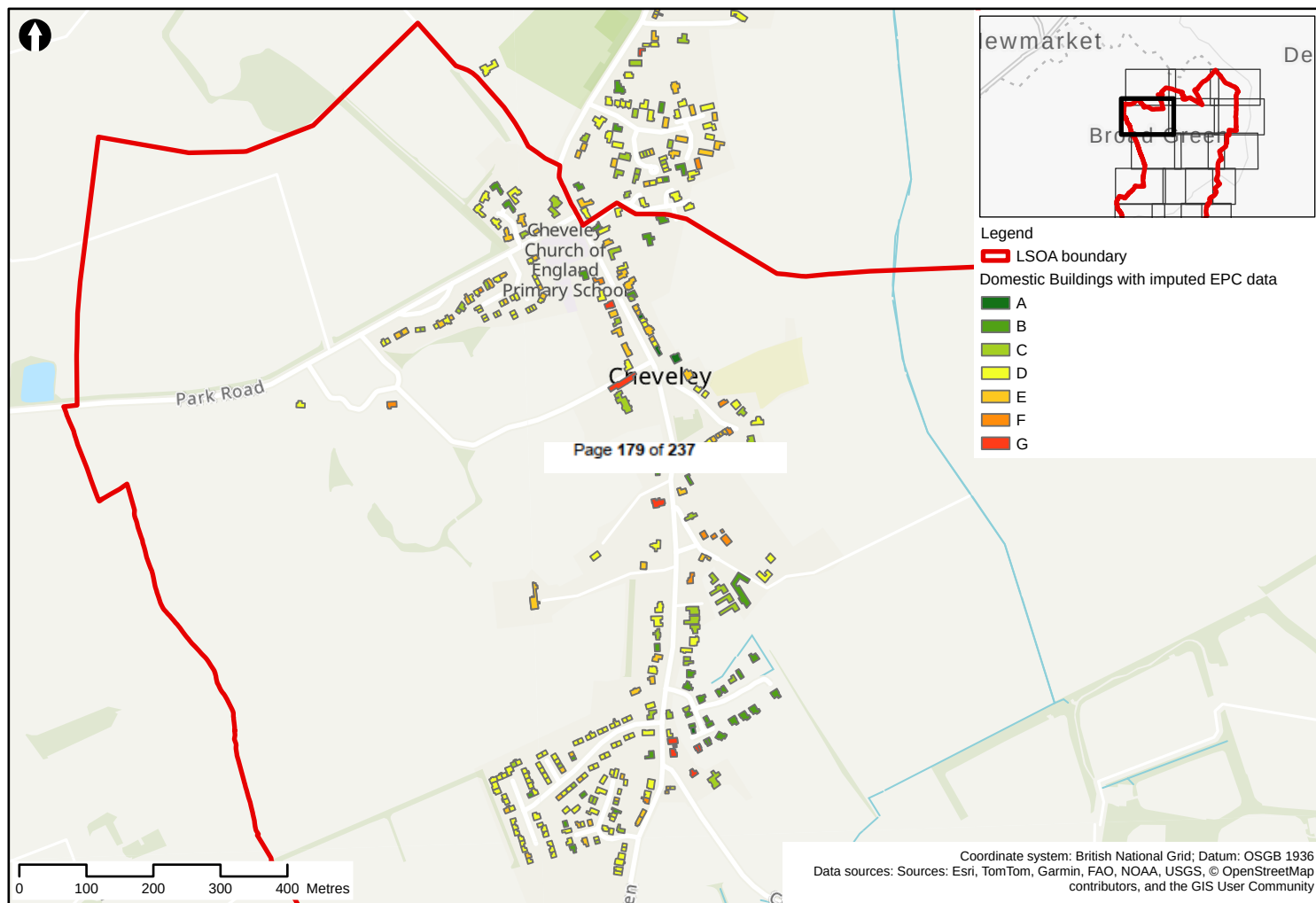
Datasets	Uses
Technology uptake projections	UKPN DFES 2025 Scenarios datasets EPC Imputation modelling
Growth projections	Cambridgeshire County Council population, households and dwellings projection UKPN DFES 2025 Domestic and I&C Connections datasets
Cambridgeshire local datasets	UK Gov vehicles dataset
Data validation	Policy targets: Clean Power 2030, 2035 Ban of sale of new ICE passenger vehicles, Generation pipeline for Embedded Capacity Register, Development Consent Order Applications registry, Rooftop Solar Potential dataset Heat Decarbonisation: YLNZH Domestic and Non-Domestic Heat Pump Potential, YLNZH Heat Development Regions Transport: Cambridgeshire public EV charging targets

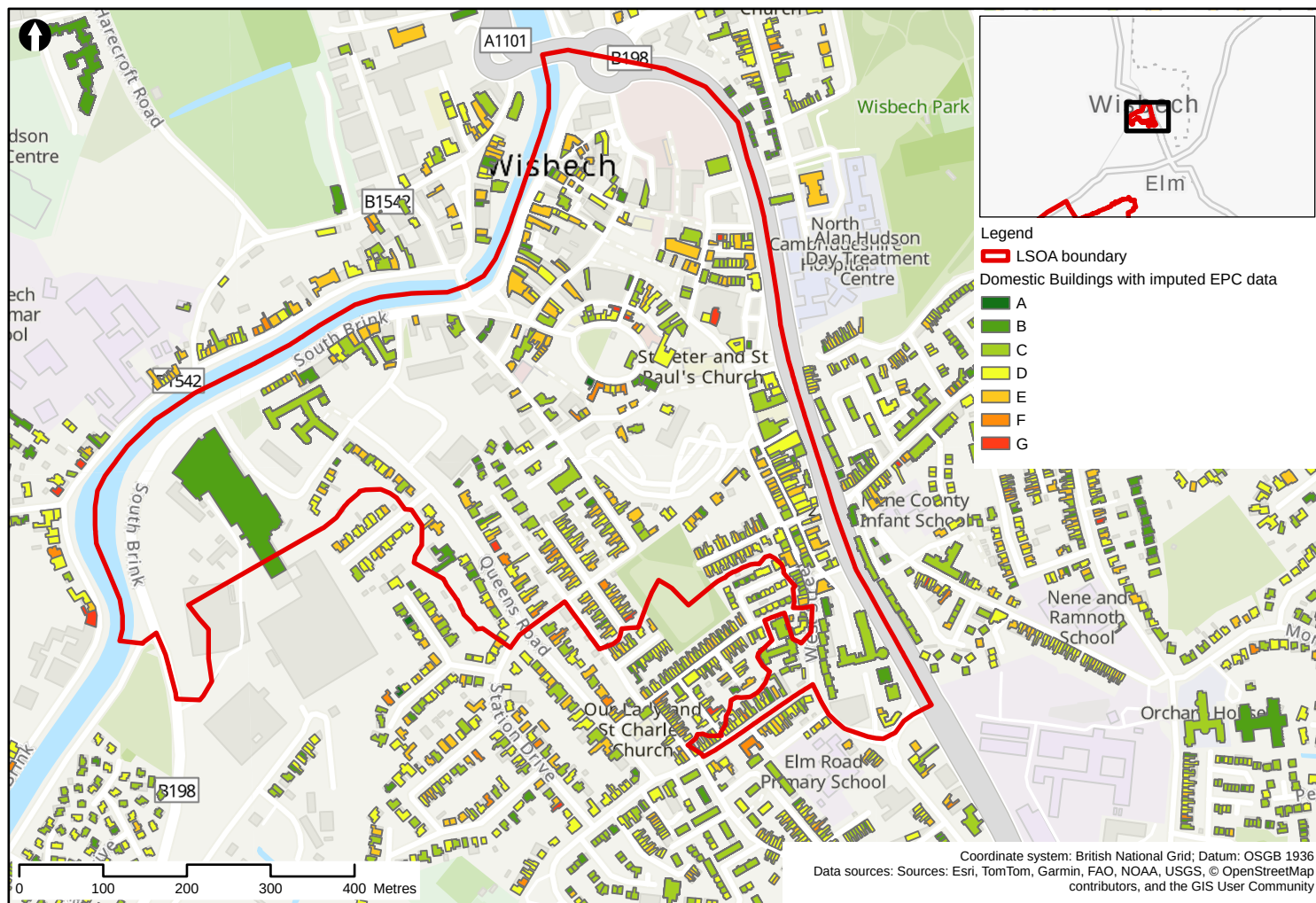
C. Energy efficiency

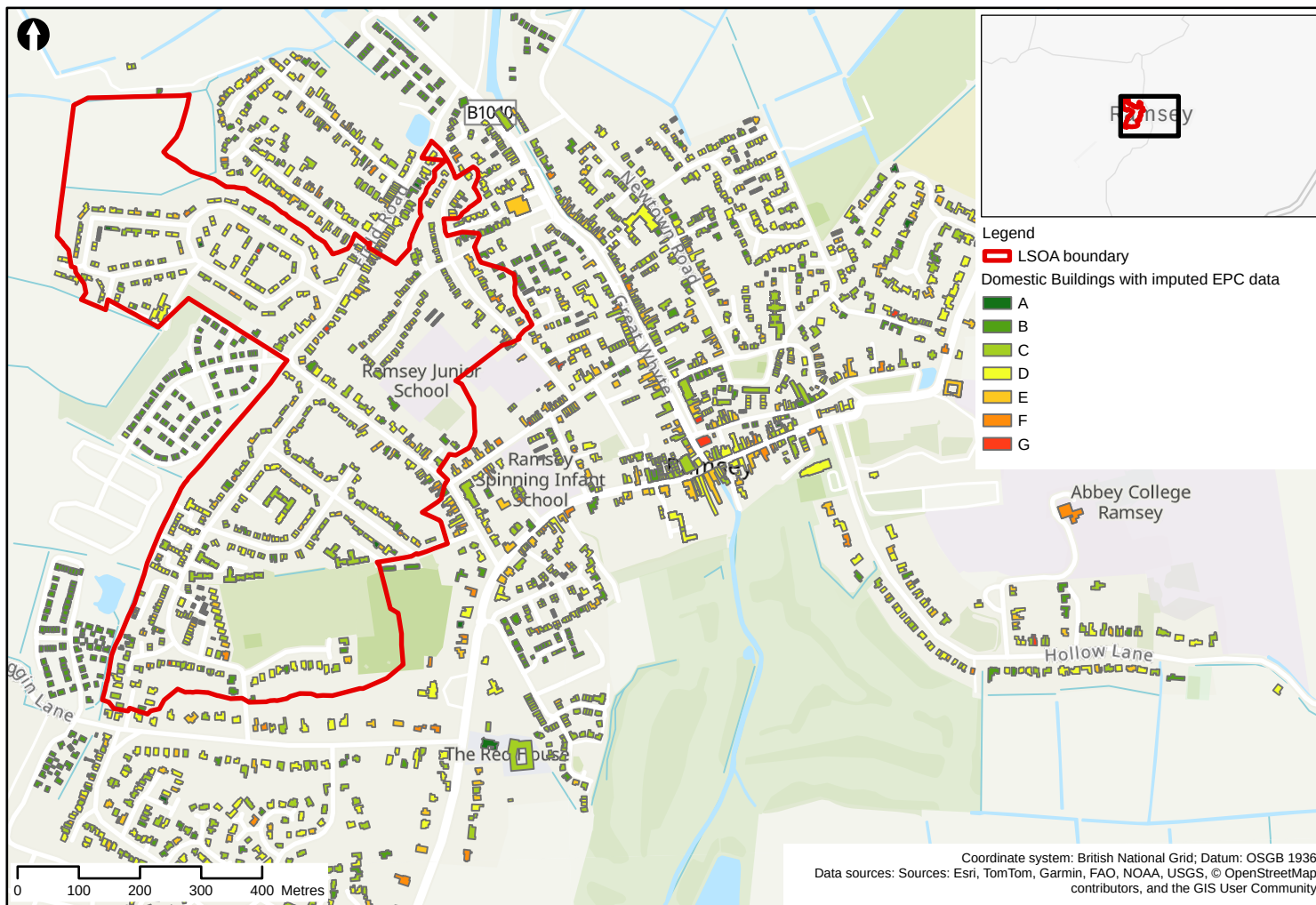
C.1 Methodology & assumptions

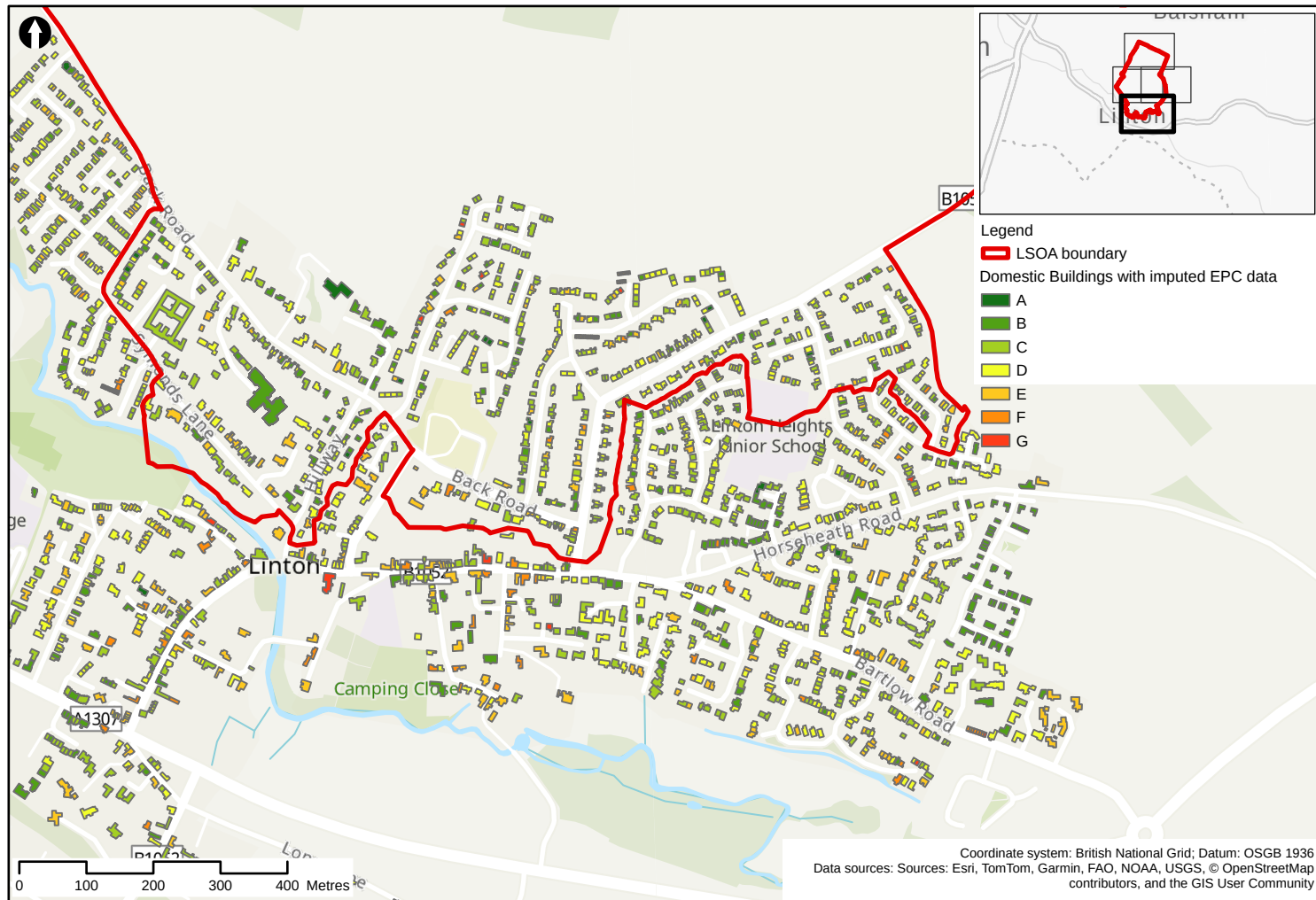
Please refer to the spreadsheet titled 'CCC Modelling - Building Energy Efficiency and Heat v2 - process load correction included'.

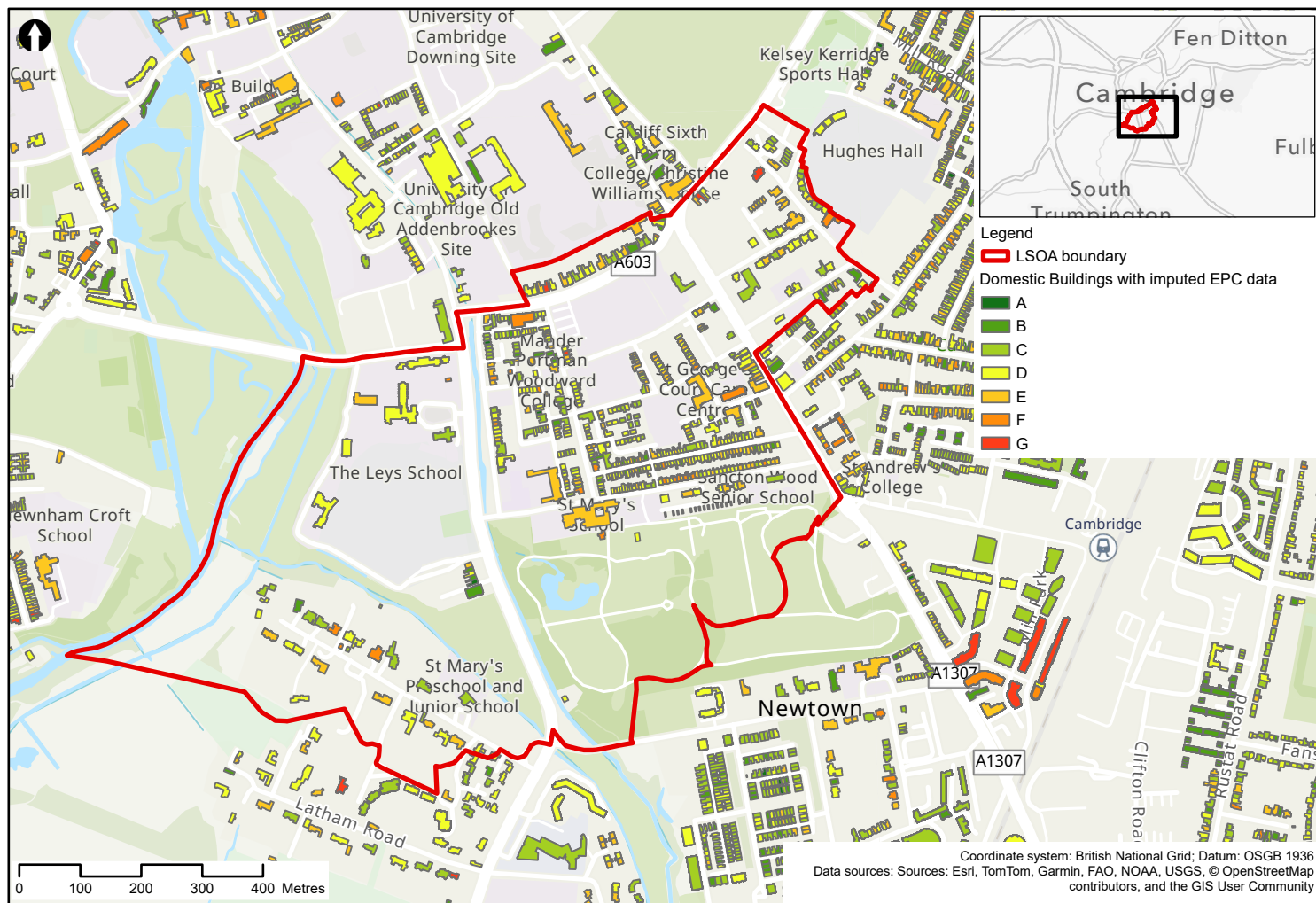
C.2 Domestic EPC Records within highest fuel poverty LSOAs for each district council









