INFRASTRUCTURE COORDINATION SERVICE

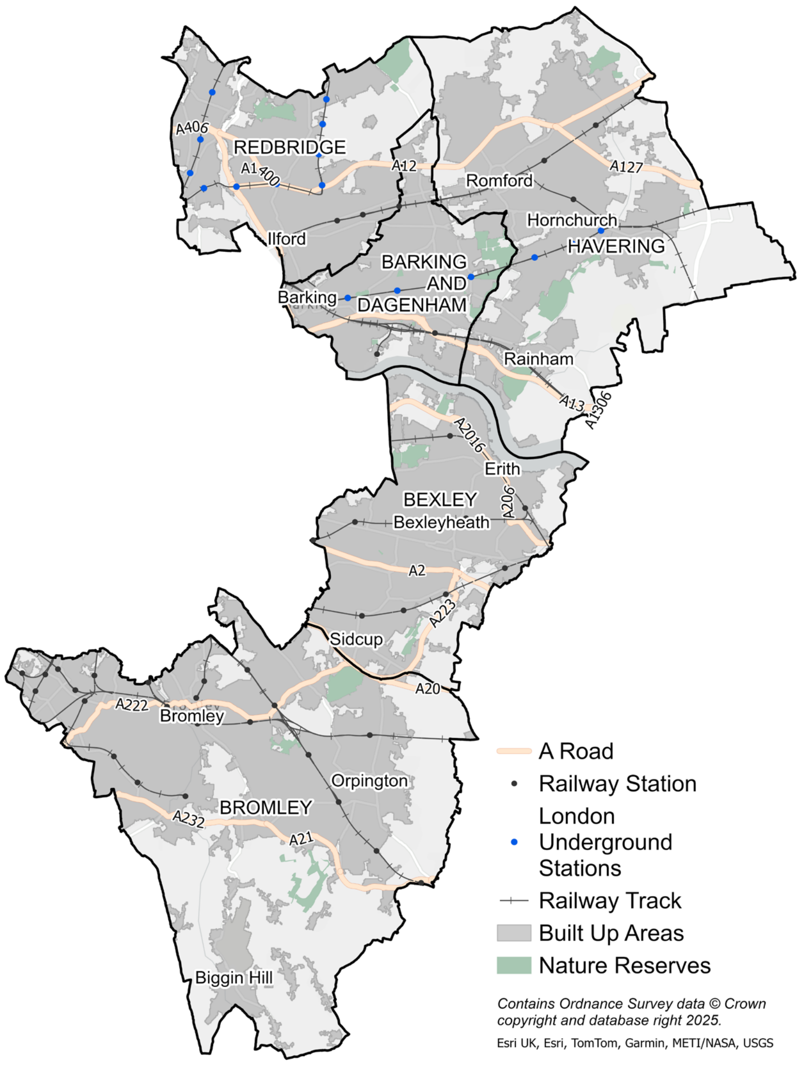
ARUP

Greater London Authority

East London Subregional Phase 1 Local Area Energy Plan

Final report

November 2025



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This Plan was prepared by Arup on behalf of the Greater London Authority Infrastructure Coordination Service.

I. Executive Summary

Executive Summary

Introduction

This report presents the findings of Phase 1 of the East London Local Area Energy Plan (LAEP), covering the London Boroughs of Barking & Dagenham, Bexley, Bromley, Havering, and Redbridge. Developed by Arup for the Greater London Authority (GLA) and the eastern subregion, the plan establishes a shared evidence base to support boroughs in delivering net zero targets, aligned with the Mayor of London's Accelerated Green Pathway.

The East London subregion is entering a pivotal phase in its energy transition. With ambitious housing and growth targets coupled with highly constrained electrical infrastructure, this region, as well as other London Boroughs, must take a joined-up cross-boundary approach to achieving net zero.

The fourth and final instalment of the subregional LAEPs in London: the East London subregional LAEP Phase 1 seeks to address some of these challenges, by building an analytical evidence base and identifying tangible actions and next steps to progress net zero.

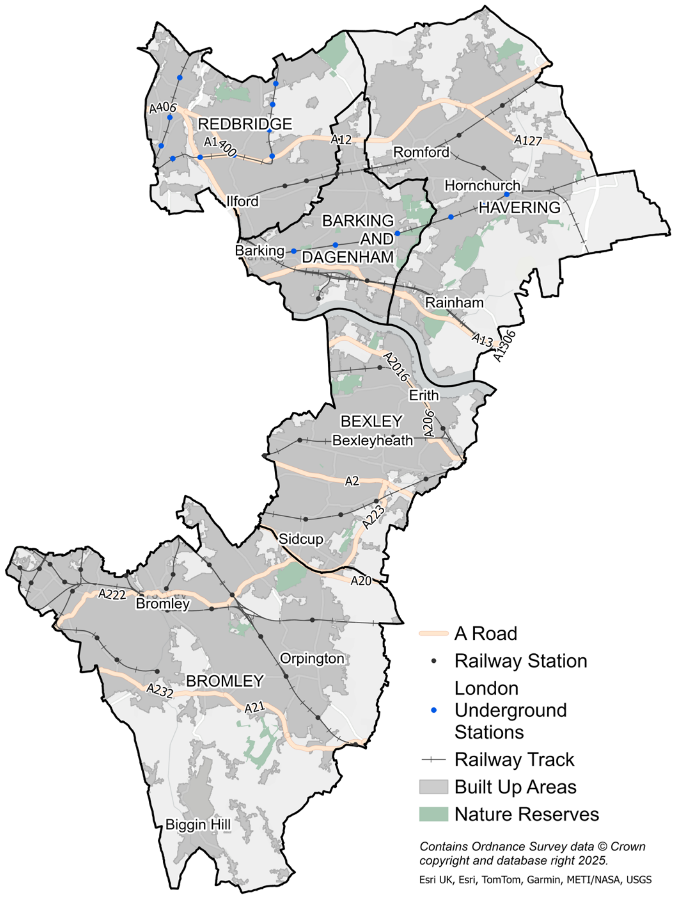

Figure 0.1: Contextual map of East London

Executive Summary

Modelling analysis

This report presents the findings of three modelled decarbonisation pathways, which combine different low carbon measures with different rates of deployment ambition.

The analysis highlights the scale of transformation required across East London subregion's energy system. Heating remains the largest source of emissions, followed by transport and electricity. Grid constraints, ageing infrastructure, and high levels of fuel poverty, particularly in Barking & Dagenham and parts of Redbridge, pose significant challenges to decarbonisation. Meanwhile, housing growth and increasing energy demand from transport and data centers add further pressure.

The Mayor's Accelerated Green Pathway has been modelled alongside two other scenarios to illustrate different paces of decarbonisation progress. Scenario modelling shows that achieving net zero by 2030 or 2050 will require deep retrofit of buildings, widespread deployment of heat pumps and solar PV, and a five- to tenfold increase in EV charging infrastructure, while heat networks offer strategic opportunities in high-density zones. The LAEP also identifies priority areas for investment, outlines embodied carbon impacts, and provides borough-specific recommendations to guide Phase 2 planning and delivery.