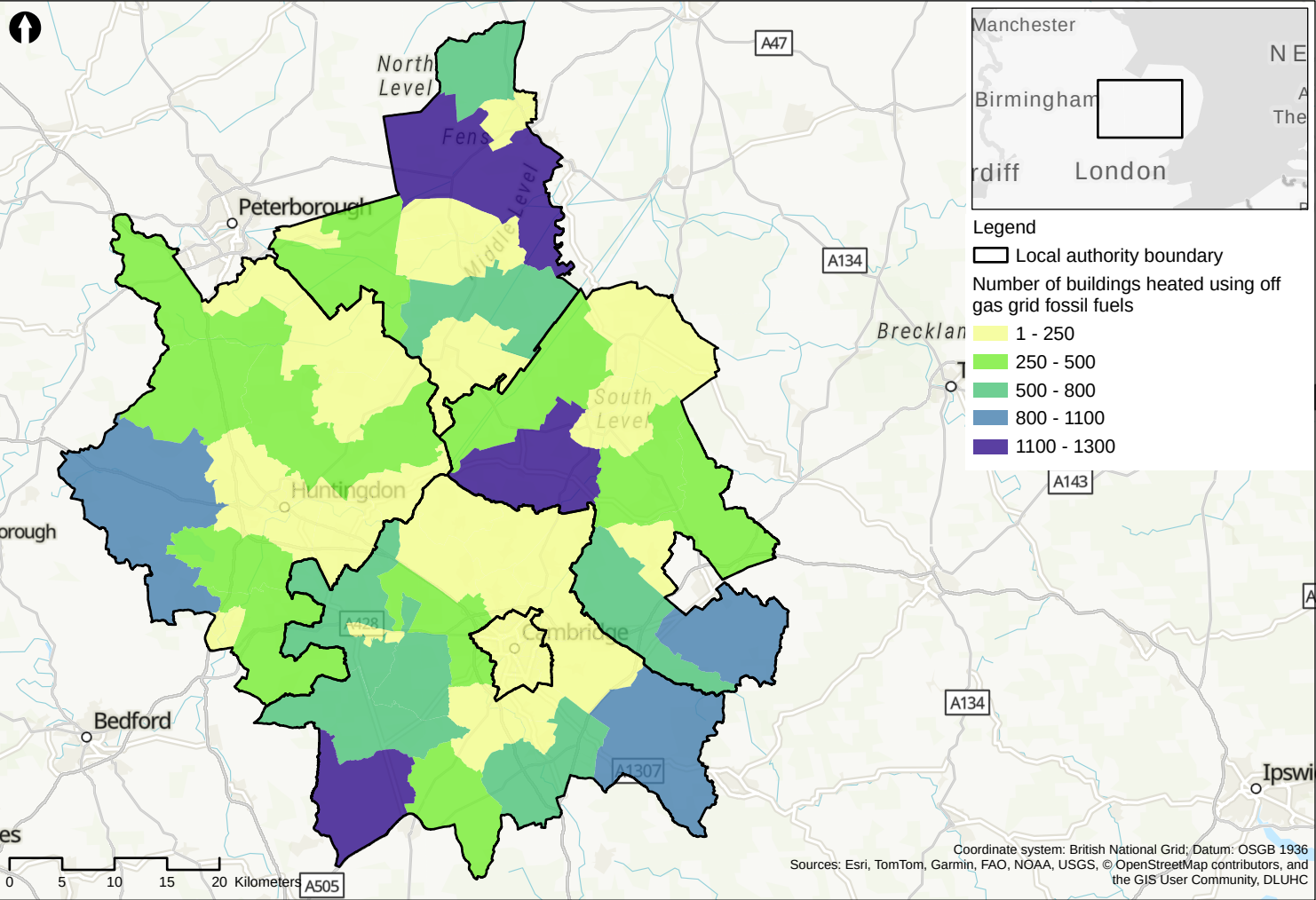


D. Low carbon heating

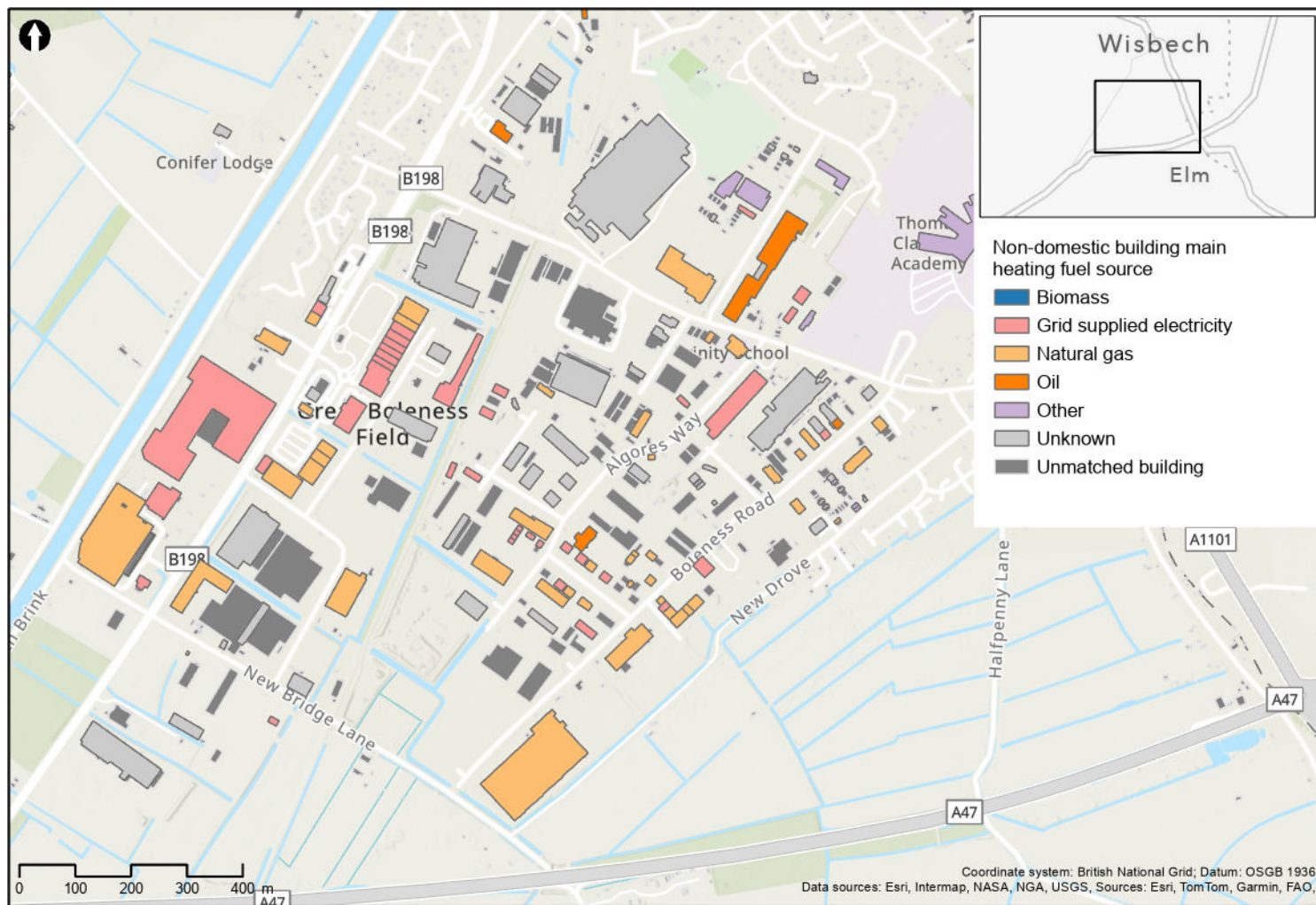
D.1 Methodology & Assumptions

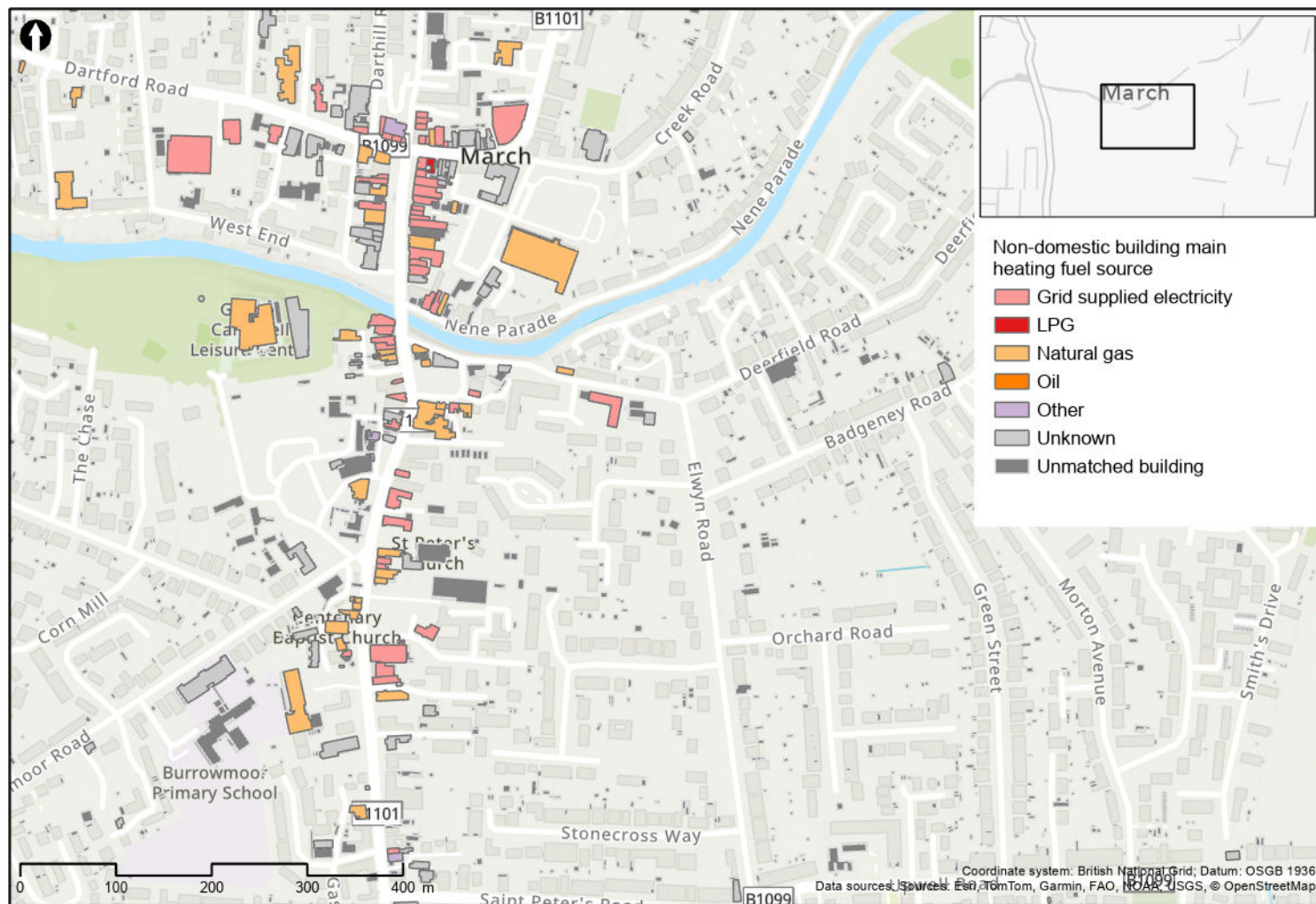
Please refer to the spreadsheet titled 'CCC Modelling - Building Energy Efficiency and Heat v2 - process load correction included'.

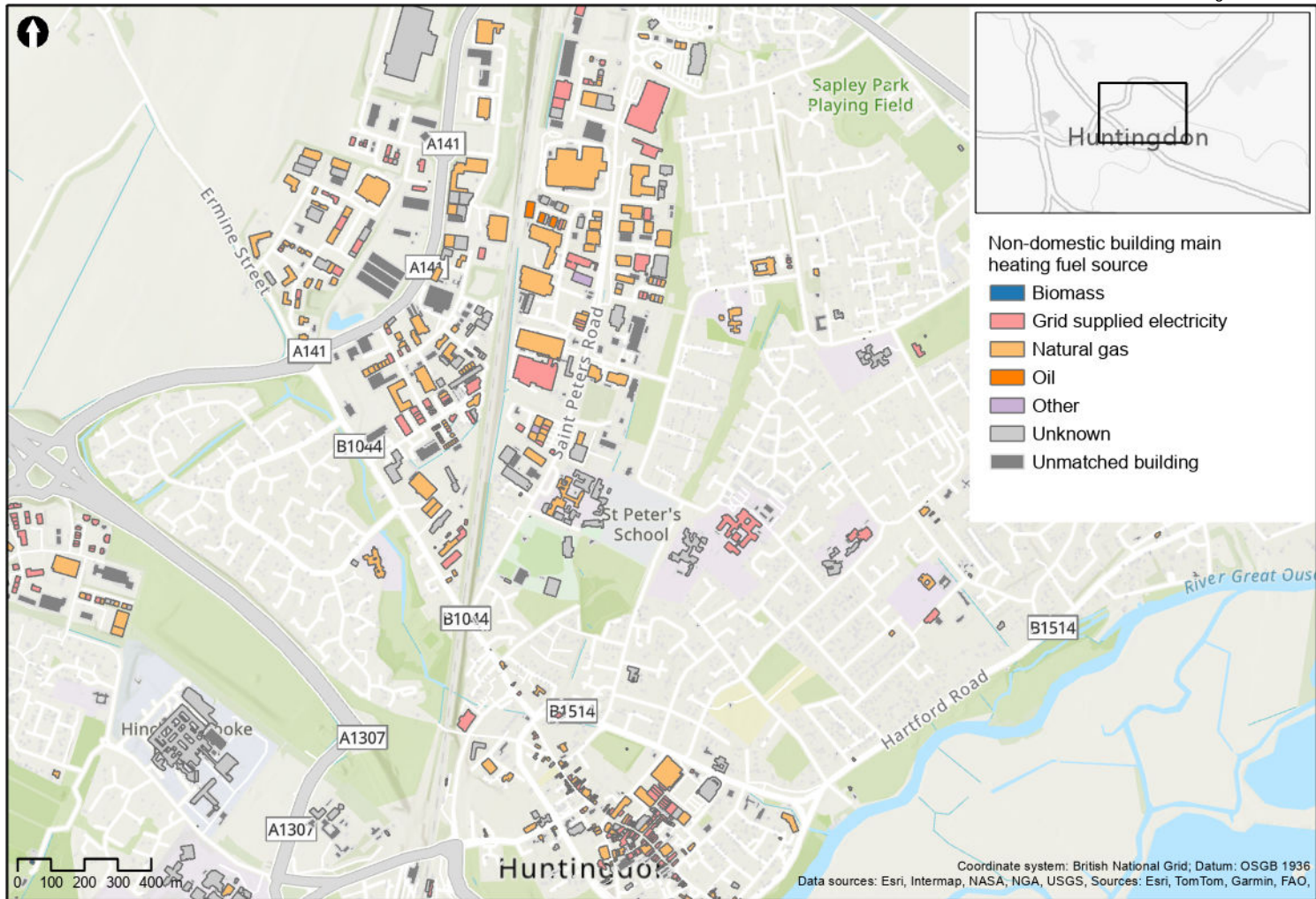
D.2 Off Gas Map

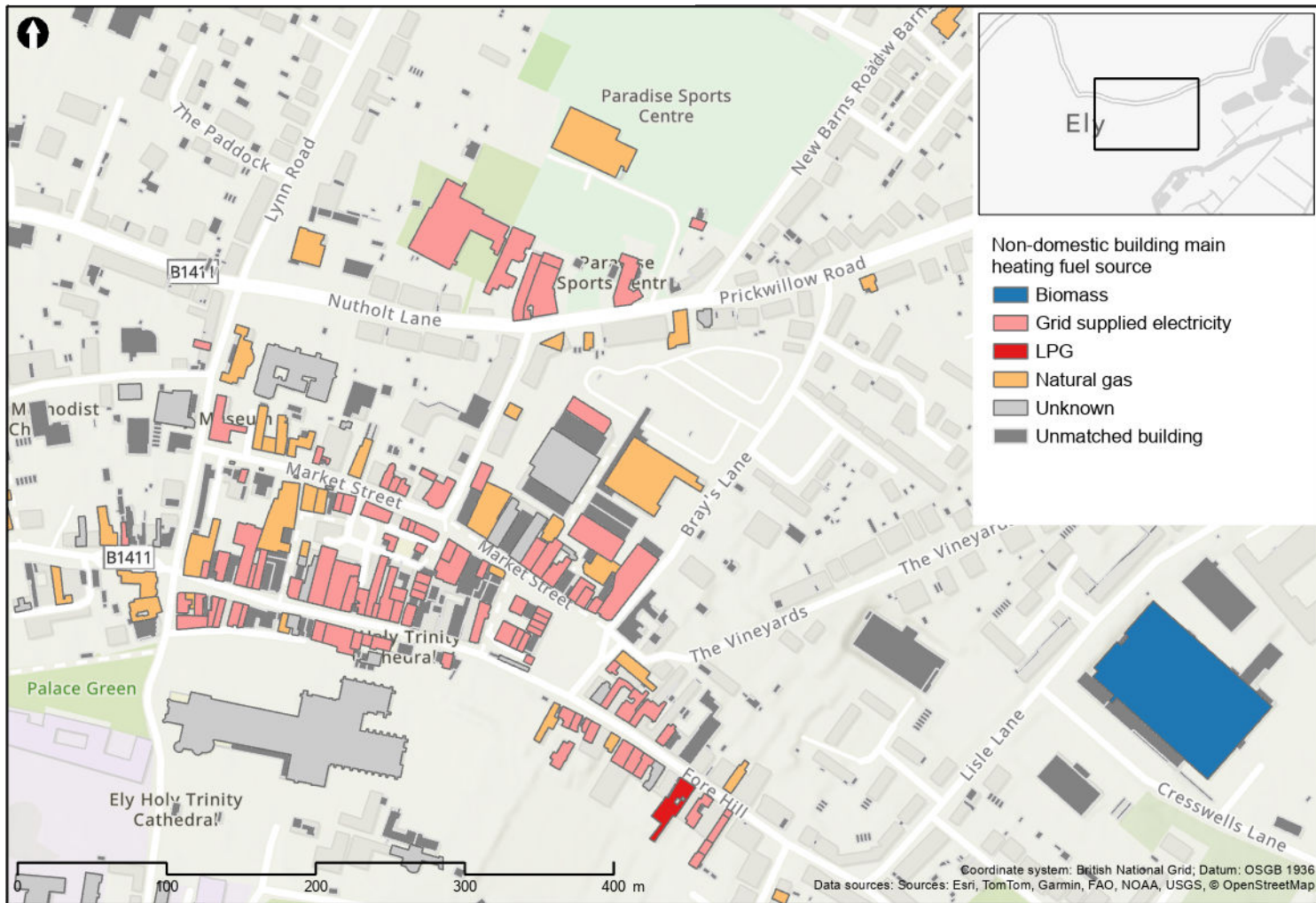


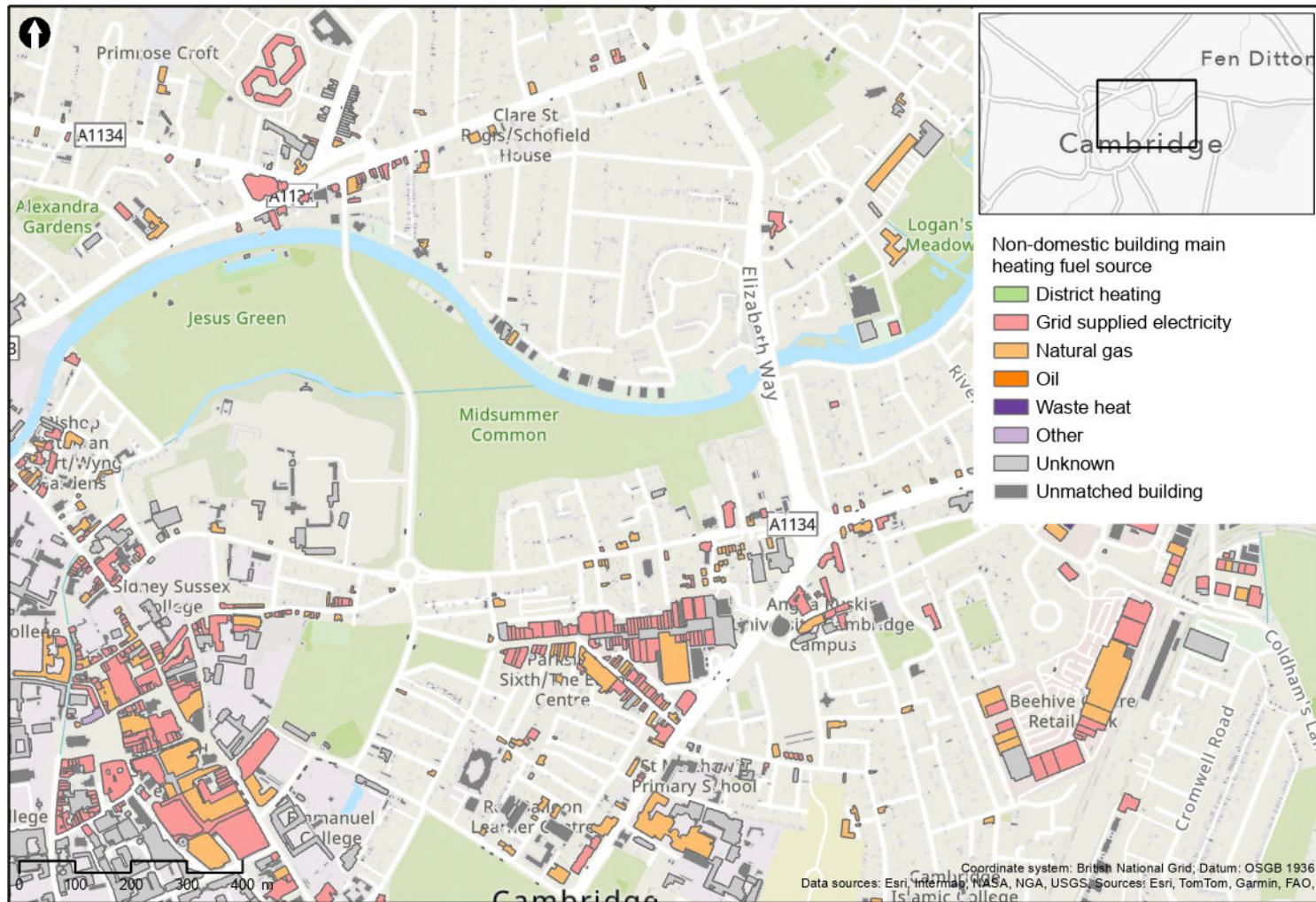
D.3 Clusters of Non-Domestic Properties & heating source

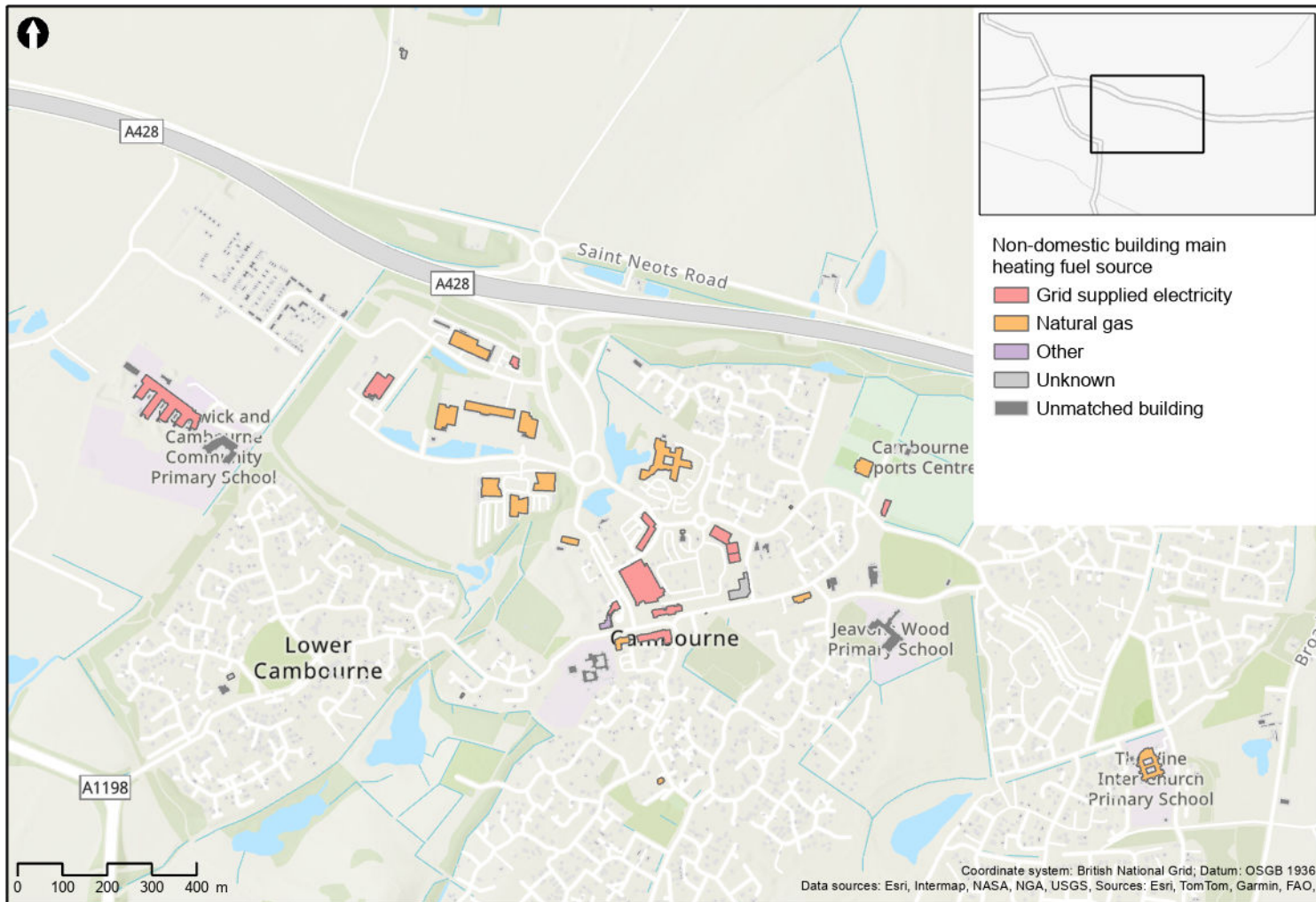












D.4 Project List

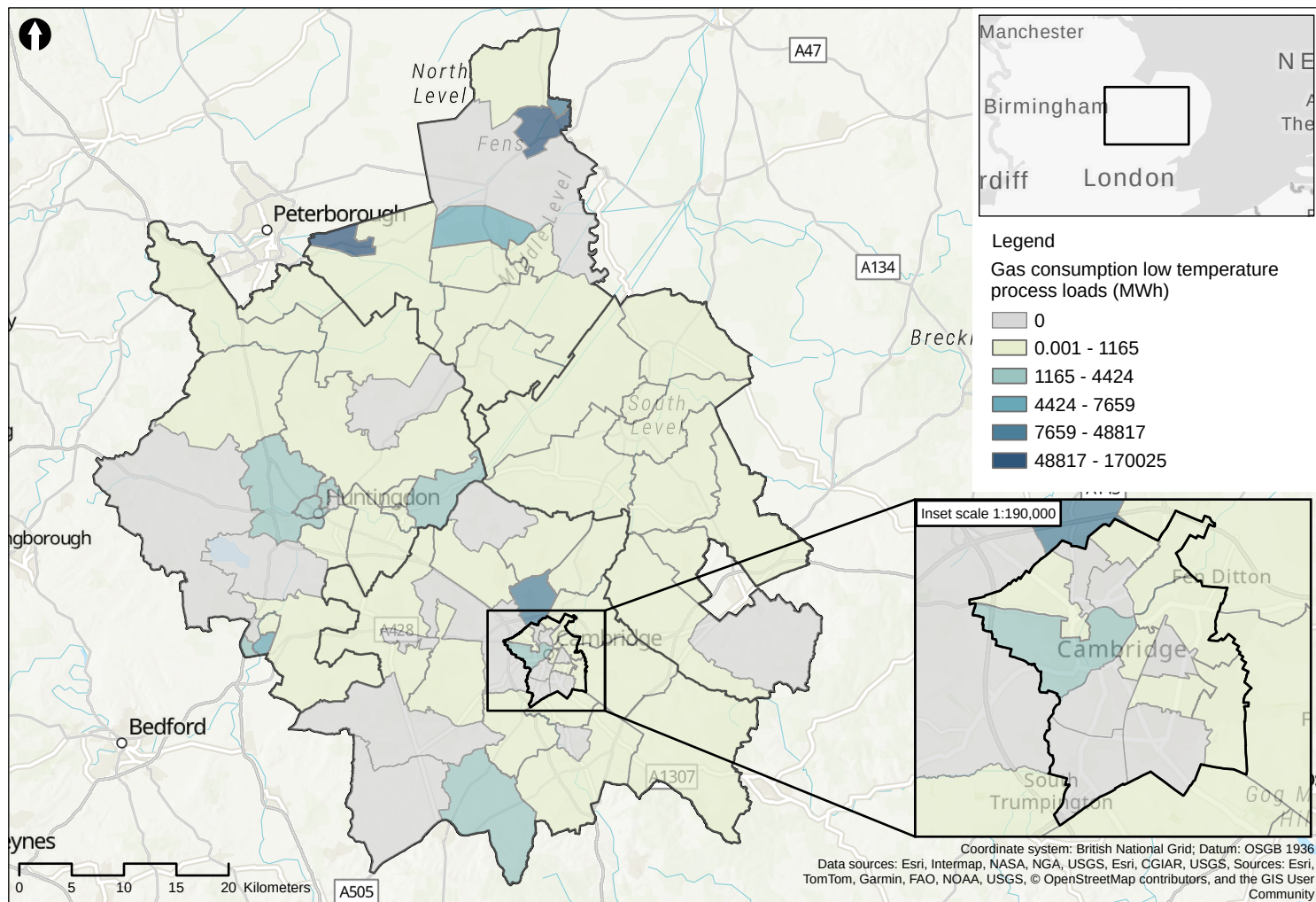
Project Definition Project or programme (Bold Purple = Prioritised in Roadmap)	No	Description	Sector	Type of intervention	Market segment	Criteria Degree of LA influence	Cost to Council	Direct Carbon impact	Wider systemic impact	Difficulty to implement	Social Impact	Combined score
[DH9] Whole street energy efficiency improvements and heat pump installation (Chitchyna, 2025) (NOA, 2024, p13)	DH9	The concept of doing group purchase schemes - for either heating or fabric upgrades - on a street or neighbourhood basis. Reaches economies of scale, and also can help smooth the customer experience in a similar way "solar Together" accomplished.	Low carbon heating	Support & guidance	Domestic	1-Areas we directly control/guide	Low	Medium	Medium	Medium	Medium	9
[DH9b] Pilot project - Small scale communal systems (MM)	DH9b	Pilot / demonstrator for small scale communal systems for streets of terraced homes with sufficient space for plant room in back alleys, potentially can use shared open loop ground source where viable. (can reduce up front and maintenance costs per household) Could apply for DESNZ funding to trial it on a mixed tenure street of terraced homes in an area of high fuel poverty.	Low carbon heating	innovation / Demonstrator	Domestic	1-Areas we directly control/guide	Medium	High	Medium	High	Medium	10
[DH10a] Group purchase heat pump scheme (MM) (CAG, 2025)	DH10a	Running a similar to Solar together, scheme that allows multiple residents in an area to purchase heat pumps on mass from a reputable installer, and benefit from a smoother customer journey and economies of scale	Low carbon heating	Financial Incentive	Domestic	1-Areas we directly control/guide	Low	Medium	Medium	Medium	Medium	9
[DH13] Education and awareness campaign (Action on Energy) (CISL, 2025, p7)	DH13	Leverage the work done to date on Action on Energy. Further engage residents through further awareas campaigns, to access the information there. Enhance and supplement the information already on the platform as needed.	Low carbon heating	Support & guidance	Domestic	1-Areas we directly control/guide	Low	Low	high	Low	Medium	10
[DH16] Demonstrator projects (Ahmad (2023) p5)	DH16	Having demonstrator projects available, so that consumers can see the change before they commit. Breaks down the knowledge barrier and apprehension, and can also help answer questions about what contractors to engage with and what the real world performance are. Could include installation in schools and community centres, where people can see the change	Low carbon heating	innovation / Demonstrator	Domestic	1-Areas we directly control/guide	Low	Low	Medium	Low	Low	10
[DH18b] Whole home retrofit and low carbon heating improvements on social tenures (consider heat as a service arrangement) (MM)	DH18b	for social tenures, looking at the remaining housing stock, and per neighbourhood or estate, reviewing building efficiency and low carbon heating at the same time. Could consider switching to a energy as a services type arrangement, or simply using economies of scale to reduce capital cost	Low carbon heating	Capital project	Domestic	1-Areas we directly control/guide	Medium	Medium	high	Medium	High	12
[DH19b] Direct installation of ASHP and fabric upgrades to vulnerable groups (MM)	DH19b	Council directly intervenes, and installs fabric upgrades and ASHP (via a delivery partner), to vulnerable groups. Specifically target people who are lower income, suffer from medical conditions, or would generally disproportionately benefit from improved indoor temperature comfort. Fund could be eligibility based, allowing the Council to decide who to fund, and direct others to the range of other incentives available	Low carbon heating	Capital project	Domestic	1-Areas we directly control/guide	Medium	Medium	high	Medium	High	12
[DH6] Low interest loans potentially via county council. (lowest ranked by survey) (Bristol, n.d.) (Chityana, 2025)	DH6	Low Interest loans via the county, to residents. Bristol operate this through their partner Lendology. Note - research from Chityana, as well as CISL, suggests that low interest loans and other debt financing has historically low uptake rates and is not attractive to residents	Low carbon heating	Financial Incentive	Domestic	2-Areas we can enable through funding	Medium	Medium	Medium	Medium	Low	11
[DH6b] Accessing renewable energy company community benefit funds. (CISL, 2025, p7)	DH6b	Some renewable energy companies voluntarily create community benefit funds, which can include monetary and non-monetary contributions to the local community. Potential partnerships with these companies to direct some of those funds into retrofit or heating changes could be pursued by the Council	Low carbon heating	Financial Incentive	Domestic	2-Areas we can enable through funding	Low	Medium	Medium	Low	Low	9
[DH7b] Revolving fund for able-to-pay. (CISL, 2025, p7)	DH7b	Likely a council backed revolving fund, specifically for the able- to pay market. Allows any repayments from recipients to be invested back into the fund to fund future recipients	Low carbon heating	Financial Incentive	Domestic	2-Areas we can enable through funding	Medium	Medium	Medium	Medium	Low	11
[DH8] Energy savings-based loan repayment: reductions in heating costs are directed to loan repayment first, with the homeowner paying the base price until the loan is paid off (Chityana, 2025) (similar to ECO)	DH8	A scheme that would likely require delivery through energy retailers, such as the ECO4, but for all income levels. A resident felt this would be ideal, if essentially the cost to the consumer is nil - energy bills are fixed, and any savings from the retrofit or heat pump installation go towards paying down the capital cost	Low carbon heating	Financial Incentive	Domestic	2-Areas we can enable through funding	Low	Medium	Medium	High	Low	9
[DH19] Long term funding for building fabric improvement in social housing and low income households (CCC, 2025, p392)	DH19	Targeted financial assistance for low income households. Note there are owner occupiers who are low income, so assistance is needed for all tenure types (not just rented or social housing)	Low carbon heating	Financial Incentive	Domestic	2-Areas we can enable through funding	Medium	Medium	Medium	Medium	Medium	10
[DH17d] Neighbourhood-wide, council funded, house assessments (MM)	DH17d	Designed for interested residents but slow adopters. Use convening power of the Local Authority to encourage residents in similar / neighbouring homes to take a survey; and encourage the surveyor to reduce costs through volume, the chance of conversion into sales, and the efficiencies through studying the same archetype many times over.	Low carbon heating	Support & guidance	Domestic	2-Areas we can enable through funding	Low	Low	Medium	Low	Medium	9
[DH17e] Council funded, house assessments paired with boiler inspections (MM)	DH17e	Designed for laggards at risk of being locked-in to a boiler replacement when a boiler fails, since they haven't thought about alternatives. Local Authority works with energy majors (e.g. British Gas) to develop an add-on survey to assess property suitability for heat pump which can be rolled out alongside regular annual boiler service. Local Authority agrees to fund the first e.g. 500 surveys which British Gas up-sells to customers	Low carbon heating	Financial Incentive	Domestic	2-Areas we can enable through funding	Low	Low	Medium	Medium	Medium	10
[DH11] Integrating house valuations with energy efficient measures, (Chityana, 2025)	DH11	having estate agents include energy efficiency in their estimate of your home when selling.	Low carbon heating	Support & guidance	Domestic	4-Areas we can influence locally	Low	Low	high	High	Low	11
[DH15] ZEB heat battery (CAG, 2025, q48)	DH15	The concept that ASHP don't work in every instance - in particular where a heat pump and fan outside the building is inappropriate. In this case, larger 'heat batteries' with direct electric heating might be more appropriate	Low carbon heating	Support & guidance	Domestic	4-Areas we can influence locally						#N/A
[DH17b] Mechanism for customer complaints / customer protection. (Rosenow, 2022, p903)	DH17b	Example taken from Sweden, where in addition to information campaigns and high training for installers, they had mechanism for customer complaints to be raised and resolved. Gave consumer confidence in making the investment.	Low carbon heating	Support & guidance	Domestic	4-Areas we can influence locally	Low	Low	Medium	Medium	Low	11
[DH17c] Assess training needs of local contractors, and support during accreditation. (CISL, 2025, p8)	DH17c	Collaborative approach with local installers, assessing their gaps and training needs, providing funding for them to take on apprentices and upskill as necessary. Supporting local contractors specifically, to gain national accreditation. It was recognised that local supply chains are important, because for the domestic sector, the work is often too small for competent installers to travel long distances for work.	Low carbon heating	Support & guidance	Domestic	4-Areas we can influence locally	Low	Low	Medium	Medium	Medium	10
[DH20] Relaxing restrictions on permitted development, allowing easier rollout. (already underway via warms homes plan)	DH20	Warm homes plan already aims to ease restrictions and the 1m rule	Low carbon heating		Domestic	4-Areas we can influence locally	Low	Low	Medium	Low	Low	10
[DH16b] Create 'Tesla' Effect. Making heat pumps attractive to consumers (MM).	DH16B	Use the growth in the region and the scale of new housing development to make heat pumps aspirational by demonstrating (as Tesla did for EVs) the quality of comfort in a heat pump fed home	Low carbon heating	Procurement policy	Domestic	4-Areas we can influence locally	Low	Low	Medium	Medium	Low	11
[DH2] Regulations mandating only low carbon heating installations from 2035 onwards.	DH2	National Government putting into law that only low carbon heating installations will be permitted post 2035.	Low carbon heating	Planning policy (regulation)	Domestic	5-Areas we can influence or ask for nationally	Low	High	high	High	Low	11
[DH3] "Clean heat market mechanism" requiring suppliers of gas boilers to increase the number of heat pumps sold (Gov, 2025).	DH3	A government scheme, requiring the supply chain to increase the supply of ASHP, in hopes of bringing down costs and removing the barrier of long lead times and high costs.	Low carbon heating	Planning policy (regulation)	Domestic	5-Areas we can influence or ask for nationally	Low	Low	high	High	Low	11
[DH5] Increase Lobbying to DESNZ to rebalance energy costs. (NAO, 2024 p11) (CAG, 2025) (EHPA, 2025)	DH5	Lobby the government to rebalance energy costs, which DESNZ have delayed for 2 years. European Heat pump association (EHPA) shows that price ratio between gas and electricity is the primary driver to heat pump uptake in homes	Low carbon heating	Planning policy (regulation)	Domestic	5-Areas we can influence or ask for nationally	Low	High	high	High	Low	11
[DH7] Boiler upgrade scheme incentive of £7,500 grant. (NAO, 2024)	DH7	Advocate to central government to continue this scheme.	Low carbon heating	Financial Incentive	Domestic	5-Areas we can influence or ask for nationally	Low	High	high	Medium	Low	12
[BH7c] Lobby national government to expand the BUS to include units that can heat AND Cool (MM) (CAG, 2025)	DH7c	Specifically lobby government to expand the incentives to cover heat pumps that can heat and cool. While focus has been on warmer homes, in the stakeholder engagement, NHS represents highlighted that better cooling in summer months will have very high health consequences if not prioritised	Low carbon heating	Financial Incentive	Domestic	5-Areas we can influence or ask for nationally	Low	High	high	Medium	Low	12
[DH10] Investment in energy efficiency deducted from stamp duty payment (Chityana, 2025). (CIHL, 2025, p8)	DH10	Would require lobbying to national government, but various modifications have been proposed to stamp duty. 1 - deducting the fabric upgrade costs from stamp duty, or 2 - simply adjusting the stamp duty rate based on energy efficiency.	Low carbon heating	Financial Incentive	Domestic	5-Areas we can influence or ask for nationally	Low	Low	high	High	Low	11
[DH14] Lobby DESNZ to provide a more robust consumer engagement plan (NOA, 2024 p10)	DH14	View that central government needs to own an improved consumer engagement plan. Local Authority could lobby DESNZ to accomplish this.	Low carbon heating	Support & guidance	Domestic	5-Areas we can influence or ask for nationally	Low	Low	high	Low	Low	11
[DH17] Accreditation scheme and gov training programme, to ensure the consumer has confidence in those hired to do the work. (Chitchyna, 2025)	DH17	Likely a central government process, but one where suppliers can be accredited so that it is clear to homeowners / landlords, whether the installer is competent to undertake the works	Low carbon heating	Planning policy (regulation)	Domestic	5-Areas we can influence or ask for nationally	Low	Low	high	High	Low	11
[DH18] Warm Homes Plan (Energy UK (2023))	DH18	Funding available through the Government's Warm Homes: Social Housing Fund, and Warm Homes: Local Grant	Low carbon heating	Financial Incentive	Domestic	5-Areas we can influence or ask for nationally	Low	Medium	Medium	Low	Medium	8
[DH21] DESNZ to publish guidance on where exemptions will exist (NAO, 2024)	DH21	Lobby DESNZ to release exemptions on which homes may be exempt from the 2035 phase out of new fossil fuel burners. This will assist in giving confidence to citizens on whether they need to act	Low carbon heating		Domestic	5-Areas we can influence or ask for nationally	Low	Low	Medium	Medium	Low	11
[DH22] Tax incentives for private sector landlords (CISL, 2025, p8)	DH22	Reinstating some of the tax incentives that existed for private sector landlords to install energy efficiency or low carbon heating measures in rented tenures.	Low carbon heating		Domestic	5-Areas we can influence or ask for nationally	Low	Low	high	Medium	Medium	11

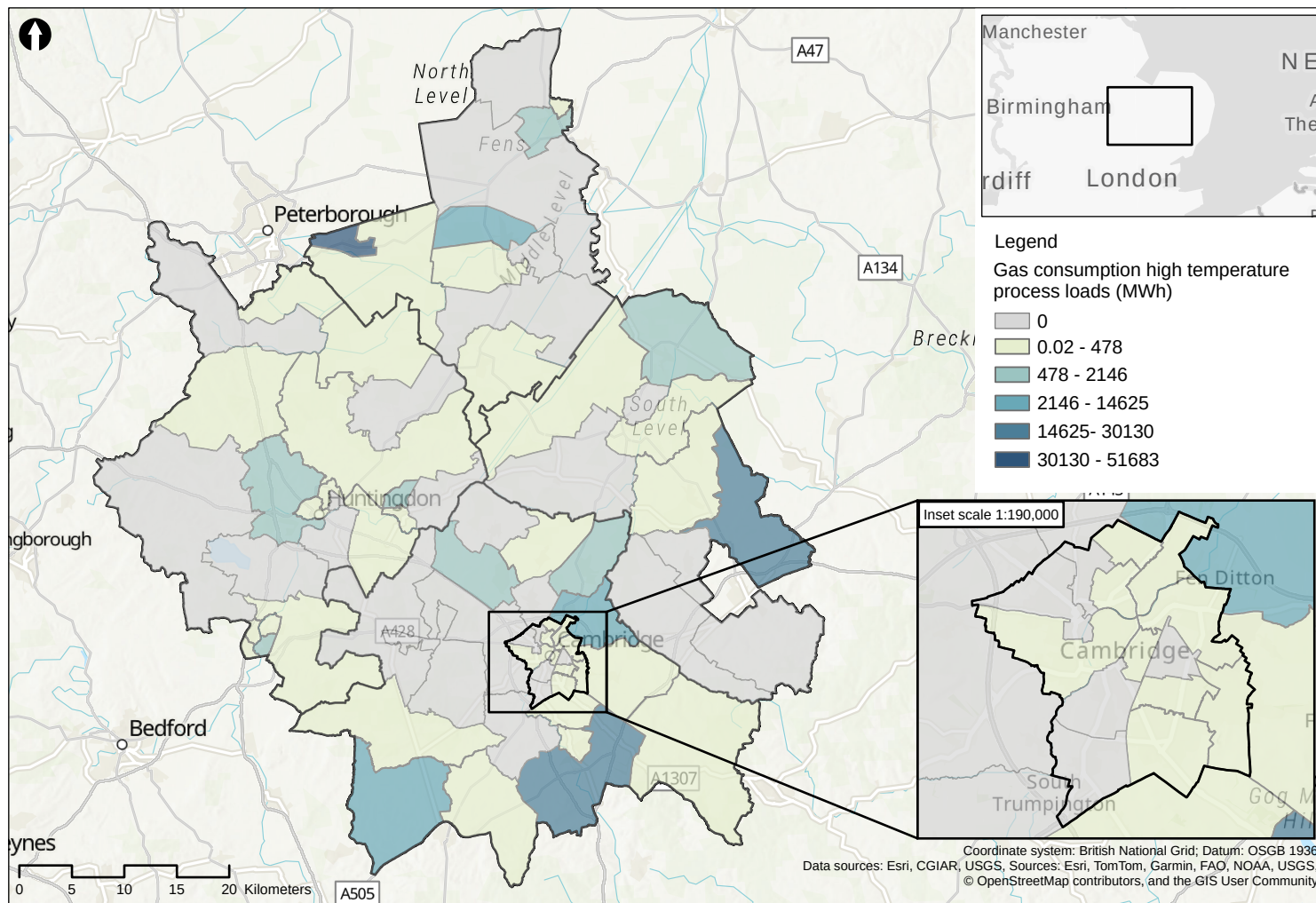
Project Definition						Criteria						
Project or programme (Bold Purple = Prioritised in Roadmap)	No	Description	Sector	Type of intervention	Market segment	Degree of LA influence	Cost to Council	Direct Carbon impact	Wider systemic impact	Difficulty to implement	Social Impact	Combined score
Business heat pump scheme	H13b	Council uses convening power (as councils have done with rooftop solar) to identify a competent contractor and negotiate prices, giving comfort to SMEs and businesses. The SME bears the cost (but may be able to recover from national grant).	Low carbon heating	Financial Incentive	Non-domestic	1-Areas we directly control/guide	Low	Low	Medium	Medium	Low	11
[H9b] Local Government-Business Park / industrial estate Landlord partnerships (MM)	H9b	Create a partnership with the landlords of business parks, research parks, industrial estates, etc. Many of the office buildings, and industrial businesses, likely fall into this category, and targeting the commercial landlord for open discussions on what is needed to transition whole estates	Low carbon heating	Support & guidance	Non-domestic	1-Areas we directly control/guide	Low	Low	Medium	Low	Low	10
[H19] Council to provide list of demonstration sites, or public sharing of performance from early adopters (MM)	H19	It is recognised that a barrier for non-domestic properties, is the unfamiliarity with the technology, and the lack of confidence in operational data and future performance. Council could provide a list of case studies, contacts and demonstration sites that already exist, so businesses can see the change they are about to make	Low carbon heating	Support & guidance	Non-domestic	1-Areas we directly control/guide	Low	Low	Medium	Low	Low	10
[H20] Innovation demonstrator for landlord providing heat as a service to all tenants (MM) (UKGBC, 2020)	H20	Fund a pilot, where a landlord either for a multi-storey office block has changed the heating system and provided the service of heat to their tenants instead of billing for energy.	Low carbon heating	innovation / Demonstrator	Non-domestic	1-Areas we directly control/guide	high	Medium	high	High	Low	10
[H14] Multi-year programme for decarbonisation of public sector buildings (CCC, 2025, p392)	H14	Capital programme of work from public sector specifically aimed at decarbonising public sector buildings - schools, community buildings, council buildings, etc.	Low carbon heating	Capital project	Non-domestic	1-Areas we directly control/guide	high	High	Medium	High	Medium	9
[H15] Direct funding of school retrofits and improved heating and cooling solutions (MM)	H15	Capital programme of work from public sector specifically aimed at decarbonising public sector buildings - schools	Low carbon heating	Capital project	Non-domestic	1-Areas we directly control/guide	Medium	Medium	Low	Medium	Medium	11
[H11] Utilise balance sheets of public institutions, to provide greater access to finance for businesses. (ABG, 2023, p24)	H1	"on providing greater access to finance, for example interventions include greater use of the balance sheet of existing public institutions such as Local Authorities and the British Business Bank. In Wales, Business Wales and Welsh Development Bank have linked favourable lending offers to businesses committing to implement measures to improve energy and resource efficiency." (ABG, 2023, p24)	Low carbon heating	Financial Incentive	Non-domestic	2-Areas we can enable through funding	Medium	Medium	Medium	High	Low	10
[H2] Fund building fabric improvements for businesses retrofitting a heat pump (MM)	H2	Businesses that commit to switching to a ASHP, have public funding (partial up to a cap) for building fabric retrofit as well.	Low carbon heating	Financial Incentive	Non-domestic	2-Areas we can enable through funding	Medium	Medium	Medium	Medium	Low	11
[H5] Possible feed-in-tariff for gas avoided. (MM)	H5	Public sector funded feed in tariff, whereby companies can apply for a feed in tariff paid for every MWh of gas avoided, for a certain duration (10 years)	Low carbon heating	Financial Incentive	Non-domestic	2-Areas we can enable through funding	Medium	High	Medium	Medium	Low	12
[H6] Local grant to subsidize sub-metering in multi-tenanted buildings. (MM)	H6	Grants made available to help sub-metering install sub-metering in commercial and industrial buildings with multiple tenants (note, eligibility needs to be pragmatic as if the heating solution is for building as a whole, sub-metering may not offer significant advantages)	Low carbon heating	Financial Incentive	Non-domestic	2-Areas we can enable through funding	Medium	Low	Low	Low	Low	12
[H7] Fund building fabric improvements for hard-H7 to-abate heritage buildings (MM)		Public sector funding - grant or loans - for heritage buildings which are likely to have costlier building fabric upgrades.	Low carbon heating	Financial Incentive	Non-domestic	2-Areas we can enable through funding	Medium	Medium	Low	Low	Low	11
[H7b] Joint academic and contractor funding for heritage non-domestic buildings (CISL / MM)	H7b	Similar to the domestic intervention, a partnership approach for heritage non domestic buildings. Utilising industry and academia to generate innovative solutions for this hard to abate proportion of the non-domestic property stock	Low carbon heating	innovation / Demonstrator	Non-domestic	2-Areas we can enable through funding	Low	Low	high	Low	Low	11
[H13] "low-cost public-backed loans and grants for SMEs". (ABG, 2023, p24)	H13	The same as solution [H1], but specifically targeted at small and medium enterprises, who are recognised as particularly disadvantaged when trying to transition to net zero	Low carbon heating	Financial Incentive	Non-domestic	2-Areas we can enable through funding	Medium	Medium	Medium	High	Medium	9
[H17] Scrappage schemes, to cover costs of replacing assets before end of life. (UKGBC, 2020, p3)	H17	Financial support to businesses who scrap a fossil fuel unit prior to its end of life	Low carbon heating	Financial Incentive	Non-domestic	2-Areas we can enable through funding	Low	Medium	Medium	Low	Low	9
[H22] Partial funding of assessments, or even low cost loans to large retail parks or business parks for heat system switching (MM)	H22	Consider providing low cost loans to landlords of large estates, to either conduct assessments / design of decarbonising their estate, or for the capital expenditure to at the point of purchase of equipment.	Low carbon heating	Financial Incentive	Non-domestic	2-Areas we can enable through funding	Low	Low	Medium	Low	Low	10
[H12] Local government regulation for phase out of gas heating (MM)	H12	A local law or planning policy, phasing out gas heating in either the rented sector, or in existing properties at the point of boiler replacement	Low carbon heating	Planning policy (regulation)	Non-domestic	3-Areas we can enable through policy	Low	Low	high	High	Low	11
[H4] Possibly pilot / engagement and partnerships with energy retailers to develop and test more attractive business tariffs (MM)	H4	Octopus "cozy" tariff being a prime example, the Council could act as a convener for a trial - possibly with a whole industrial estate or other, to trial new energy tariffs with energy retailers such as Octopus. This could be done in advance of the "rebalancing" of gas an electricity prices expected	Low carbon heating	innovation / Demonstrator	Non-domestic	4-Areas we can influence locally	Low	Low	high	Medium	Low	12
[H9] Local Government-Business partnerships to accelerate uptake of netzero technologies and align on delivery dates (ABG, 2023, p14)	H9	Example from Denmark where in 14 sectors the government set up net Climate Partnerships, which generated proposals for how each sector could help achieve the government's climate goals. These partnerships also generated key asks of the government to help overcome barriers.	Low carbon heating	Support & guidance	Non-domestic	4-Areas we can influence locally	Low	Low	high	Low	Low	11
[H11] Agency: businesses to remove barriers to suppliers, tenants, and franchisees. "gov't can help enable this" (CCC, 2025, p333)	H11	The CCC recognised that certain companies have limited capacity than others. SMEs, franchisees, and tenants, don't have the agency and autonomy to implement the changes they want. Government, through policies and regulations, or working with landlords, can help enable this. (this is a catch all that is covered by the more granular solutions presented	Low carbon heating	Planning policy (regulation)	Non-domestic	4-Areas we can influence locally						#N/A
[H18] Widespread training programme for assessors, installers and O&M services. (UKGBC, 2020, p3)	H18	Retraining existing gas engineers, training new installers. Could upskill furloughed or newly unemployed workers. (UKGBC, 2020). Generally recognised that there are not enough competent installers or assessors for the non-domestic building stock	Low carbon heating	Support & guidance	Non-domestic	4-Areas we can influence locally	Low	Low	Medium	Medium	High	11
[H21] Mandatory operational ratings for non-domestic sector (UKGBC, 2020, p5)	H21	Introduce a local bylaw which requires this on non-domestic buildings. A rating system like this would mean that better performing buildings, will fetch higher rents from tenants and therefore incentivise landlords to invest. In parallel tenants will be able to know this before leasing a space, and will therefore increase demand for these spaces. Example cited is the NABERS scheme in Australia.	Low carbon heating	Planning policy (regulation)	Non-domestic	4-Areas we can influence locally	Low	Low	high	Medium	Low	12
[H3] DESNZ have delayed rebalancing costs for 2 years. Increase Lobbying to national government (NAO, 2024 p11) (CAG, 2025)	H3	This is a national government issue to resolve, primarily sitting with DESNZ and Ofgem. Local government could lobby and increase pressure via NESO and DESNZ, as this is a primary barrier affecting both domestic and non-domestic sectors	Low carbon heating	Planning policy (regulation)	Non-domestic	5-Areas we can influence or ask for nationally	Low	Low	high	Low	Low	11
[H8] Lobby central government to publish MEES guidance for non-domestic sector (MM)	H8	Currently the government has conducted a consultation on proposals to raise the MEES for non-domestic rented tenure from EPC E to EPC B. No response has been given, nor an update to the standard. Lobbying central government for this could help incentivise landlords of non-domestic properties.	Low carbon heating	Planning policy (regulation)	Non-domestic	5-Areas we can influence or ask for nationally	Low	Low	high	Low	Low	11
[H10] Product phase out dates & supply chain routemaps. (ABG, 2023, p23)	H10	Clear product phase out dates paired with value chain route maps, can be developed by the government and industry together. This would give businesses a clear roadmap allowing them to business plan and manage investments. This worked for the automotive sector with the Automotive council taking the lead on the transition to EVs.	Low carbon heating	Support & guidance	Non-domestic	5-Areas we can influence or ask for nationally	Low	Low	high	Medium	Low	12
[H16] Reduced rate of VAT on low carbon heating technologies. (UKGBC, 2020, p3)	H16	reducing VAT on LCT to help bring down up front costs	Low carbon heating	Financial Incentive	Non-domestic	5-Areas we can influence or ask for nationally	Low	Low	high	Medium	Low	12