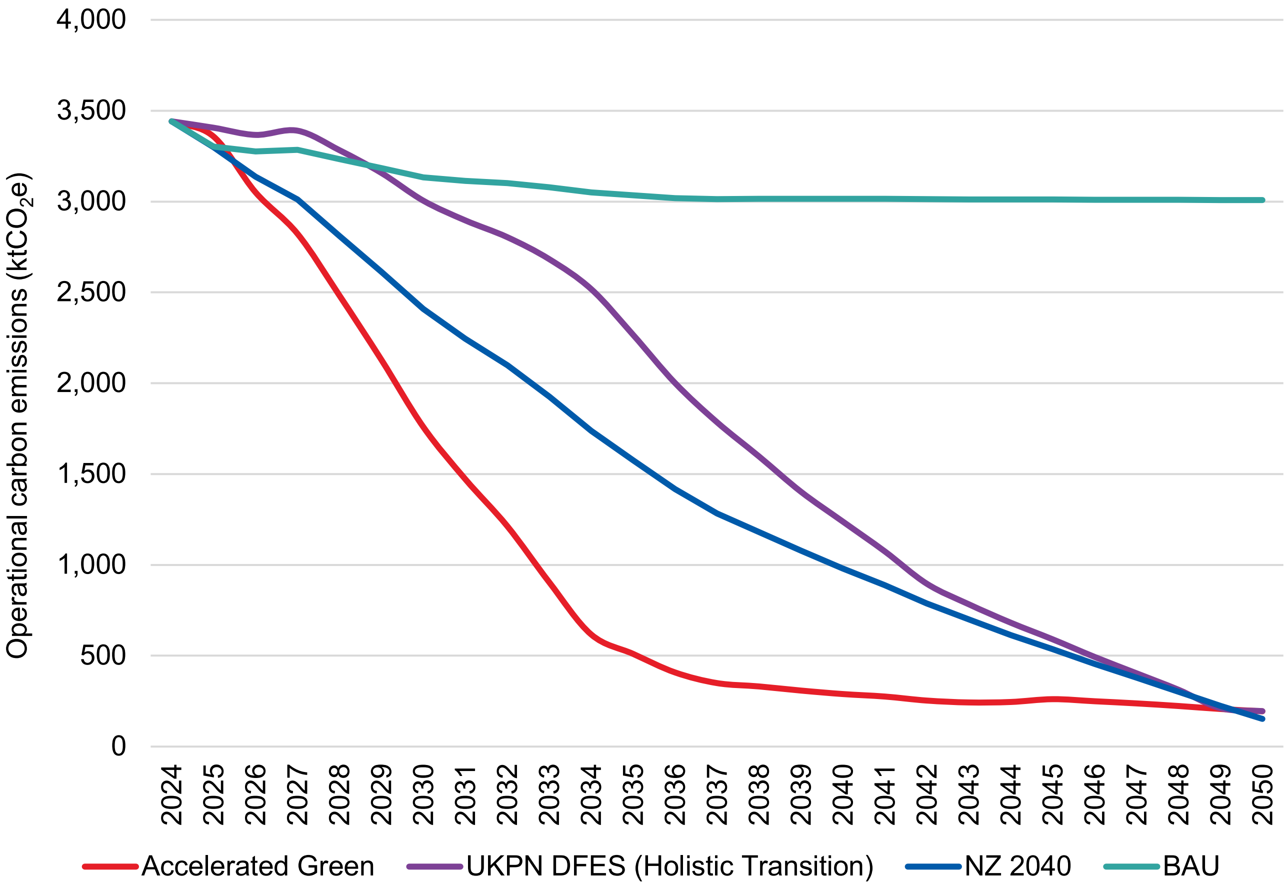

Figure 0.2 Subregional emissions in the modelled scenarios.

Executive Summary

Next steps and recommendations

The data and analysis presented in this report demonstrates the scale and change which is necessary to achieve East London's net zero carbon targets while supporting continued growth and a resilient energy system. A summary of the identified potential priority intervention areas and associated actions is provided below.

1. Retrofit and heat electrification

- Prioritise social housing and owner-occupied homes for retrofit, especially in Bromley and Havering.
- Develop borough-specific retrofit pipelines using LAEP data (EPC ratings, IMD, heat network proximity).
- Undertake whole-life carbon assessments to optimise retrofit strategies.

2. Heat networks

- Advance strategic heat network zones, particularly in Barking & Dagenham and Romford.
- Engage with waste heat suppliers (e.g. data centres, EfW facilities).
- Collaborate with DESNZ and neighbouring boroughs to align with Heat Network Zoning policy.

3. Transport electrification

- Deploy rapid charging hubs on borough-owned land and transport hubs.
- Promote modal shift through active travel infrastructure and public transport improvements.
- Progress LEVI-funded on-street charging programmes.

4. Renewable energy

- Scale up rooftop solar PV, especially in Rainham, Bexleyheath, and South Barking.
- Embed solar PV targets in borough Local Plans and asset strategies.
- Support community energy initiatives and streamline planning for installations.

5. Data and delivery

- Use the LAEP DataHub to support borough-level Phase 2 LAEPs.
- Develop scoring matrices to prioritise interventions based on local needs.
- Coordinate with GLA, UKPN, SGN, and other stakeholders for delivery.