E. Industrial Decarbonisation

Please refer to the spreadsheet titled 'CCC Modelling - Building Energy Efficiency and Heat v2 - process load correction included'.

E.1 Process Loads Maps





E.2 Process Loads Table

E. Industrial Decarbonisation

Cambridgeshire SIC codes and low temperature vs high temperature assignment

sic_code	use type	Process temperature estimation	count
0100	Agriculture	Low Temperature	18
1610	Electricity supply	Low Temperature	1
1620	Gas supply	Low Temperature	1
1700	Water supply	Low Temperature	2
2234	steel wire manufacturing	High temperature	1
2235	Other drawing, cold rolling and cold forming of steel	Low Temperature	5
2410	Structural clay products	High temperature	2
2420	Cement, lime and plaster	High temperature	1
2437	Other building products of concrete, cement or plaster	High temperature	1
2440	Asbestos goods	Low Temperature	1
2471	Flat glass	High temperature	1
2478	Glass containers	High temperature	1
2479	Glassware products	High temperature	5
2489	Ceramics	High temperature	3
2512	Basic organic chemicals except specialised pharmaceutical chemicals	High temperature	1
2513	Fertilisers	High temperature	2
2514	Synthetic resins and plastics materials	High temperature	1
2551	Paints, varnishes and painters' fillings	Low Temperature	3
2567	Miscellaneous chemical products for industrial use	High temperature	20
2568	Formulated pesticides	Low Temperature	1
2569	Adhesive film, cloth and foil	High temperature	2
2570	Pharmaceutical products	High temperature	3
2582	Perfumes, cosmetics and toilet preparations	Low Temperature	1
2600	Production of manmade fibres	High temperature	4
3111	Ferrous metal foundries	High temperature	3
3112	Non-ferrous metal foundries	High temperature	2
3137	Small metal products manufacturing	High temperature	2
3142	Metal doors, windows, etc	High temperature	1
3161	Hand tools manufacturing	High temperature	3
3169	Miscellaneous finished metal products, not elsewhere specified	High temperature	1
3204	Fabricated constructional steelwork for buildings	High temperature	4
3205	Boilers and boilerhouse plant	High temperature	2
3211	Dairy, feed processing and other agricultural machinery	High temperature	1

3221	Metal cutting machine tools	High temperature	27
3222	Hard tipped and other metal cutting tools	High temperature	5
3230	Textile machinery	Low Temperature	1
3244	Food and drink processing machinery	Low Temperature	2
3245	Furnaces and kilns	High temperature	1
3246	Process engineering contractors	High temperature	4
3255	Lifts, escalators, cranes, transporters manufacturing	High temperature	4
3262	Ball, needle and roller bearings	High temperature	1
3275	leatherworking, plastics, footwear manufacturing	Low Temperature	2
3281	Industrial internal combustion engines	High temperature	1
3283	Oil hydraulic equipment	High temperature	1
3284	HVAC equipment manufacturing	High temperature	3
3286	Machinery for foundries and rolling mills	High temperature	1
3290	Ammunition	High temperature	1
3301	Office machinery	Low Temperature	1
3302	Electronic data processing equipment	Low Temperature	6
3410	Insulated wires and cables	High temperature	3
3420	Machinery for generating and transmitting electric power	High temperature	2
3433	Alarms and signalling equipment	Low Temperature	1
3435	Electrical equipment for industrial use, not elsewhere specified	Low Temperature	3
3441	Telegraph and telephone apparatus and equipment	Low Temperature	2
3442	Electrical instruments and control systems	Low Temperature	5
3443	Radio and electronic capital goods	Low Temperature	3
3444	Components other than active components, mainly for electronic equipment	Low Temperature	4
3454	Electronic consumer goods	Low Temperature	10
3460	Domestic-type electric appliances	Low Temperature	2
3470	Electric lamp bulbs and tubes	Low Temperature	2
3510	Motor vehicle engines	High temperature	11
3521	Motor vehicle bodies	High temperature	1
3522	Trailers and semi-trailers	High temperature	1
3530	Motor vehicle parts	High temperature	4
3610	Shipbreaking	High temperature	3
3640	Aerospace equipment manufacturing and repairing	High temperature	2
3650	Baby carriages and wheelchairs	Low Temperature	2
3710	Measuring, checking and precision instruments and apparatus	Low Temperature	25
3720	Medical, surgical and veterinary equipment	Low Temperature	1
3732	Optical precision instruments	Low Temperature	5
4122	Other processed and preserved meats	Low Temperature	1

4123	Poultry meat products	Low Temperature	4
4147	Canning, bottling, drying etc of fruit and vegetables	Low Temperature	2
4180	Starch	High temperature	1
4196	Bread and flour confectionery	High temperature	2
4222	Non-compound animal feeds and feed supplements	Low Temperature	3
4239	All other foods not elsewhere specified	Low Temperature	15
4270	Beer and other brewing products	Low Temperature	2
4322	Weaving of cotton, silk and manmade fibres	Low Temperature	1
4384	Woven carpets and rugs	Low Temperature	1
4399	Other miscellaneous textiles not elsewhere specified	Low Temperature	3
4410	Tanning and dressing of leather	Low Temperature	1
4534	Work clothing and men's and boys' jeans	Low Temperature	3
4555	Soft furnishings	Low Temperature	1
4556	Canvas goods, sacks and other made-up textiles	Low Temperature	1
4620	Preservation and treatment of wood	Low Temperature	1
4630	Builders' carpentry and joinery	Low Temperature	6
4650	Other wooden articles (except furniture)	Low Temperature	2
4663	Brushes and brooms	Low Temperature	1
4671	Wooden cabinet work and components for furniture	Low Temperature	2
4672	Shop and office fitting	Low Temperature	5
4722	Household and personal hygiene products of paper	Low Temperature	1
4723	Notepaper	High temperature	3
4724	Other packaging products of paper and pulp	High temperature	6
4725	Rigid boxes and cartons	High temperature	3
4728	Other paper and board products	High temperature	16
4751	Printers of newspapers	Low Temperature	2
4752	Printer-publishers of periodicals	Low Temperature	3
4753	Printer-publishers of books	Low Temperature	1
4754	Other publishers	Low Temperature	9
4811	Rubber tyres and inner tubes	High temperature	2
4812	Rubber products not elsewhere specified including reclaimed rubber	High temperature	3
4832	Plastics semi-manufactures	High temperature	1
4835	Plastics packaging products	High temperature	1
4836	Plastic products not elsewhere specified	High temperature	3
4930	Photographic and cinematographic processing	Low Temperature	2
4942	Sports goods	Low Temperature	6
4954	Stationers' goods not elsewhere specified	Low Temperature	1
4959	Other manufactures not elsewhere specified	Low Temperature	70

5000	General construction and demolition work	High temperature	34
5010	Construction and repair of buildings	Low Temperature	41
5020	Civil engineering	Low Temperature	12
5030	Installation of fixtures and fittings	Low Temperature	7
5040	Building completion work	Low Temperature	4
INDUSTRIAL	Unassigned industrial	Low Temperature	1
NON- DOMESTIC	Unassigned non domestic	Low Temperature	59

F. Transportation

F.1 Methodology & assumptions

Our analysis started by modelling changes in the fuel make-up of vehicles across the five local authorities over time based on UK Power Networks’ Distribution Future Energy Scenarios (DFES). Our analysis focuses on the following vehicle types: cars, vans, buses + coaches, heavy goods vehicles (HGVs), and motorcycles. We also considered five fuel types: battery electric (BEV), plug-in hybrid (PHEV), petrol, diesel, and other. We only have data on PHEV cars and vans—other vehicle types are assumed to have no PHEVs. References to ‘EVs’ include all BEVs—and PHEVs when present.

We used UK Government’s vehicle licensing dataset from 2023 as a baseline for our projections. This dataset provided (by individual vehicle type) the (a) total number of vehicles, (b) total number of petrol vehicles, (c) total number of diesel vehicles. We used the 2023 total number of vehicles and population growth projections to project the growth in total number of vehicles through to 2045. The DFES dataset provided pre-calculated projections for BEV and PHEV vehicle numbers up to 2045. Where the DFES projections appeared to exceed population growth forecasts, we capped the DFES projections. Finally, the number of petrol, diesel, and other vehicles were calculated as a fixed percentage of Total Vehicles less BEV + PHEV vehicles, using 2023 figures as a baseline.

In order to calculate **projected carbon emissions** (tCO₂e) through 2045, we first estimated the total annual kilometres driven per vehicle and fuel type. A number for annual average mileage was used for each vehicle type. The number, acquired from UK Government, is assumed to stay constant over time (i.e. in our model, residents will not change how much they drive nor switch to non-fuel modes of transport such as biking).

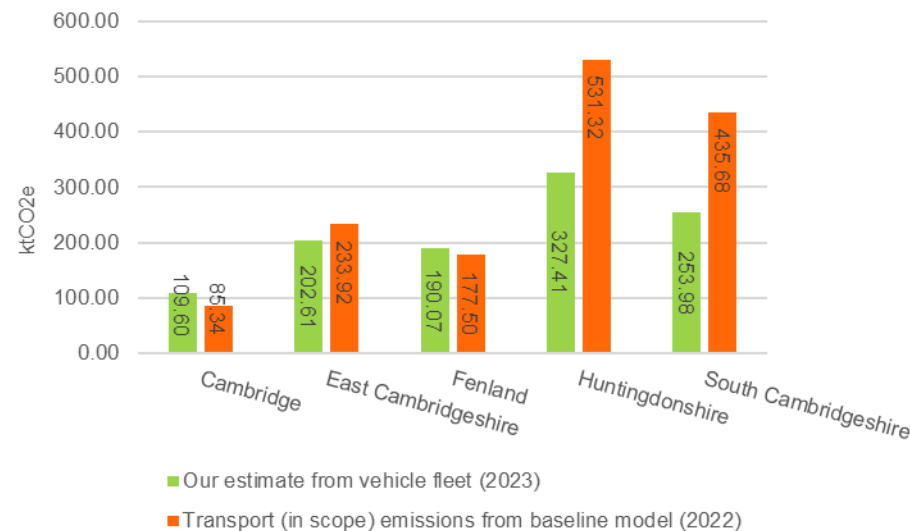
We obtained carbon factors (in kgCO₂e/km) from DESNZ. The data, however, was limited. For example, we had carbon factors for diesel HGVs, but not petrol or BEV HGVs. In such cases, we compared the factor for a vehicle type with incomplete data to the factor for a vehicle type with a full set of data to create a conversion factor. The conversion factor was multiplied against the full set of data to obtain estimated carbon factors for the vehicle type (see table below for method). The carbon factor for ‘Others’ fuel types was taken as an average of Diesel, Petrol, and EV factors.

Table F.1: Transport Emission Factors

Fuel Type	HGV carbon factor (kgCO ₂ e/km)	Van carbon factor (kgCO ₂ e/km)	Van to HGV Conversion Factor	Estimated HGV carbon factor (kgCO ₂ e/km)	Final carbon factor utilised in modelling (kgCO ₂ e/km)
Diesel	0.87	0.25	3.44		0.87
Petrol		0.31		1.08	1.08
BEV		0.08		0.28	0.28

We multiplied total annual kilometres driven by a carbon factor for each vehicle and fuel type to obtain ‘Total Calculated Carbon Emissions’. As a check, we compared our calculated tCO₂e volumes to DESNZ-reported tCO₂e volumes for transport (in-scope) (Figure F.1)

Figure F.1: Attempt to re-create the carbon baseline



Source: Mott MacDonald analysis and [DESNZ carbon emissions data](#)

There was reasonable agreement for Cambridge City, East Cambridgeshire and Fenland. We have satisfied ourselves that:

- The discrepancy in Huntingdonshire and South Cambridgeshire directly correlates to the greater quantity of emissions associated with A-roads;
- There is not a matching “outlier” increase in emissions on minor roads in these regions;
- As such - the discrepancy appears to be associated with through traffic.

As through traffic, the emissions from this activity will need to be addressed through infrastructure either at the start/end of the journey (which we assume is outside the LAEP study region), such as fleet charging infrastructure, or through 'opportunity' charging/fuelling aligned with the A-road/motorway network.

We used the projected number of EV vehicles alongside data from the Department for Transport and data published by UKPN in the LAEP+ tool to project the increase in public chargers needed to meet EV uptake as well as the impact that increased charging will have on electricity demand. We reviewed the advice provided by the Energy Saving Trust to local authorities applying to the Local Electric Vehicle Infrastructure (LEVI) fund and used a figure of 1 charge post to 10 vehicles¹⁰⁴.

We calculated the number of on-street publicly available chargers that may be required for households that don't have the capacity to install a private, residential EV charger—for example, those living in terraced houses and apartment buildings who don't have off-street parking.

To estimate the number of on-street chargers that will need to be installed in each LSOA, we multiplied the percentage of dwellings with on-street parking (taken as 1 minus the percentage of dwellings with off-street parking, data acquired from LAEP+) by the number of households that own at least one vehicle to estimate the number of vehicle-driving households that currently park on-street. This also estimates the number of vehicles that park on-street and that will eventually need access to an EV charger in order to facilitate the electrification of transport. We assumed a target of 10 EVs per 1 EV charger (provided by the Energy Saving Trust) to estimate the number of publicly accessible on-street chargers that each LSOA will need.

¹⁰⁴ [Forecasting public electric vehicle charging demand: A guide for local authorities in England prepared by the Local Government Support Programme, September 2022](#)

Data on percentage of dwellings with off-street parking from LAEP+ is missing for 20 LSOAs which have been excluded from the on-street EV charger estimation (projected to need 0 EV chargers as a result of the missing data).

Determining the impact on the electricity grid requires determining the utilisation rate of each EV charger. We worked with a time-based utilisation rate (the number of hours per day a charger is plugged into a vehicle). The 2023 public EV charger rate is 14%, assumed to grow proportionally year-on-year to reach 30% by 2030 for all scenarios except the counterfactual. In the counterfactual scenario, the rate remains fixed at 14% until 2045. This projection is based on Recharge UK's 'Charging Forward to 2030' report.

We calculated the total energy consumption from EV chargers in kWh per year. To determine the average power of public chargers under 50kW, we used a weighted sum from LAEP+ data (and used the same process for public chargers over 50kW). Multiplying the number of EV chargers by the charger power (kW), AC/DC charging conversion factor (taken from previous project experience), the utilisation rate, and the hours in a year we projected the total annual energy consumption from EV charging to 2045. This projection was split amongst the three aforementioned categories.

In sum, for each local authority and each scenario we have projected to 2045:

- a. Total number of vehicles by fuel type
- b. Total kilometres (km) driven by vehicle and fuel type
- c. Total emissions (tCO₂e) by vehicle and fuel type
- d. Total number of publicly shared and accessible EV chargers
- e. Total energy consumption (kWh) of publicly shared and accessible EV chargers

To calculate each, we have also used intermediate calculations such as total number of EV cars and vans and EV charger utilisation rates, which are included as tables in the spreadsheet.

F.2 Needs for publicly available on-street chargers

This section highlights residential areas with limited off-street parking, which may act as a barrier to electric vehicle uptake unless access to public on-street chargers is available.