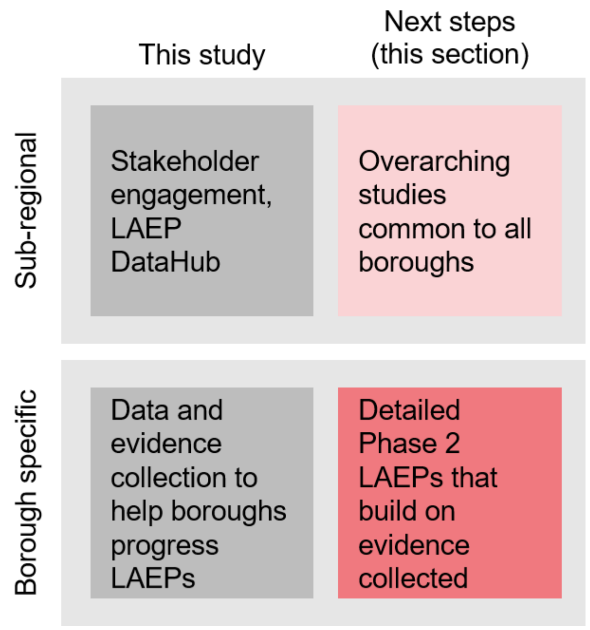

Figure 0.3 Categorised actions into borough specific or sub-regional

II. Glossary Of Terms

Glossary of terms

Table 0.1: List of Abbreviations

Abbreviation	Full term / definition
AG	Accelerated Green
AZP	Advanced Zoning Programme
BAU	Business As Usual
BMS	Building Management System
CPO	Charge Point Operators
DESNZ	Department of Energy Security and Net Zero
DNO	Distribution Network Operator
DNOA	Distribution Network Options Assessment
DFES	Distribution Future Energy Scenarios
EPC	Energy Performance Certificate
EV	Electric Vehicle
FES	Future Energy Scenarios
GLA	Greater London Authority
HNZ	Heat Network Zoning
HP	Heat Pump
IMD	Index of Multiple Deprivation

Abbreviation	Full term / definition
LAEP	Local Area Energy Plan / Planning
LCT	Low Carbon Technology
LSOA	Lower Layer Super Output Area
LSOM	London Solar Opportunity Map
MEES	Minimum Energy Efficiency Standards
NESO	National Energy System Operator
NZM	National Zoning Model
PPA	Power Purchase Agreement
PV	Photovoltaic (solar panels)
RESP	Regional Energy System Plan
SEG	Smart Export Guarantee
SME	Small and Medium-sized Enterprise
TOUT	Time of Use Tariffs
UKPN	UK Power Networks
ULEV	Ultra Low Emission Vehicle
ULEZ	Ultra Low Emission Zone

Glossary of terms

Table 0.2: Key Terms

Term	Definition
Advanced Zoning Programme	A government initiative to identify areas suitable for heat networks.
Batteries	Devices that store electrical energy for later use.
Building Management System	Computer-based systems that control and monitor a building's energy use.
Data Centres	Buildings filled with computer servers and storage systems, used to process and store data.
Decarbonisation	The process of reducing carbon dioxide emissions from energy use.
Distribution Future Energy Scenarios	Local projections of how energy demand and supply might change in the future.
Distribution Network Operator	A company that manages the local electricity distribution network.
Electrification	Switching from fossil fuels to electricity for things like heating and transport.
Embodied Carbon	Carbon emissions associated with making and installing materials and equipment, not their use.
Energy Performance Certificate	A rating that shows how energy efficient a building is, with A being the most efficient.
Energy System	Network of infrastructure, technologies and processes that generate, distribute store and use energy
Flexibility	The ability of an energy system to adjust to changes in supply and demand.
Fuel Poverty	When a household cannot afford to heat their home to a comfortable level.
Future Energy Scenarios	National projections of possible future energy use and supply.
Heat Network	A system of pipes that delivers heat from a central source to multiple buildings (also known as district heating).
Heat Network Zoning	Designating areas where heat networks are expected to be the best way to provide low-carbon heating.
Heat Pump	A device that extracts heat from the air, ground, or water and uses it to heat buildings.
Hydrogen	A gas that can be used as a clean fuel, producing only water when burned.
Index of Multiple Deprivation	A measure of different types of disadvantage in an area, such as income, employment, health, and housing.