A table of the twenty LSOAs we estimate have the largest need for on-street chargers is provided below:

Table F.2: Example LSOAs appearing to need public on-street chargers

LSOA21CD	LSOA21NM	LSOA Local Name	Est. chargers required
E01017943	Cambridge 006A	Newmarket Road Retail Area	34
E01033121	South Cambridgeshire 006H	Orchard Park	28
E01018063	Fenland 002A	Wisbech Park	27
E01018000	Cambridge 009D	Mill Road Bridge to Brookfields Hospital	26
E01017983	Cambridge 007C	Midsummer Common to Grafton Centre	26
E01018168	Huntingdonshire 013C	St Ives Town Centre and Park and Ride	26
E01018187	Huntingdonshire 019A	St Neots Market Square	24
E01018138	Huntingdonshire 012A	Riverside Road	23
E01017989	Cambridge 008C	St Mathew's Piece	23
E01017988	Cambridge 008B	Parkside to Tenison Road	21
E01017998	Cambridge 009B	Sedgewick Street	19
E01017985	Cambridge 007E	Lammas Land	18
E01017950	Cambridge 002B	Alexandra Gardens	18
E01033112	Fenland 003I	Wisbech Town Centre	16
E01018087	Fenland 009C	West End Park	16

LSOA21CD	LSOA21NM	LSOA Local Name	Est. chargers required
E01018158	Huntingdonshire 003C	Ramsey Town Centre	16
E01018025	East Cambridgeshire 004B	Ely City Centre	16
E01017987	Cambridge 008A	Tenison Road to Mill Road Bridge	16
E01018008	Cambridge 004C	Chestnut Grove Recreation Ground	16
E01018052	East Cambridgeshire 006F	Soham High Street	16

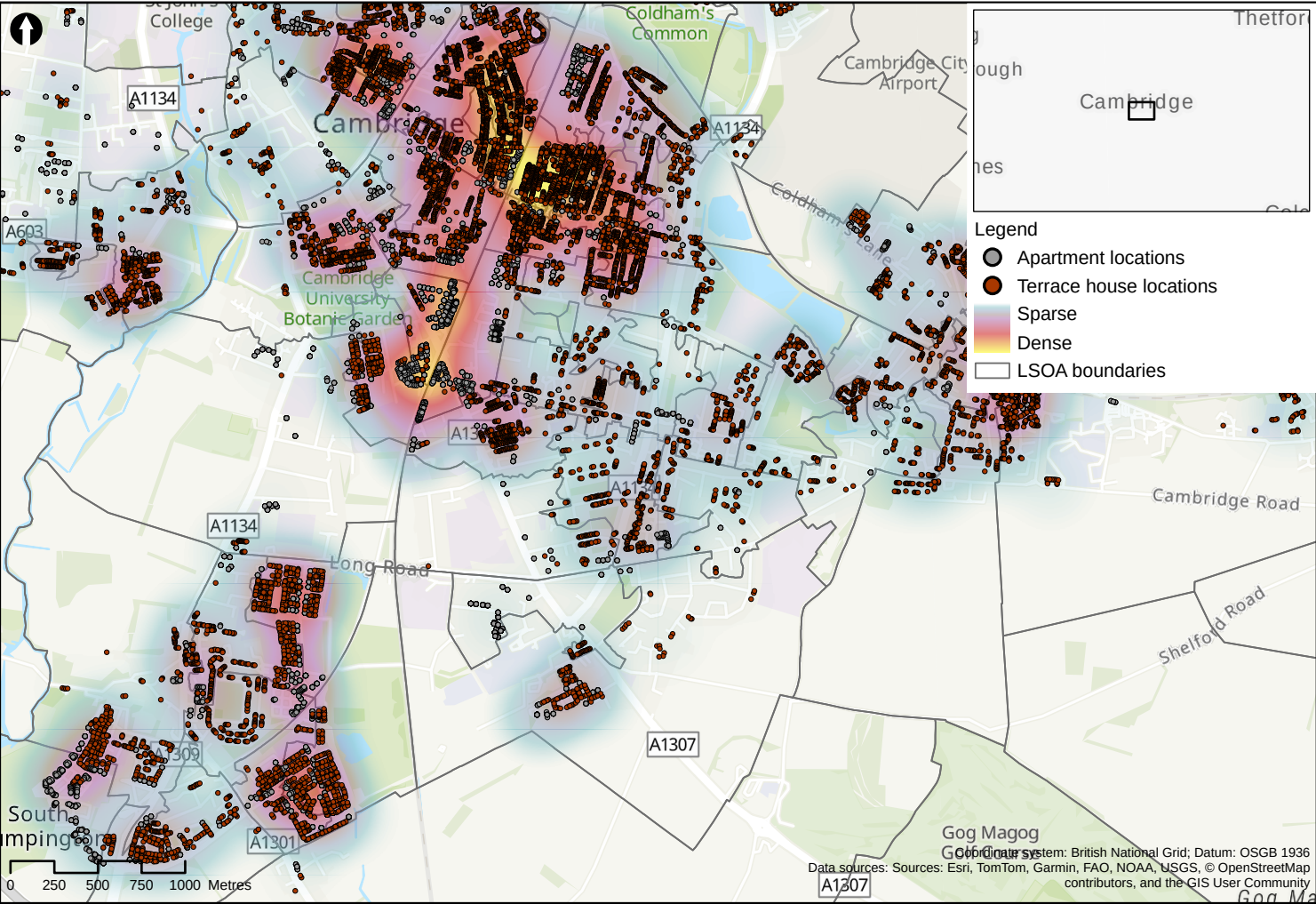
Source: Mott MacDonald analysis based upon data on percentage of dwellings with off-street parking provided by Cambridgeshire County Council in the YLNZH tool

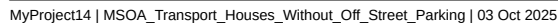
The following examples of dwellings without off-street parking were found using example post codes within each LSOA provided by the site <https://findthatpostcode.uk/>. These are supported by wider heat maps of the surrounding area provided below.

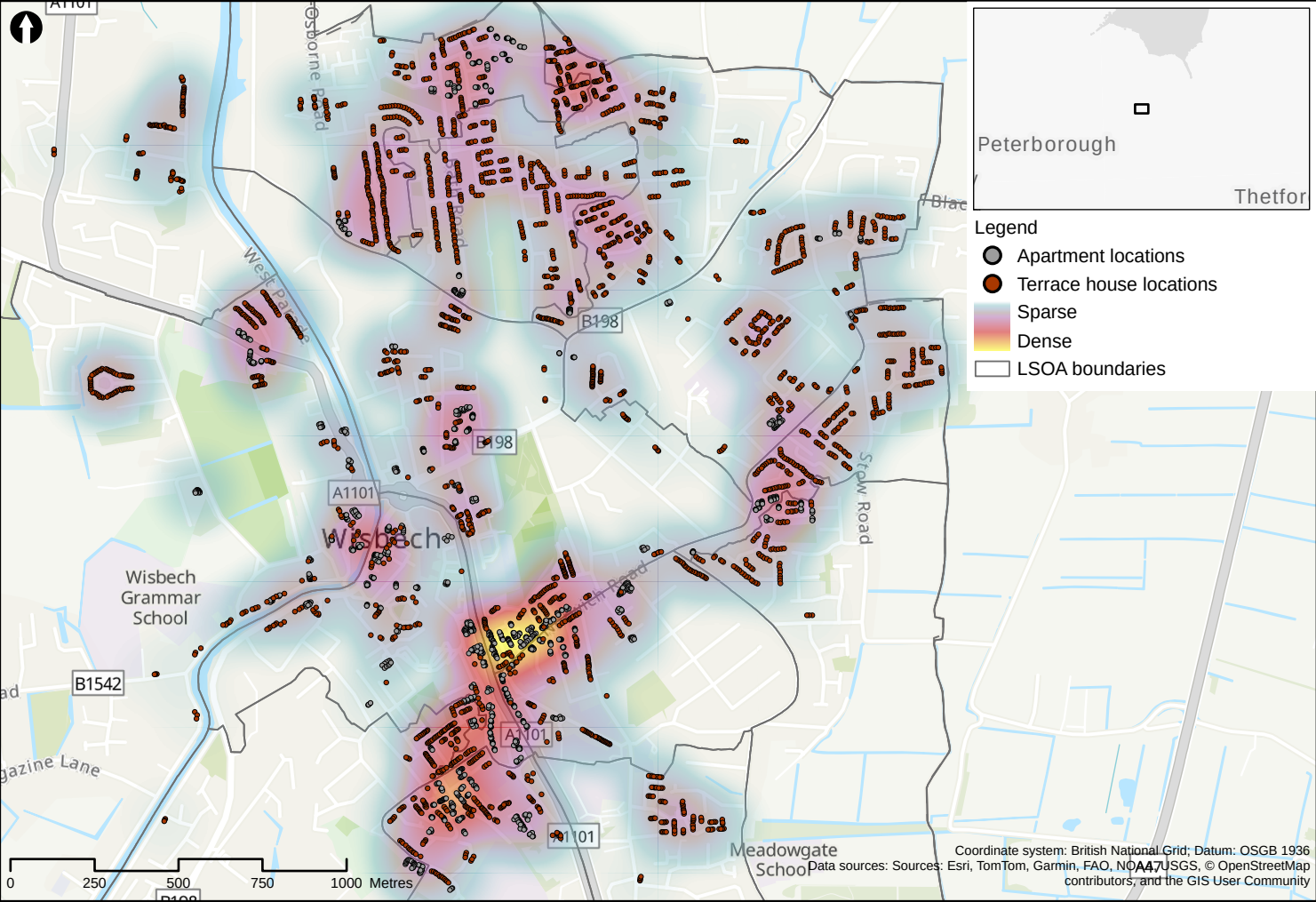
Figure F.2: John Street, CB1 1DU, Cambridge City LSOA E01017983 (Map1) (Top)
Chedworth Street, Cambridge City LSOA E01017985, Map 1 (Bottom)