Glossary of terms

Table 0.3: Key Terms Continued

Term	Definition
Local Area Energy Plan / Planning	A plan for how a local area will meet its energy needs and reduce carbon emissions.
Local Area Energy Plan Datahub	A central database for energy-related data used in planning.
London Solar Opportunity Map	A map showing which rooftops in London are suitable for solar panels.
Low Carbon Technologies	Technologies that emit 'low', or no net, levels of CO2 emissions when compared to the counterfactual
Lower Layer Super Output Area	A small geographic area used for reporting statistics in England and Wales.
National Energy System Operator	The organisation responsible for balancing supply and demand on the national electricity grid.
Net Zero	Achieving a balance between the amount of greenhouse gas emissions produced and the amount removed from the atmosphere.
Operational Carbon Emissions	Carbon emissions produced during the use of buildings, vehicles, or infrastructure.
Power Purchase Agreement	A contract to buy electricity directly from a generator, often used for renewable energy.

Term	Definition
Resistance Heating	Heating produced by passing electricity through wires or elements.
Retrofit (Shallow/Deep)	Upgrading existing buildings to improve energy efficiency. Shallow retrofit involves simple measures (like draught-proofing), while deep retrofit includes major upgrades (like insulation and new windows).
Smart Electric Vehicle Charging	Charging electric vehicles at times when electricity demand is lower, to reduce strain on the grid.
Smart Export Guarantee	A scheme that pays people for the electricity they generate and export to the grid.
Solar Photovoltaics	Solar panels that convert sunlight into electricity.
Substation	A facility that changes the voltage of electricity for safe distribution.
Time of Use Tariffs	Electricity prices that change depending on the time of day.
Ultra Low Emission Vehicle / Zone	Vehicles or areas with very low emissions, often subject to special regulations.
Waste Heat	Heat that is produced as a by-product of industrial processes or data centres, which can be reused for heating buildings.

1. Introduction

1. Introduction

Context

The East London subregion – comprising the London Boroughs of Barking & Dagenham, Bexley, Bromley, Havering and Redbridge – is entering a pivotal phase in its energy transition. With ambitious housing and growth targets coupled with highly constrained electrical infrastructure, this region, as well as other London Boroughs, must take a joined-up cross-boundary approach to achieving net zero.

The fourth and final instalment of the subregional LAEPs in London: the East London subregional LAEP Phase 1 seeks to addressing some of these challenges, by building an analytical evidence base and identifying tangible actions and next steps to progress net zero.

The subregional approach

Taking a subregional approach to decarbonisation planning drives efficiency across aspects of the LAEP methodology that logically can be aggregated – such as data collection, modelling, infrastructure considerations, parts of stakeholder engagement and high-level action development. A subregional approach promotes consistency, standardisation of evidence, as well as enabling the identification of cross-boundary opportunities.

Figure 1.1 maps the subregional geographies including in the Phase 1 East London LAEP. These functional geographies were determined on the phased approach to delivering subregional LAEPs across London.