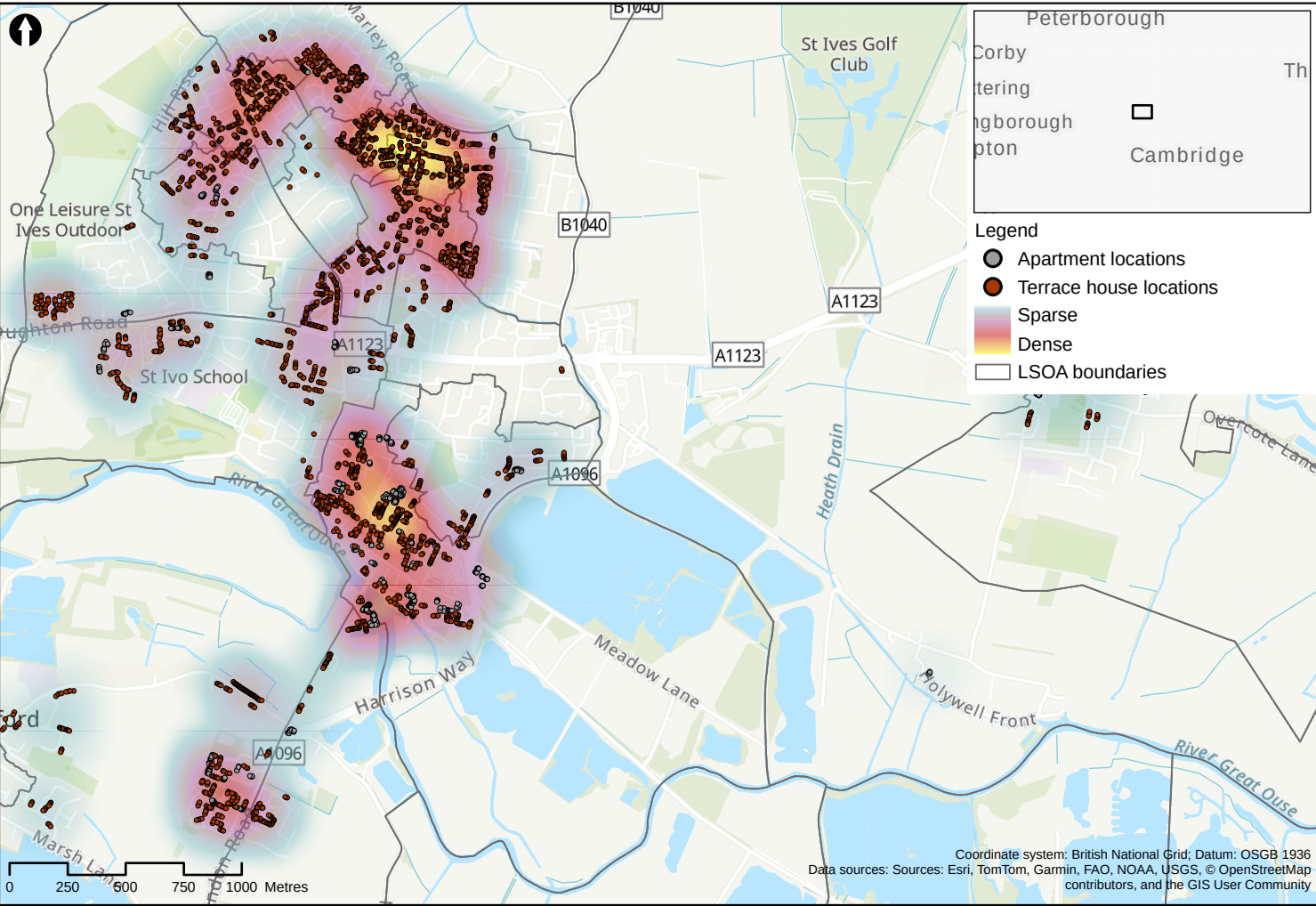
Source: Photo Credit, Nick Jimenez

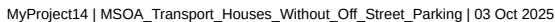


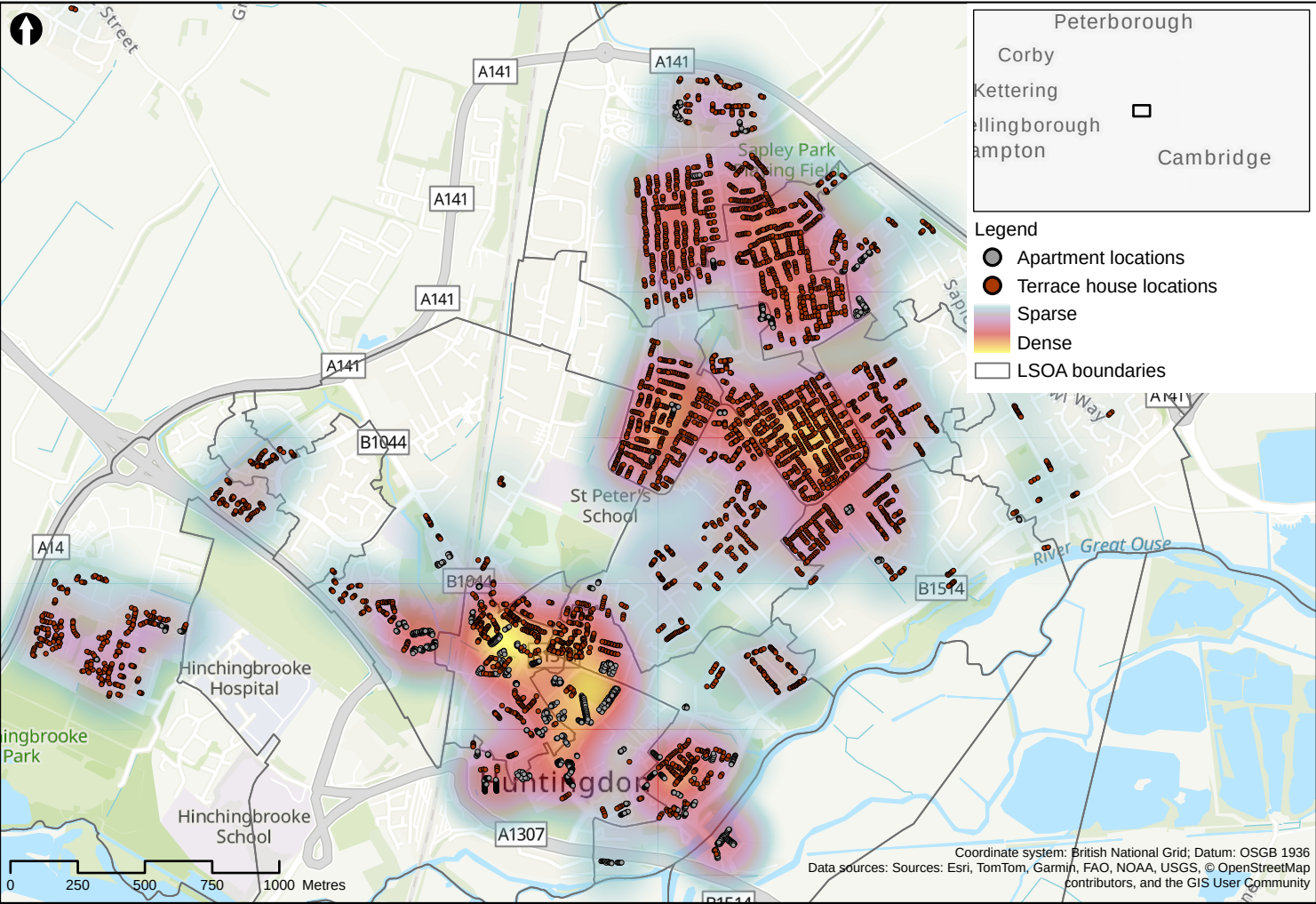


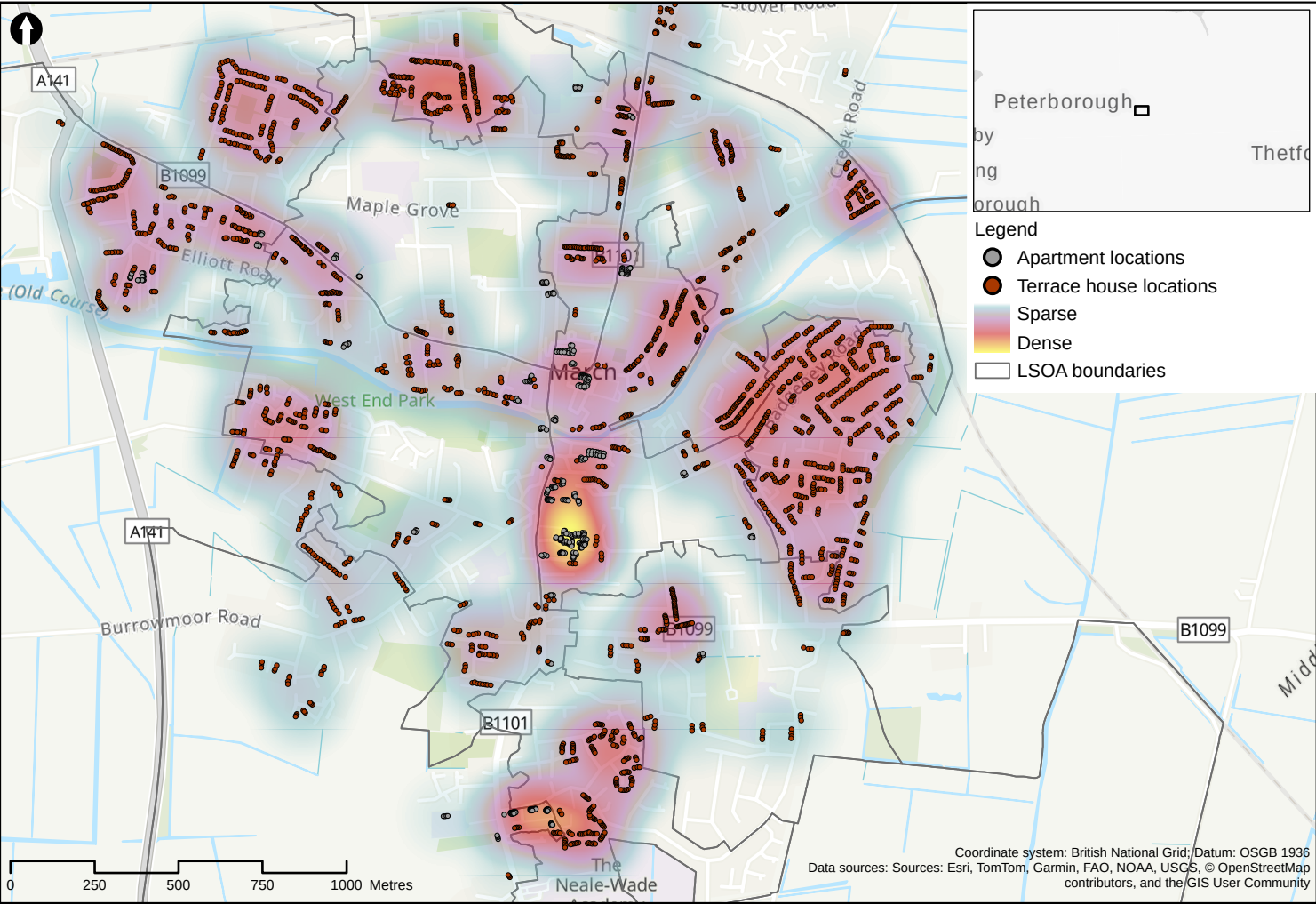


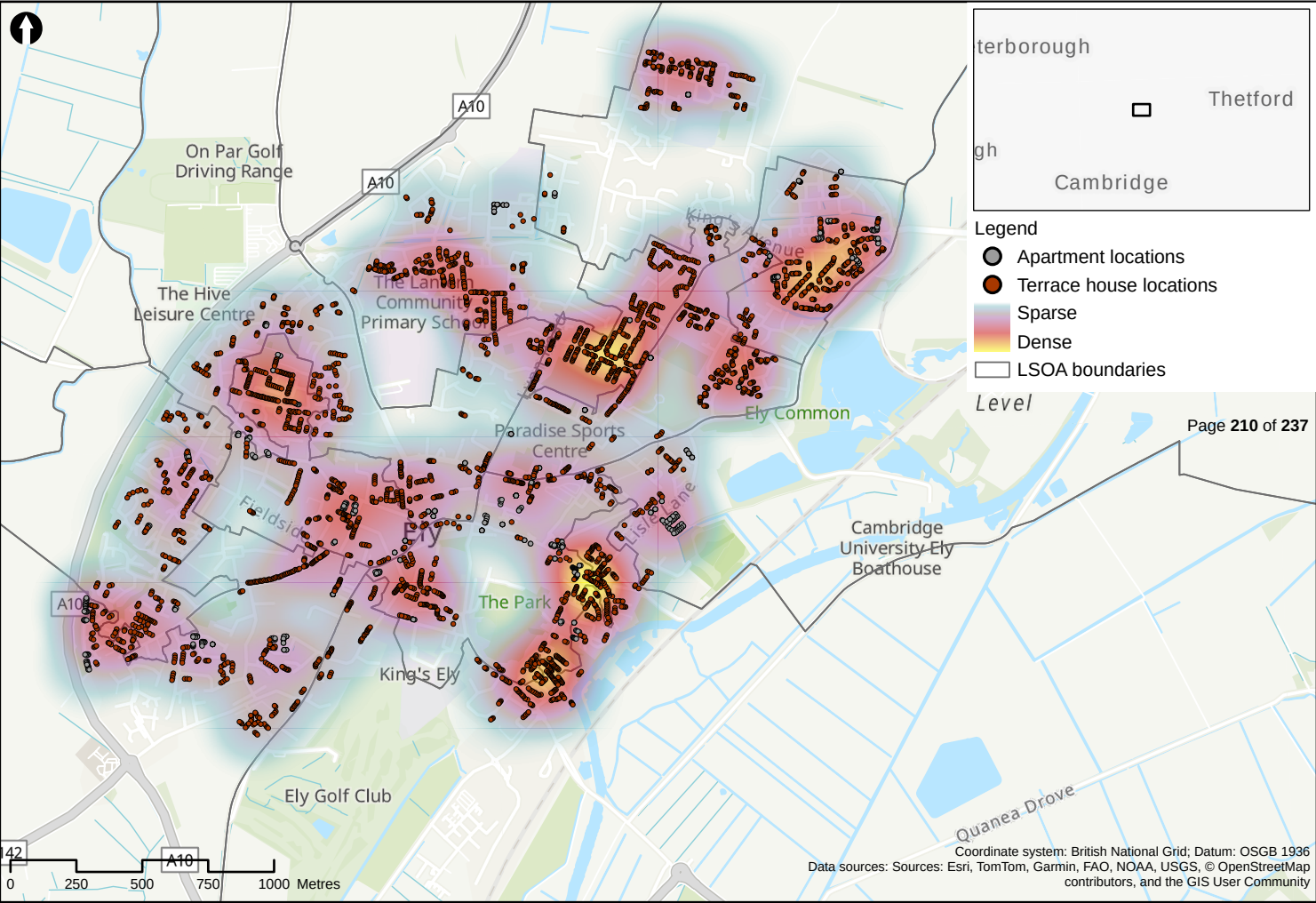
Map 4: St Ives

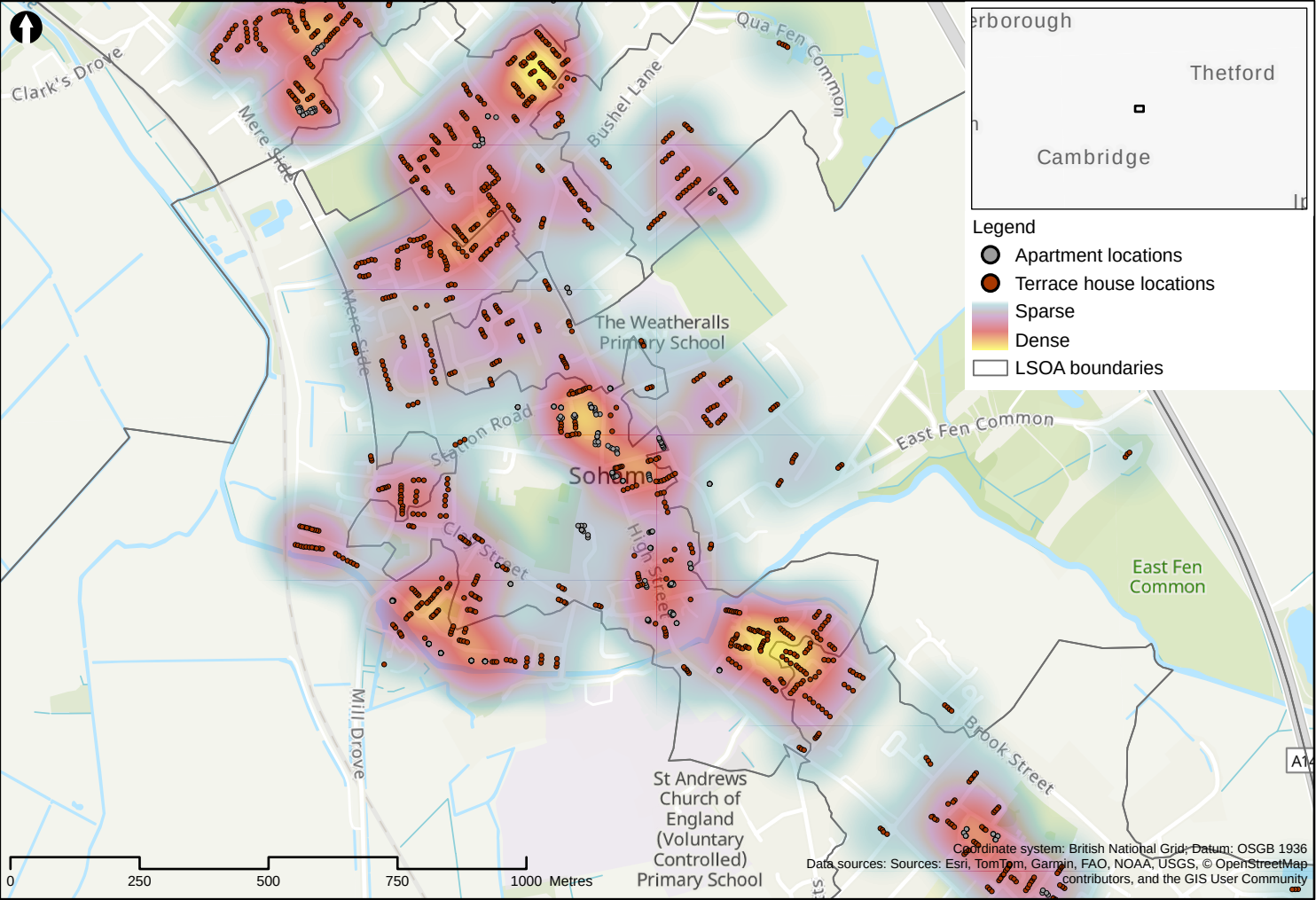


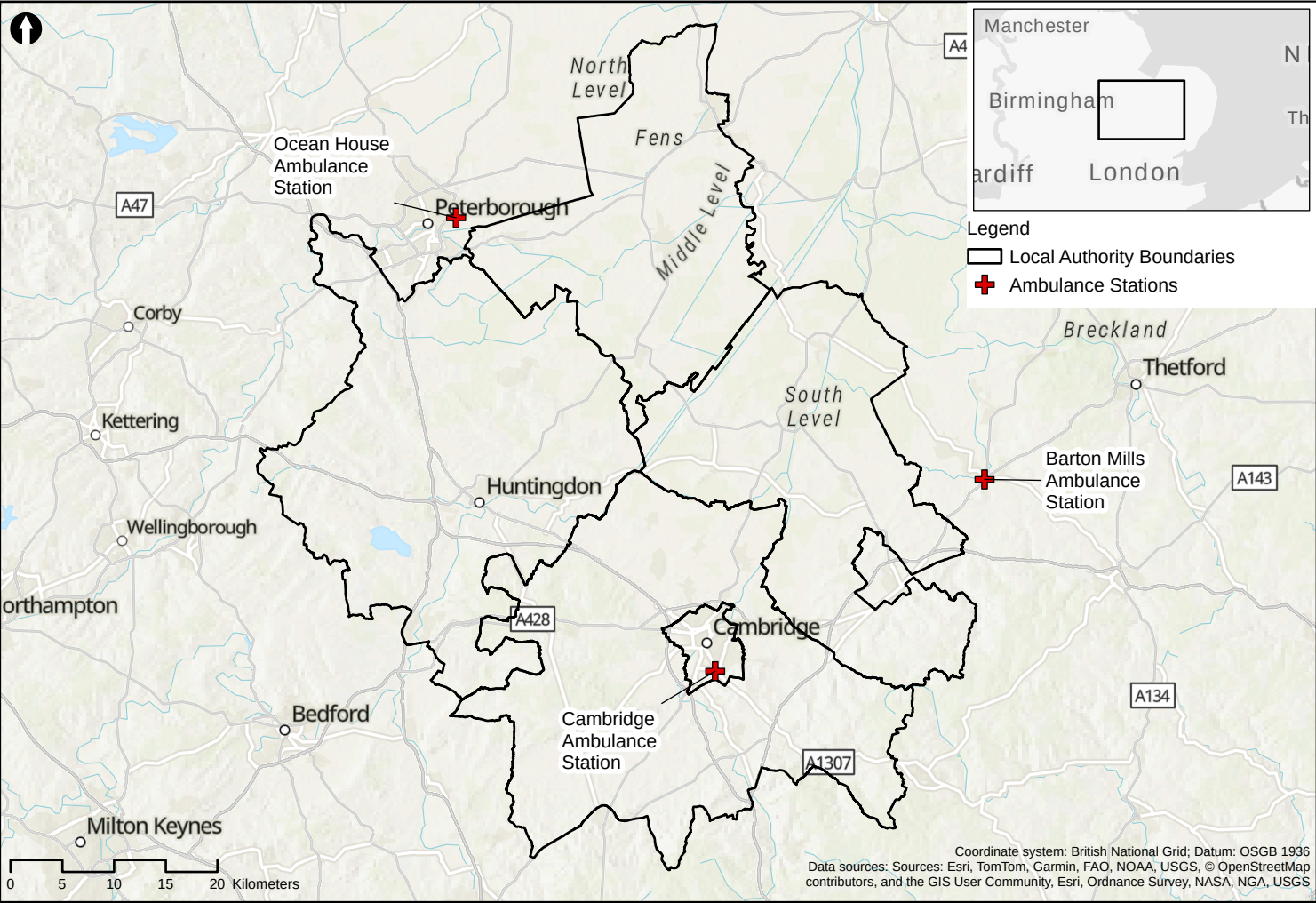


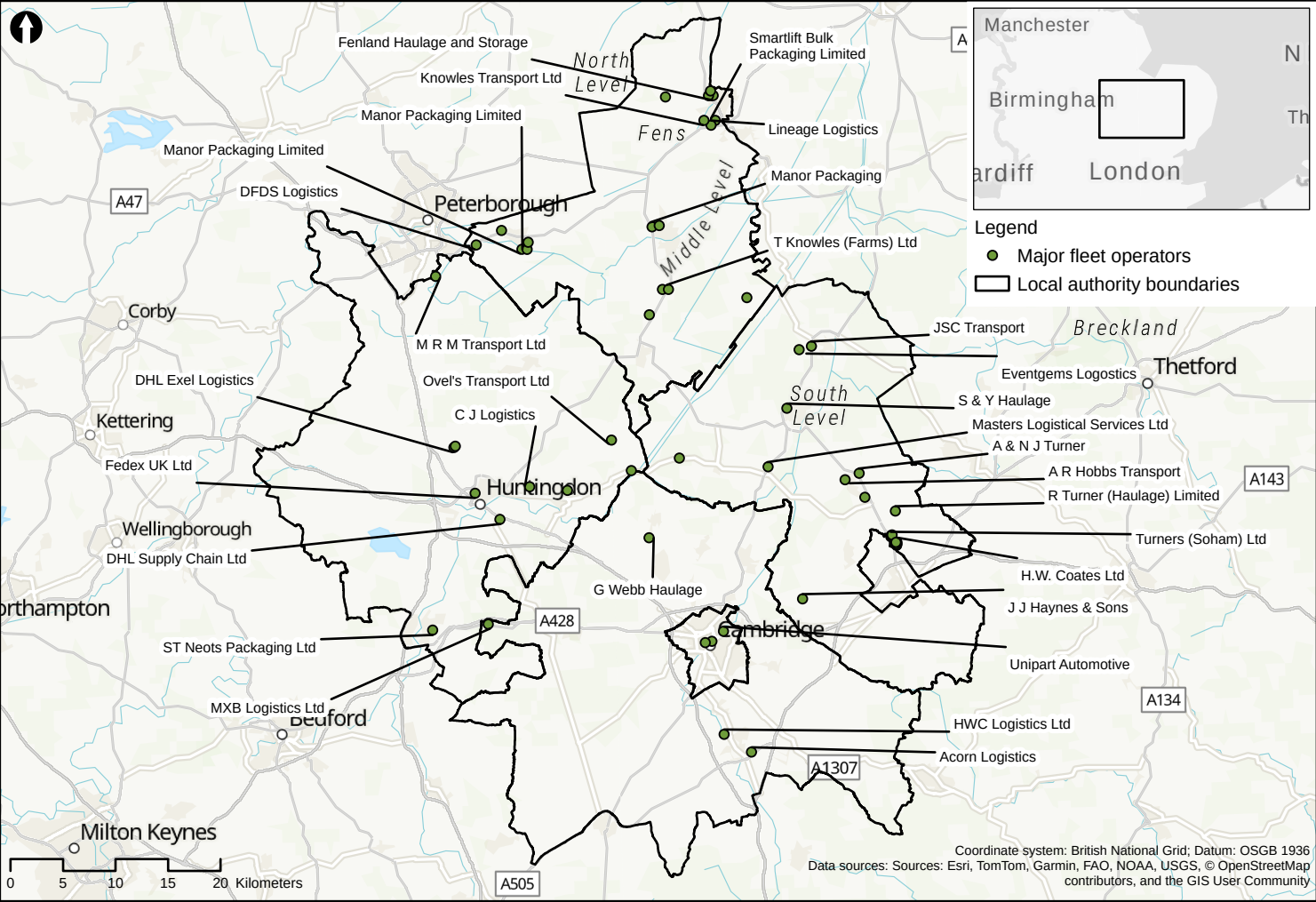












F.3 Project Table

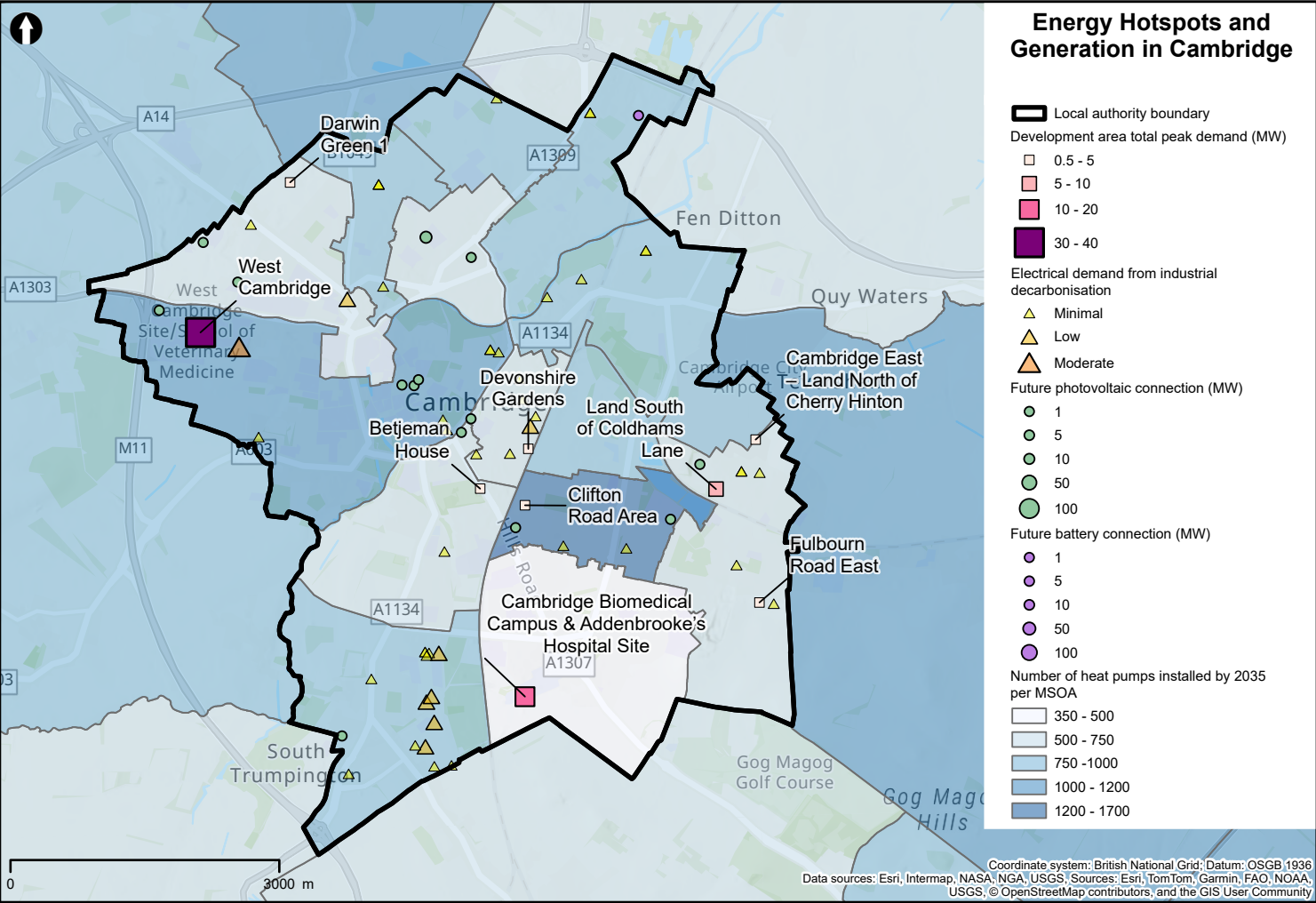
Project Definition Project or programme (Bold Purple = Prioritised in Roadmap)	No	Description	Sector	Type of intervention	Market segment	Criteria Degree of LA influence	Cost to Council	Direct Carbon impact	Wider systemic impact	Difficulty to implement	Social Impact	Combined score
Mandate ZEVs for all Council contracts	FL17	Encourage Council suppliers to reach ZEV ahead of the mandate. This would mandate that any suppliers or contractors entering into contract for the council would be required to use ZEVs.	Transport	Procurement policy	Non-domestic	1-Areas we directly control/guide	Low	Low	high	Medium	Low	12
Pilot schemes for charging in shared parking locations (estates) (MM)	T6	Pilot a financial model and technical solution, for areas with shared parking - estates. Could be a Design Build Operate model with price control, or other capital project	Transport	innovation / Demonstrator	Domestic	1-Areas we directly control/guide	Low	Low	Low	Low	High	11
Possible pilot schemes for power management systems - council funded demo before scale up	T7	Selecting pilot blocks of flats, to trial charging solutions in underground carparks - power management systems, and submetering.	Transport	Capital project	Domestic	1-Areas we directly control/guide	Low	Low	Low	Low	Low	11
Install chargers in residential areas without driveways and on-street charging (10+ projects)	T2	Cambridge and Peterborough Combined Authority won £5.4m and stated on the website (https://www.gov.uk/government/publications/local-ev-infrastructure-levi-funding-amounts/local-electric-vehicle-infrastructure-levi-funding-amounts-capital) as "Funding approved. Final review". Could be dedicated charging bays, or neighbourhood wide installation of recessed channels in footpath	Transport	Capital project	Domestic	1-Areas we directly control/guide	Medium	Medium	Low	Medium	High	12
Provide home charging infrastructure for social tenure dwellings	T11	Capital project for housing associations - providing EV charger provision to social tenures. Could explore DBO arrangement although would require price control to ensure lower operating costs are passed onto tenants.	Transport	Capital project	Domestic	1-Areas we directly control/guide	Medium	Medium	Low	Medium	High	12
Refer businesses to PAS 1899 guidance, and possibly organise demonstration sites (Gov 2025, p 44)	FL2	Demonstration sites on good design of EV charging spots at business enterprises, that cater for people with mobility issues (inclusive design).	Transport	innovation / Demonstrator	Non-domestic	1-Areas we directly control/guide	Low	Low	high	Low	Medium	10
Council building / office charger	FL21	A number of slow chargers, for council buildings / council offices, for public sector staff	Transport	Capital project	Non-domestic	1-Areas we directly control/guide	Medium	Medium	Low	Medium	Low	12
Replace Council owned fleet with ZEVs	FL22	[May be out of scope and already being funded]	Transport	Capital project	Non-domestic	1-Areas we directly control/guide	high	Medium	Medium	Medium	Low	10
[T1] pilot schemes for Council to test preferred on-street solution	T1	The Council could select a neighbourhood to trial a number of the onstreet parking solutions for residents as part of a trial. This could then inform the preferred solution to be deployed more broadly, and inform highway authority policy updates	Transport	innovation / Demonstrator	Domestic	1-Areas we directly control/guide	Low	Low	Medium	Low	Medium	9
School charger project	FL16	Council to utilise economies of scale, to help install charging points at school car parks for teachers	Transport	Capital project	Non-domestic	1-Areas we directly control/guide	Medium	Low	Medium	Medium	Medium	11
Complete disability access assessments on existing public charge points (Gov 2025, p44)	FL19	Previous audits within the UK have found that most charger installations are not conforming to PAS 1889 for being suitable for people with reduced mobility. The Council could complete this across either all public charge points, or at minimum all public sector charge points	Transport	Support & guidance	Non-domestic	1-Areas we directly control/guide	Low	Low	Medium	Low	Medium	9
Grants, or low interest loans, or other: specifically targeted at low income groups	T12	Financial assistance to lower income residents wanting to install an EV charger or upgrade to an EV. Scheme could be launched with eligibility to ensure financial aid is directed to those in need	Transport	Financial Incentive	Domestic	2-Areas we can enable through funding	Medium	Low	Low	Medium	High	13
Possible council grant for SMEs looking to transition Vehicles to EV	FL3	Grant specifically for small businesses, looking to transition one or all of their vehicle fleet	Transport	Financial Incentive	Non-domestic	2-Areas we can enable through funding	Low	Low	Low	Low	Medium	10
Innovation funding for business to trial one or two vehicles in a fleet.	FL6	For a business who is unsure how switching to an EV would impact their business model (e.g. delivery staff having to charge on route), grant / innovation funding provided to allow them to trial one vehicle or part of the fleet, before transitioning the whole fleet	Transport	innovation / Demonstrator	Non-domestic	2-Areas we can enable through funding	Low	Low	Low	Low	Medium	10
Rapid DC chargers at hospitals (EV Ambulance)	FL20	A number of rapid DC chargers, strategically placed, to cater for the transition to electric ambulances	Transport	Capital project	Non-domestic	2-Areas we can enable through funding	Medium	Low	Low	Low	Low	12
Council providing partial default coverage for commercial banks, allowing them to offer lower interest rates (MM)	T9	Some form of partial default coverage for commercial banks offering business loans to residents associations	Transport	Financial Incentive	Domestic	2-Areas we can enable through funding	Low	Medium	Medium	Medium	Medium	9
Council providing low interest loans to blocks of flats (MM)	T8	Low interest loans to residents associations, allowing them to fund low carbon technology rollouts	Transport	Financial Incentive	Domestic	2-Areas we can enable through funding	Medium	Medium	Medium	Medium	Medium	10
Access to public funds, or competition for grants, for employers to install charging (MM)	FL9	Grants for landlords or private employers, to install charging on business carparks (note, this may overlap with the Workplace Charging Scheme)	Transport	Financial Incentive	Non-domestic	2-Areas we can enable through funding	Medium	Medium	Medium	Medium	Medium	10
Grants to target public sector areas: hospitals, schools, other public sector buildings	FL15	Council to provide grants to public sector actors, to install charging infrastructure.	Transport	Financial Incentive	Non-domestic	2-Areas we can enable through funding	Medium	Medium	Medium	Low	Medium	9
Specific local regulation on business premises for landlords (MM)	FL8	Local bylaw or regulation, that requires business premises to install a certain volume of EV chargers in the County. Would then make sure that tenants leasing business space, have access to EV chargers in the car park for their staff or visitors	Transport	Planning policy (regulation)	Non-domestic	3-Areas we can enable through policy	Low	High	high	High	Low	11
Increase social value points awarded in tenders for commitments to install chargers in Council contracts	FL18	Encourage larger firms bidding for contracts (e.g. Mitie bidding for a facilities management contract) to install chargers at other Small and Medium Sized Enterprises (SMEs) or workplaces (schools, GP surgeries) which may not have the bandwidth and expertise to do it themselves.	Transport	Procurement policy	Non-domestic	3-Areas we can enable through policy	Low	Low	high	Low	High	11
Deommissioning plan for petrol stations	FL23	In the lifetime of the LAEP (2045) we would expect to see conventional petrol stations begin to go out of service. Risk that they become urban blight and difficult to remediate and re-develop. Develop a policy to address this.	Transport	Planning policy (regulation)	Non-domestic	3-Areas we can enable through policy	Low	Low	Low	Low	Low	11
[T3] Highway authority to provide clear guidance on acceptable cross pavement solutions	T3	update to highway codes or planning guidance, so that private residents or landlords know how to install onstreet EV charging solutions	Transport	Planning policy (regulation)	Domestic	3-Areas we can enable through policy	Low	Low	Medium	Low	Low	10
Homeowner / Landlord installation of onstreet charging solutions	T4	This is where following clear guidance to residents, homeowners or landlords fund and install an onstreet solution - home charger on the wall with recessed channel for the cable, for example	Transport	Capital project	Domestic	3-Areas we can enable through policy	Low	Medium	Low	Low	Low	10
Mandated charger role out in building regs whenever major retrofit occurring (Gov 2025 p42)	T10	Amendment to local planning policy, or advocate to central government, to modify the regulations so that whenever major retrofits are occurring, EV chargers should be installed if not done already.	Transport	Planning policy (regulation)	Domestic	3-Areas we can enable through policy	Low	High	high	High	Medium	10
Support installation of EV chargers at service stations by easing planning permissions	FL14	Remove planning as a disincentive to Motorway Service Area operators, by developing a clear route to consent (e.g. permitted development, certificate of lawful development or a specific supportive planning policy in the Local Plan). The Rapid Charging Fund did not take off with low uptake from MSA operators. Don't try and re-create the grant funding which has been lost but ensure the disincentives are addressed.	Transport	Planning policy (regulation)	Non-domestic	3-Areas we can enable through policy	Low	Medium	Medium	Medium	Low	10
Making more land available for EV chargepoints (CAG, 2025)	FL1	From a public sector organisation, looking for more council land to be made available for additional parking to account for EV charging spots	Transport	Planning policy (regulation)	Non-domestic	4-Areas we can influence locally	Low	Low	Low	Medium	Low	12
One of the outcomes of the LAEP is to try and unblock this constraint with proactive electrical network investment	FL5	Utilising the outputs of the LAEP and forecasting of electrical demand increases, so that the DNO can upgrade network infrastructure BEFORE businesses start applying	Transport	Support & guidance	Non-domestic	4-Areas we can influence locally	Low	Low	high	High	Low	11
Collect case studies, or provide advice on addressing technical issues for electrical upgrades (CAG, 2025)	FL4	Cost of onsite electrical upgrades were perceived as a barrier. The council could help share information / case studies of how other businesses addressed this or what solutions they used, to help businesses overcome specific onsite electrical upgrades needed	Transport	innovation / Demonstrator	Non-domestic	4-Areas we can influence locally	Low	Low	Medium	Low	Low	10
Public funds for public operators (LEVI Fund?) (Zero-Emission Bus Regional Area - ZEBRA now closed) (Gov, 2025, p45)	FL10	Council to lobby central government to extend funds for local bus operators to transition to zero emission vehicles. ZEBRA now closed.	Transport	Financial Incentive	Non-domestic	5-Areas we can influence or ask for nationally	Low	Low	Low	Low	Medium	10
Central government mandate for zero emission buses (Bus Services (No.2) Bill)	FL11	Lobby central government to mandate Zero emission buses (bus services No.2 bill) which is still under review.	Transport	Planning policy (regulation)	Non-domestic	5-Areas we can influence or ask for nationally	Low	Low	Low	Low	Medium	10
Gov Grant to Homeowner - Installation of cross pavement solutions (Gov 2025, p40) (Already in place)	T5	Existing grant scheme closes April 2026, provides Households with on-street parking up to £350 towards a new EV charger, if they are also installing a cross-pavement charging solution. Could lobby for this scheme to be continued, or educate residents on how to access it	Transport	Support & guidance	Domestic	5-Areas we can influence or ask for nationally	Low	Low	Medium	Low	Medium	9
Advocate to central government to open the Rapid charging fund (RCF) (Gov 2025, p41)	FL13	This would be to lobby central government to open this fund, so that services along motorways could install rapid charging hubs. Though the government's latest view is that there is good penetration of these along services, for HGVs and other business users, increased availability of charging hubs will be needed	Transport	Financial Incentive	Non-domestic	5-Areas we can influence or ask for nationally	Low	Low	Medium	Low	Medium	9

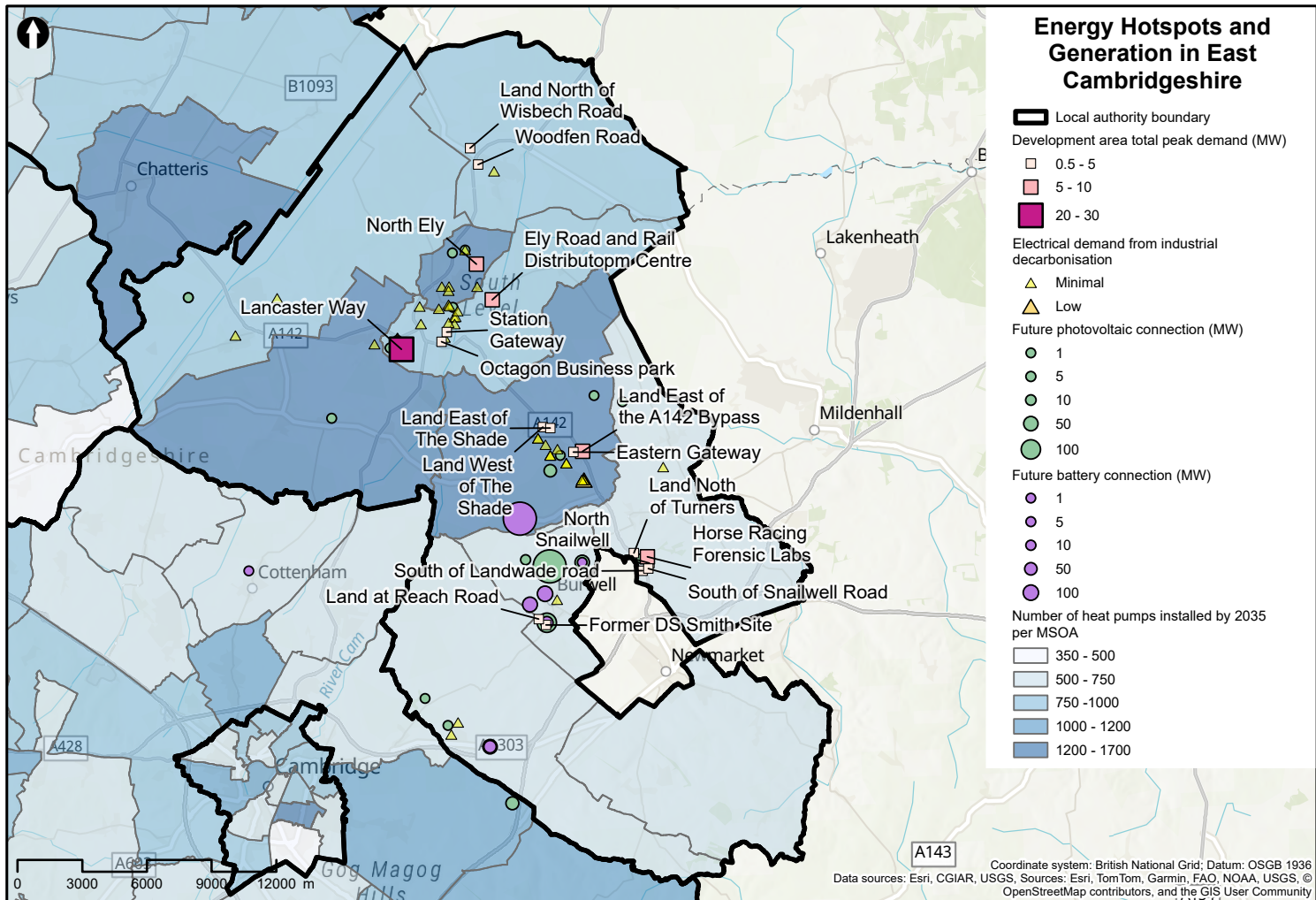
G. Local Generation

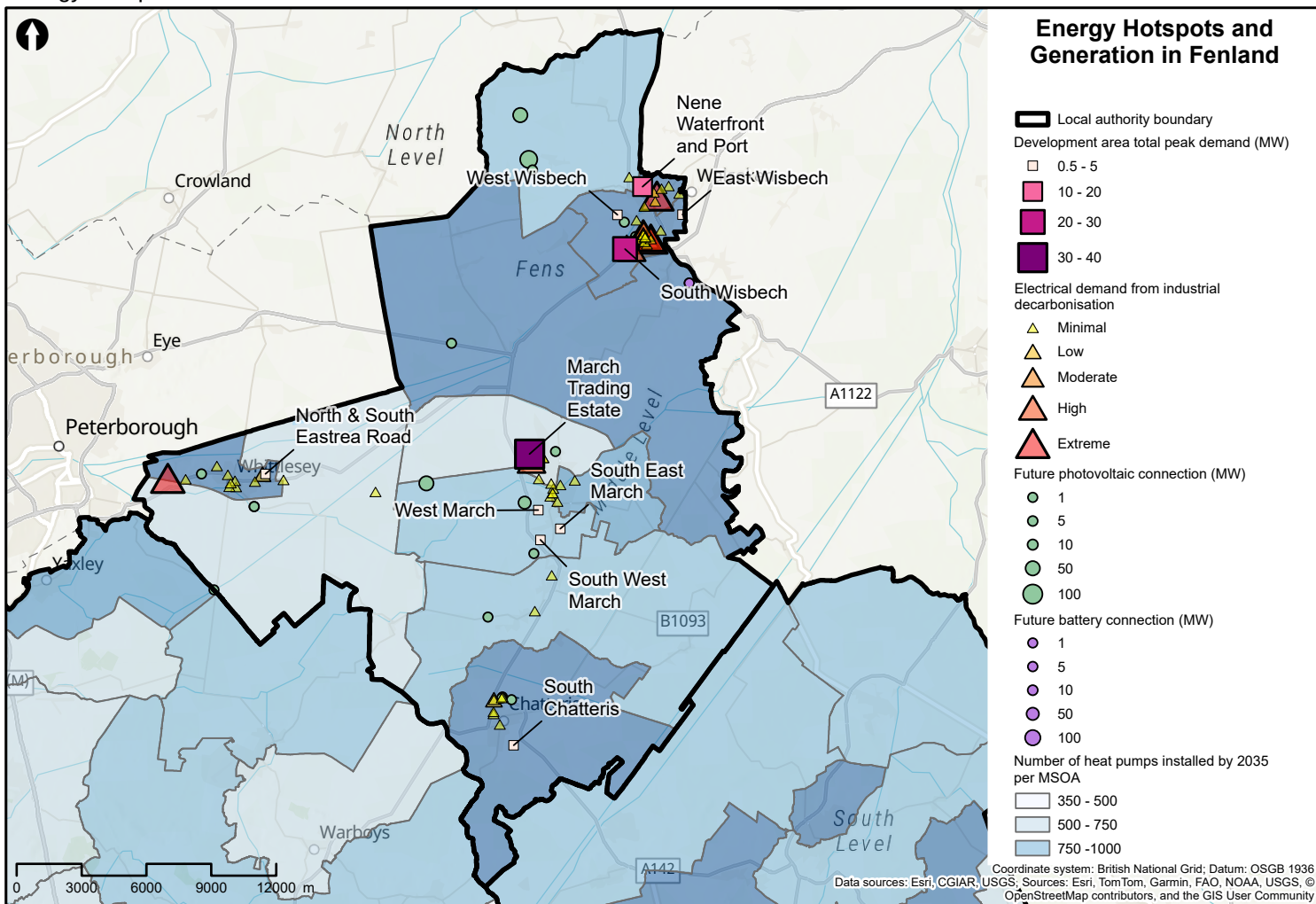
G.1 Methodology & Assumptions

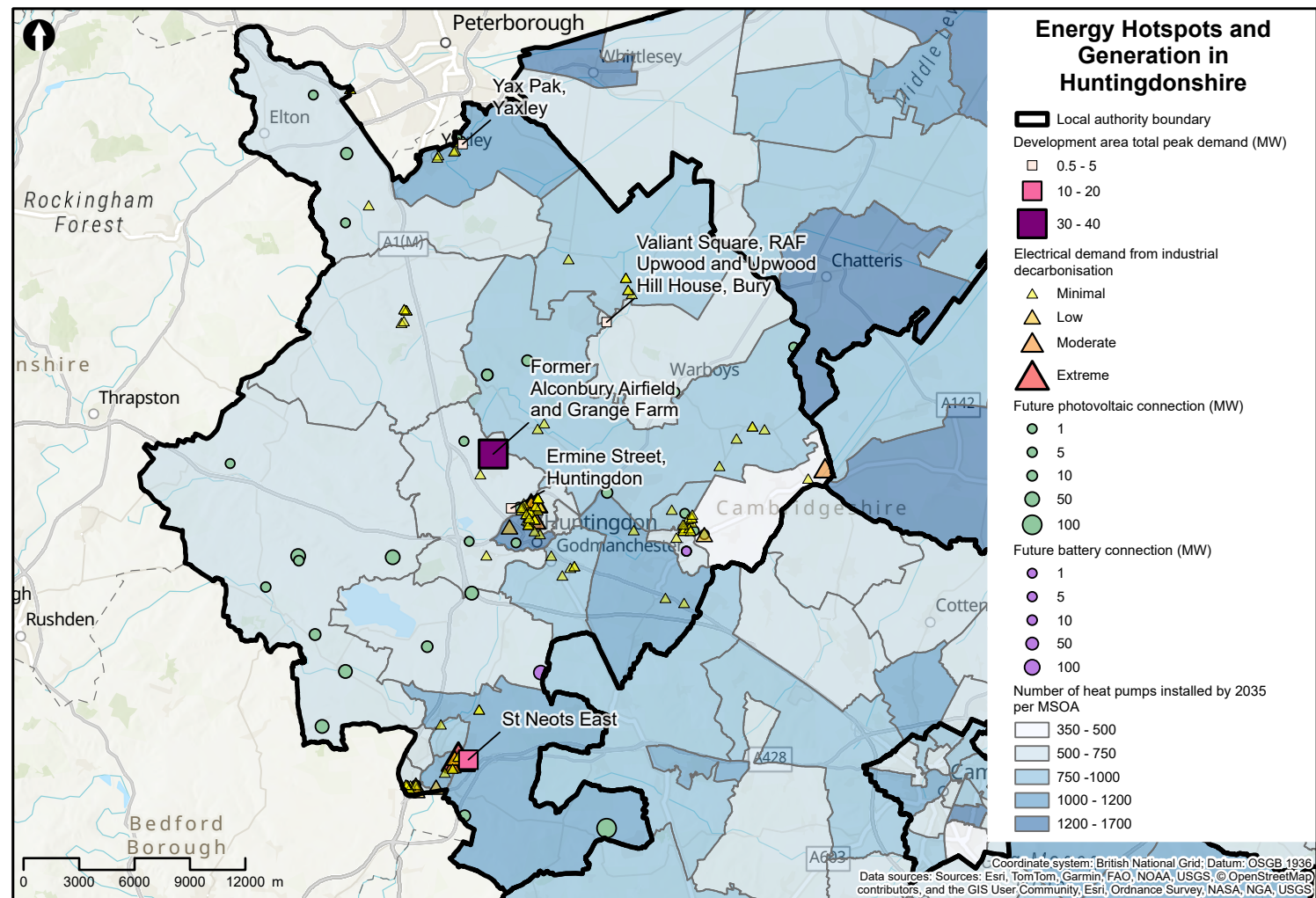
Please refer to the spreadsheet titled 'CCC Modelling – Generation.

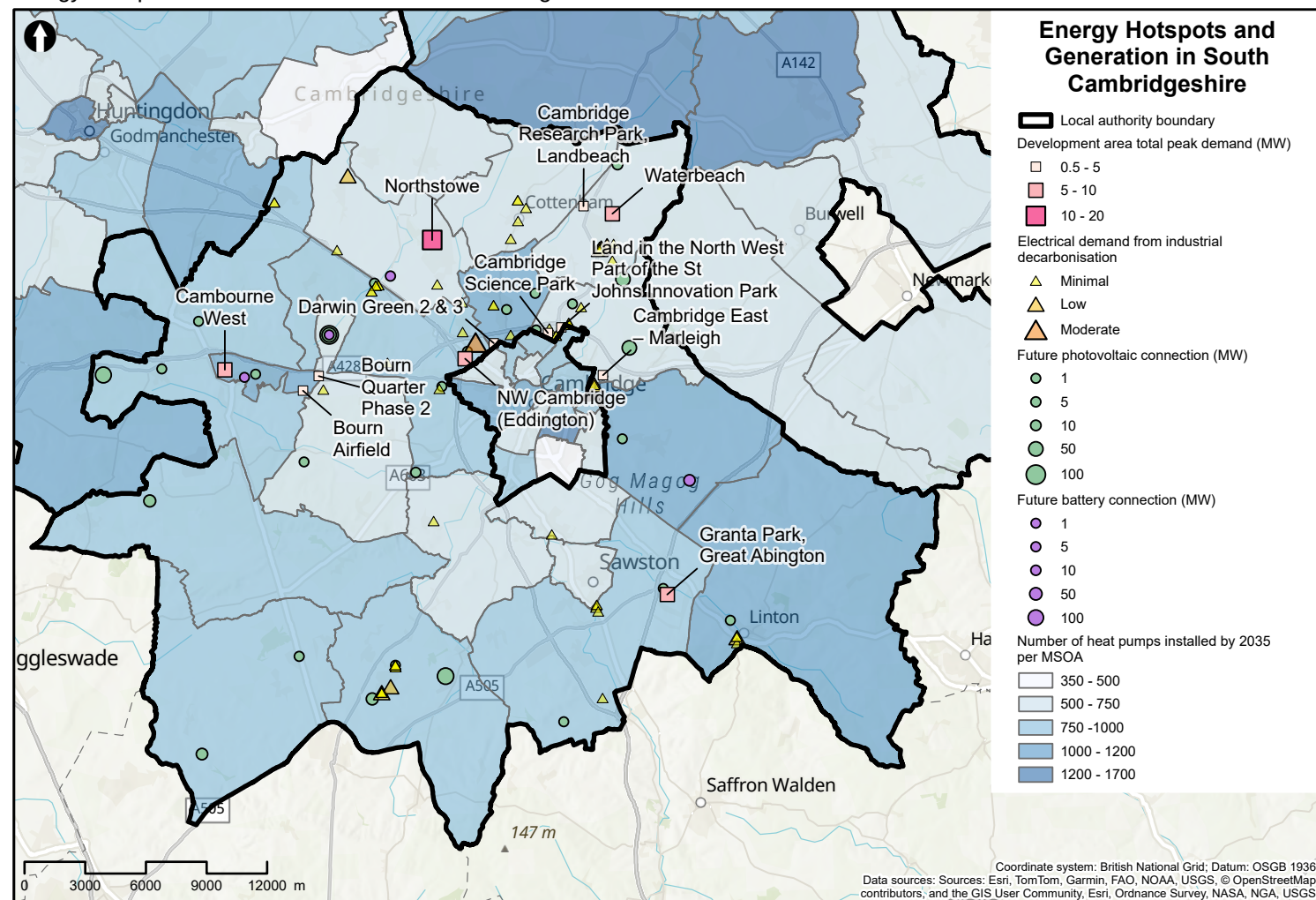
G.2 Maps & Images

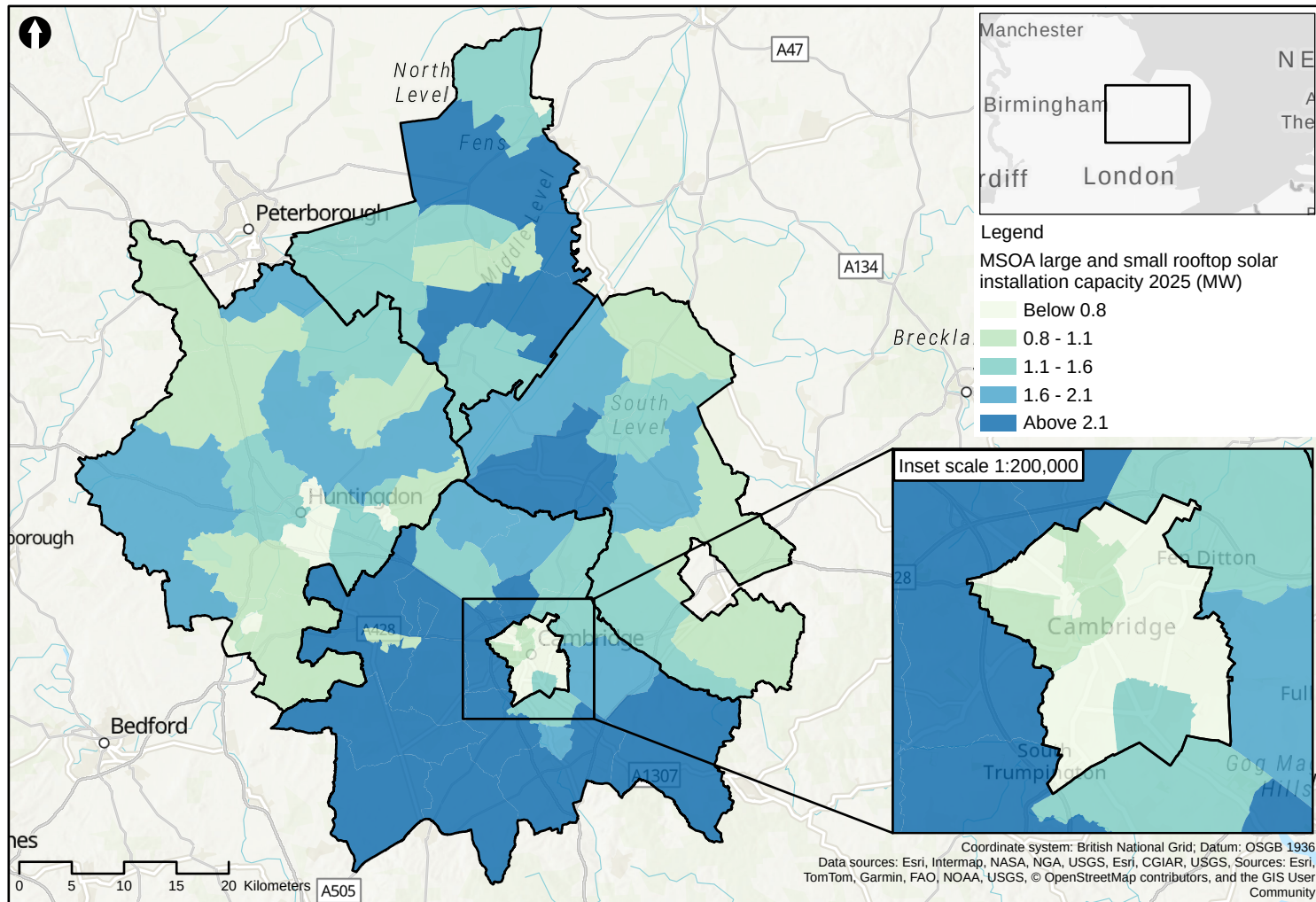


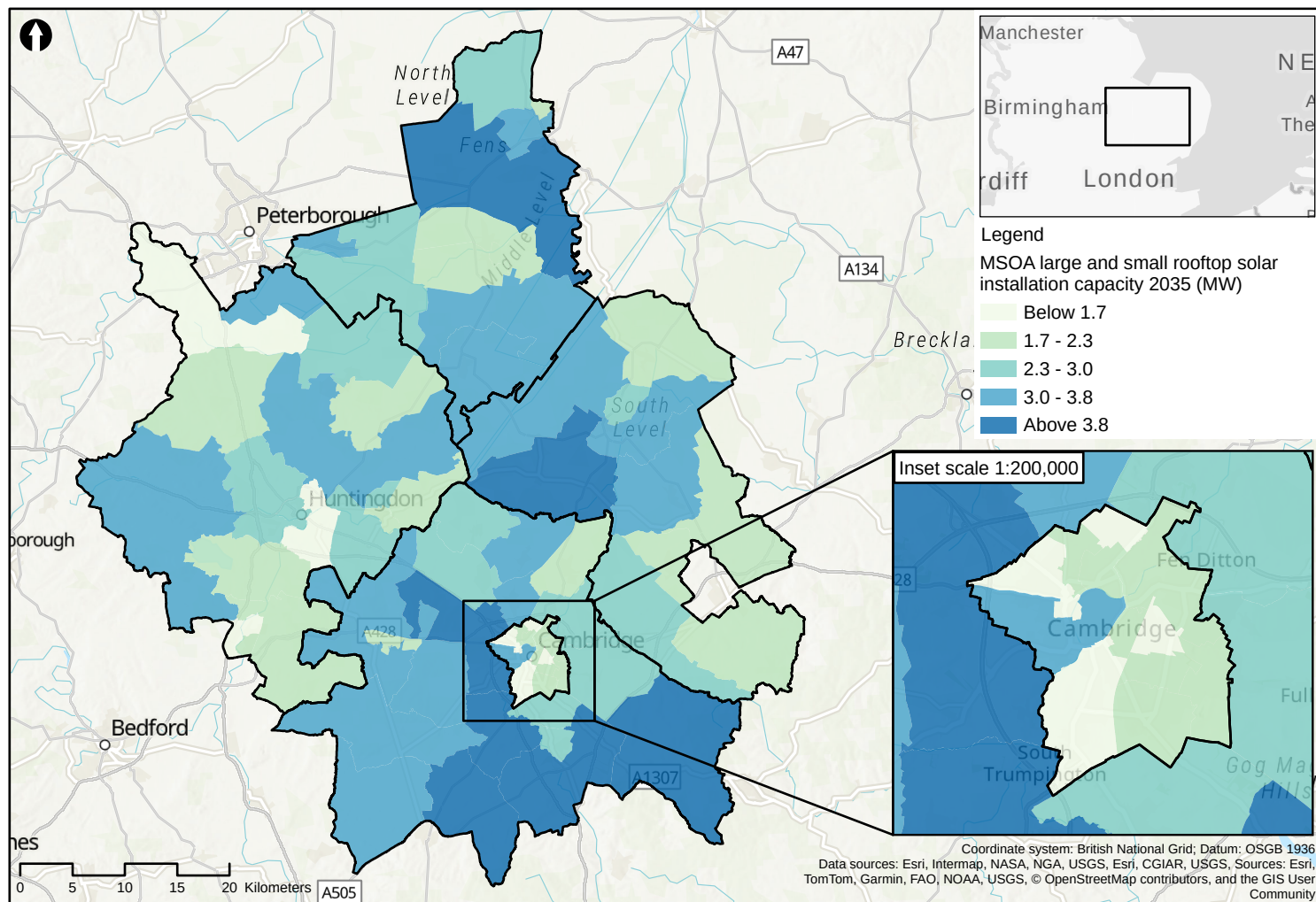


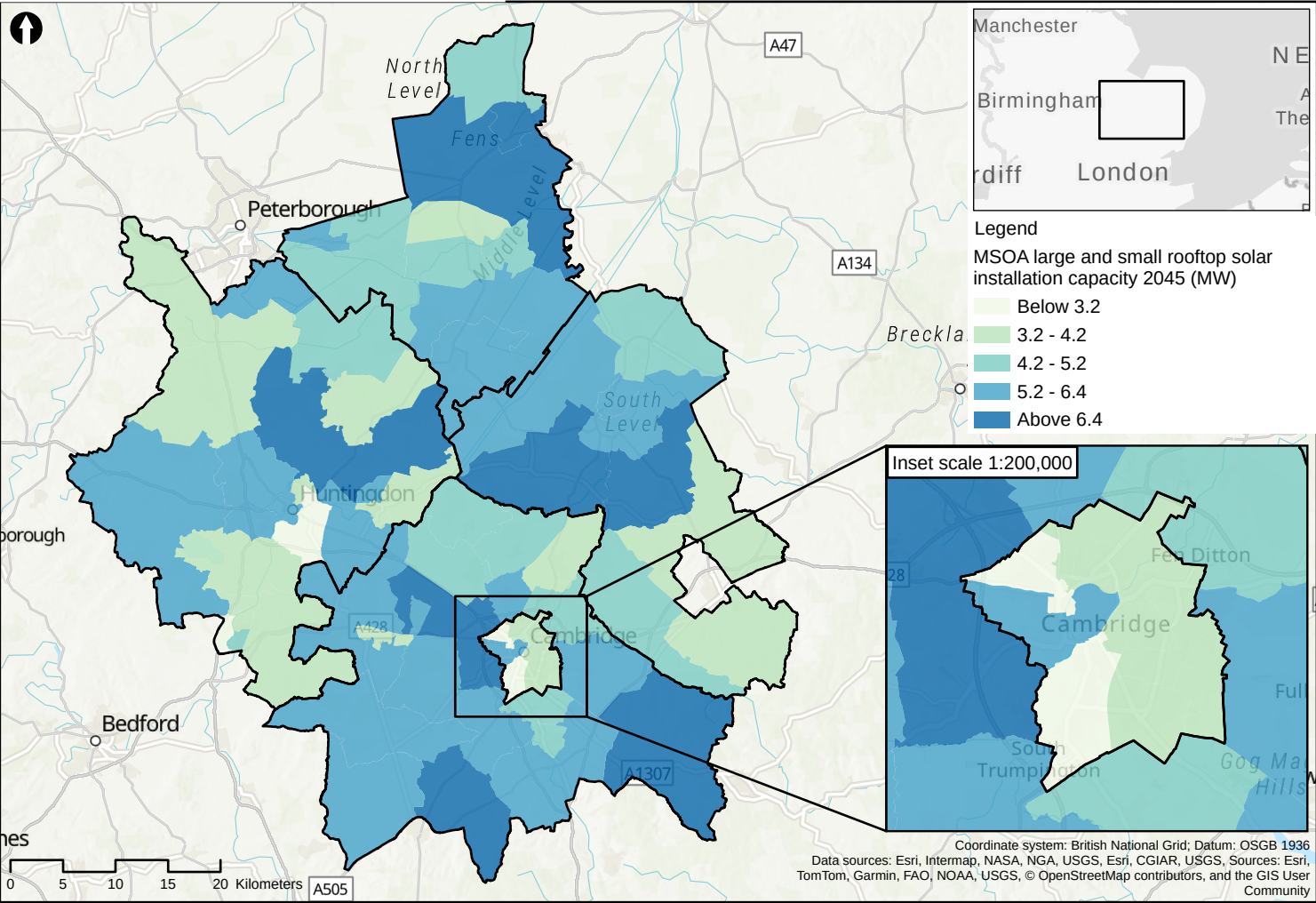












H. Network Impacts

H.1 Methodology & Assumptions

Impact on After-Diversity Maximum Demand (ADMD) of domestic adoption of electric heating and Electric Vehicles

ADMD has been sourced from Scottish Power ADMD calculator¹⁰⁵ and experimental values from experimental network trials, and applied these for domestic heat pumps, resistive heating systems, and EV charging. These were assigned based on projected uptake volumes and diversified peak demand figures per dwelling. The aggregated domestic ADMD was calculated per substation to reflect the expected increase in residential demand.

Note, that for new builds heat pumps are assumed to be installed from 2030 onwards. As such, the ADMD value selected per new home provides an 'all in' value for the home including these low carbon technologies.

Impact on After-Diversity Maximum Demand (ADMD) of non-domestic heating conversions

We used three separate approaches to calibrate our estimates of ADMD increases associated with non-domestic properties installing heat pumps.

Firstly, we carried out a top-down estimate. This used the analysis presented in Section 6.2 which estimated a total quantity of gas offset and electricity consumed by new heat pump installations. We estimated the peak demand by using a load factor for heating (assumed 0.27 based on a figure agreed with a client in another project looking at non-domestic heating). The load factor represents the ratio of the actual heating output to the rated capability of the heating system if used at full output 24/7/365 days a year. Other similar metrics are Elexon's electricity profiles in which the difference between profile

class 3 (Non-Domestic Unrestricted Customers) and profile class 4 (Non-Domestic Economy 7 Customers) are predominantly in the 30.6% of days counted as winter weekdays.

Secondly, we calculated a bottom-up estimate by multiplying the quantity of installations in the Distribution Future Energy Scenarios (DFES) with a unit size of heat pump. A diversity factor for heating of 0.62 was assumed based on a design guide from Glen Dimplex Heating & Ventilation. A single heat pump size of 50kW was used which is on the high side; more than 95% of installs were smaller than this in Your Local Net Zero Hub's technical potential data sets.

Thirdly, we summed up the technical potential dataset in Your Local Net Zero Hub for all the properties in which the overall assessment was that a conversion to Ground-source Heat Pump or Air Source Heat Pump was feasible. Only "child" polygons representing properties were included.

The results are summarised below and indicate that our ADMD calculations are likely to be on the higher-end, meaning they suggest network upgrades are required sooner. This should allow the local authorities and UK Power Networks the opportunity to monitor and scale back or defer infrastructure upgrade plans; rather than being caught out by sudden load increases and pinch points arising.

¹⁰⁵ https://www.spenergynetworks.co.uk/pages/admd_calculator.aspx

Table H.1: Summary of non-domestic heat pump calibration

Scenario	Forecast increase in ADMD (MW) by 20450			
	Top-down	Bottom-up	Technical potential	
			ASHP	GSHP
Counterfactual	8	7	355	109
Electric Engagement	697	625	355	109
Hydrogen Evolution	467	428	355	109
Holistic Transition	665	599	355	109

Source: Mott MacDonald

We assumed that installations of resistive heating and heat pumps have the same impact on ADMD. We justify this since firstly, the Coefficient of Performance of heat pumps is lower on cold winters days and secondly, resistive heating solutions are likely to have an element of night storage heaters – therefore whilst resistive heating does not gain from the Coefficient of Performance, it is also designed not to coincide with the daily peak load. This assumption was also necessary to generate a monotonic increase in electrical peak demand as gas heating systems are replaced, which is typically reported by the DNOs as their central view; and to correctly order the Holistic Transition, Hydrogen Evolution and Electric Engagement scenarios in terms of peak demand.

Impact on After-Diversity Maximum Demand of new housing and commercial developments

The peak demand per dwelling is assumed as 1.3kW based on measured experimental data from UKPN Customer Led Network Revolution trial. As discussed previously, this assumes new homes are built with air source heat pumps and home EV chargers.

Peak demand for non-domestic developments was estimated using the use class data provided in the Infrastructure Delivery Framework report. These were matched to benchmark peak demand intensities per square meter based

on BSRIA’s “Rule of Thumb” guidance using Electrical (BG 86) and Mechanical (BG 85) criteria. A general diversity factor of 0.6 was applied to the aggregated loads, in line with Electricity North West’s Code of Practice 279. Heating and cooling loads were converted to an electrical equivalent assuming that all developments are heat-pump led, and with a worst-case Coefficient of Performance of 2.0 on coldest winters’ day.

Demand headroom

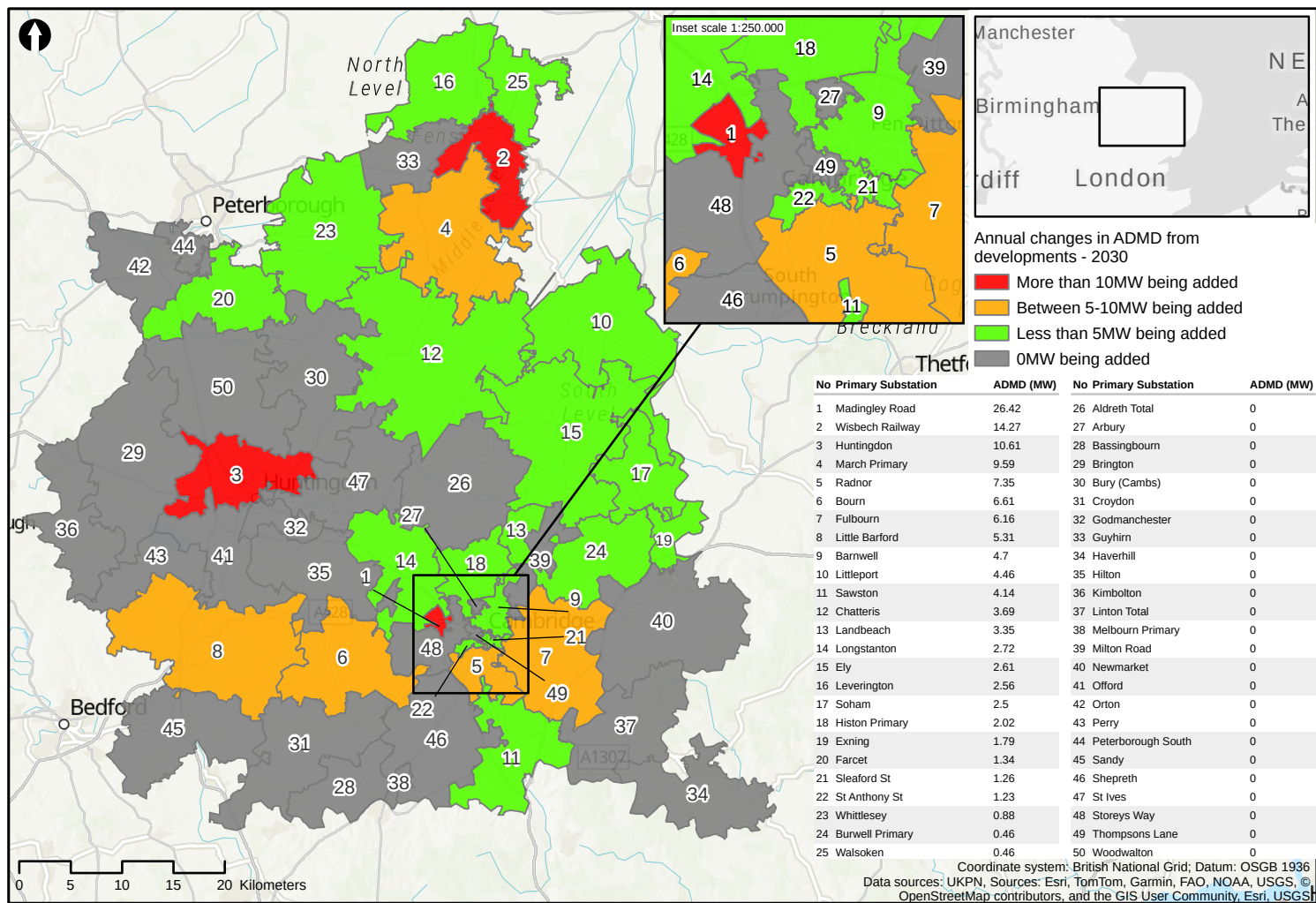
Where we show a county-wide headroom, it is for illustrative purposes – headroom must be available at each relevant substation to which future load is connected. For purposes of illustration, we assume that the peak demand on each substation (and therefore headroom) occurs at the same time across all substations.

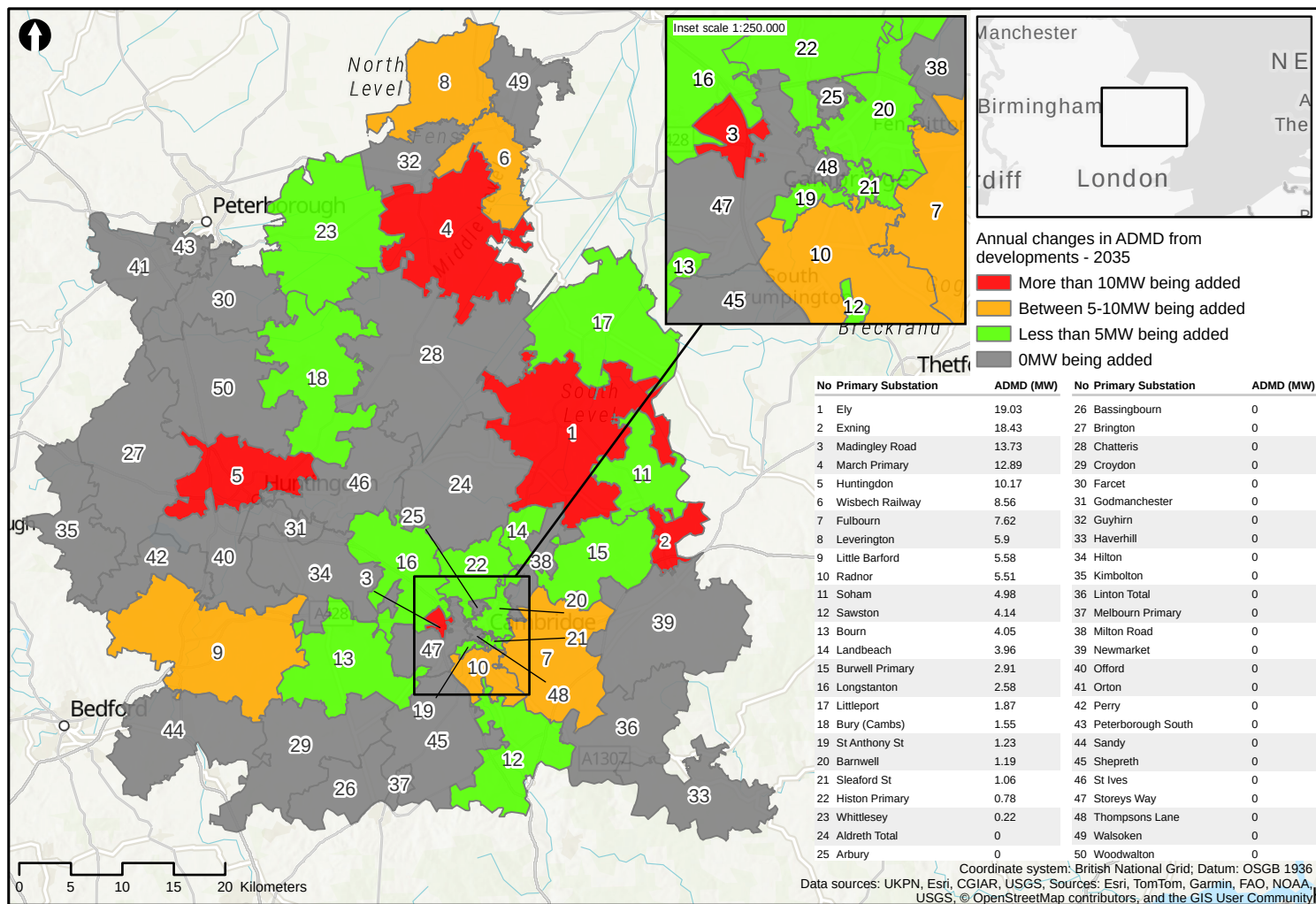
Build out rates

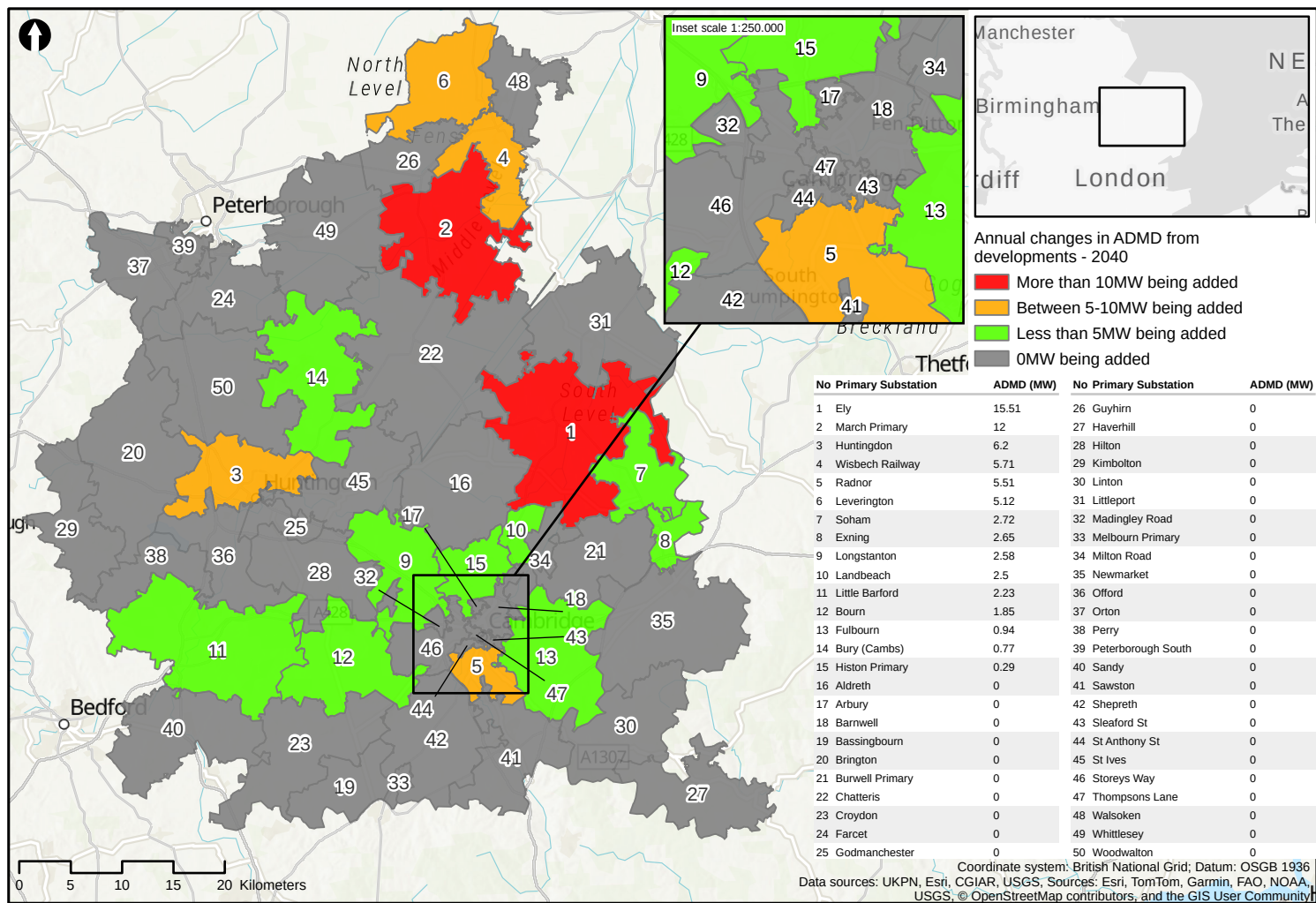
The full list of sites provided by the IDF, and their assumed build out rates in 5 yearly intervals, is provided in “CCC-Modelling Network.xls”.

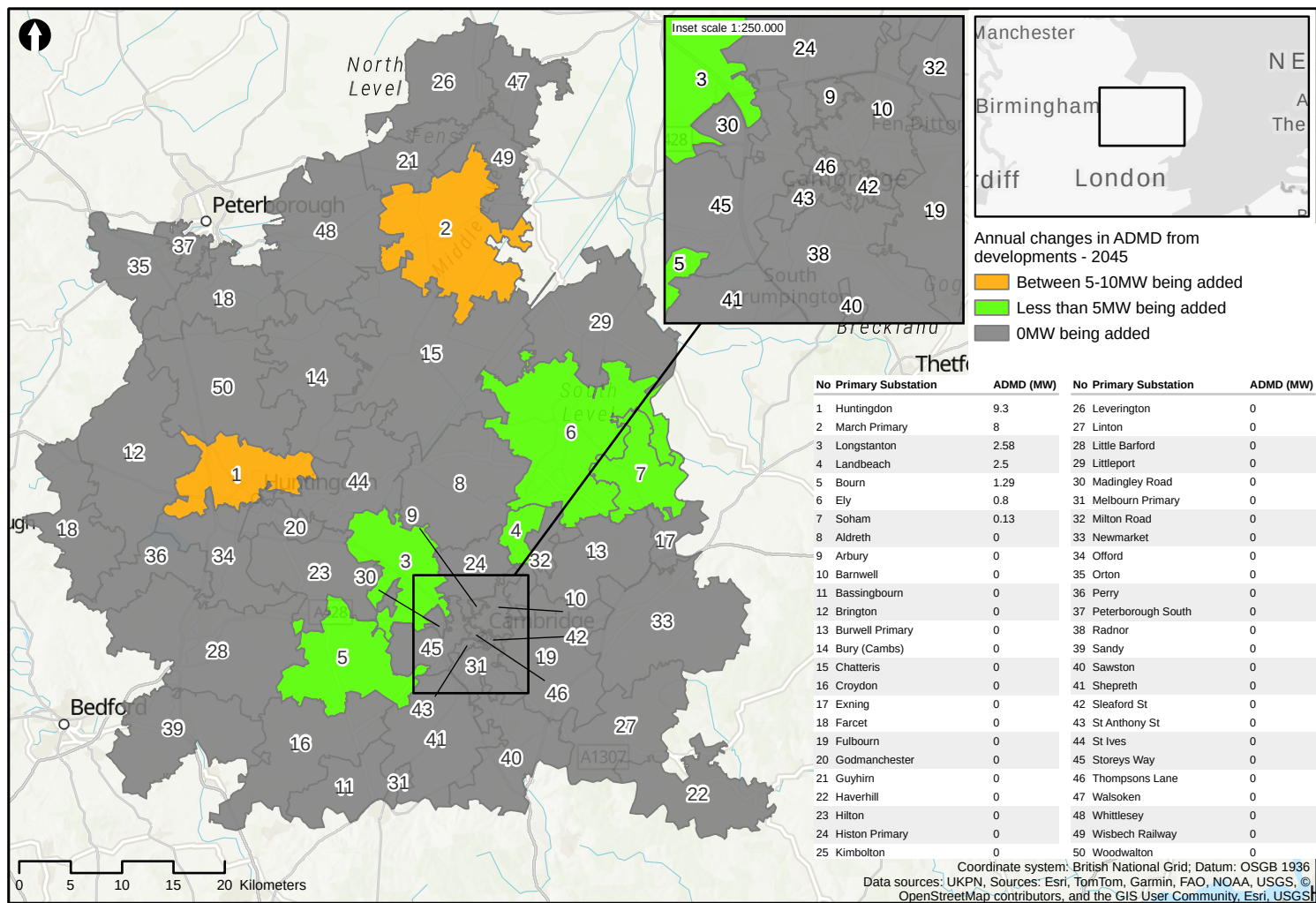
H.2 Maps & Images

These show the impact of new commercial and housing developments foreseen in the Infrastructure Delivery Plan.









I. Economics

I.1 Methodology & Assumptions

Please refer to the spreadsheet titled 'Cambridgeshire LAEP Economic Model'.