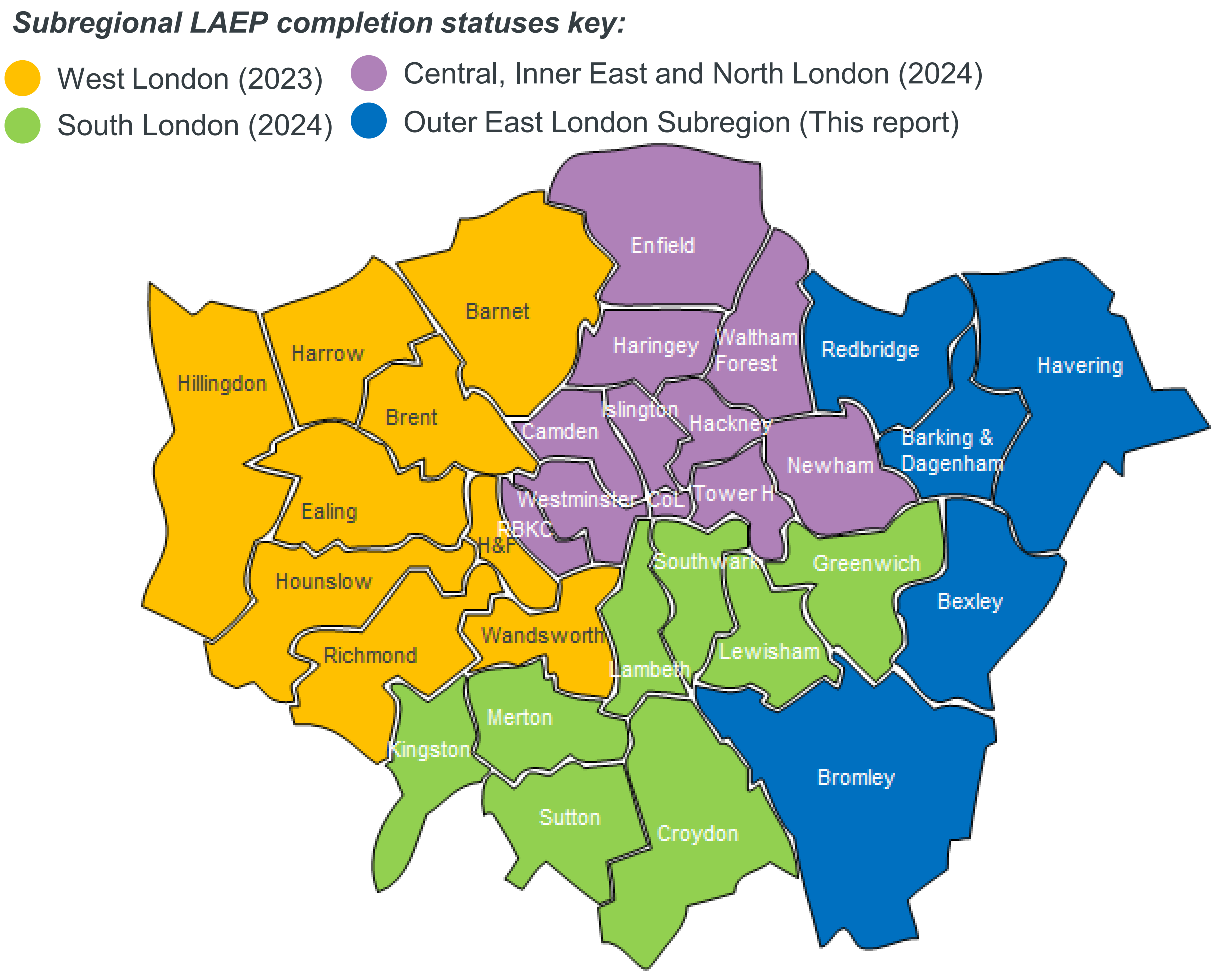

Figure 1.1: Map of subregional geographies for East London Subregional LAEP Phase 1

1. Introduction

Overview of the LAEP

Purpose of a LAEP

Local Area Energy Plan (LAEP) sets out the actions needed to transition an area's energy system to net zero, while also unlocking economic opportunities. By identifying local energy needs and future demand, LAEPs support investment in renewables, energy efficiency, and smart technologies, creating jobs, reducing energy costs, and boosting local economies.

They also help address infrastructure challenges, such as limited electrical capacity and reliance on grid decarbonisation, and highlight workforce requirements that could impact delivery. When embedded into local planning, LAEPs ensure developments are future-proofed and communities benefit from resilient, affordable energy systems. This regional LAEP provides strategic evidence to help local authorities identify opportunities and inform decision-making. It is not a policy document and does not impose requirements on individual councils.

Importantly, local government funding is limited and varies across London Boroughs. While some may support retrofit and energy transition programmes, others may currently lack dedicated funding. National schemes like Warm Homes must be expanded, with clear signposting for the "able-to-pay" category to enable action at scale.

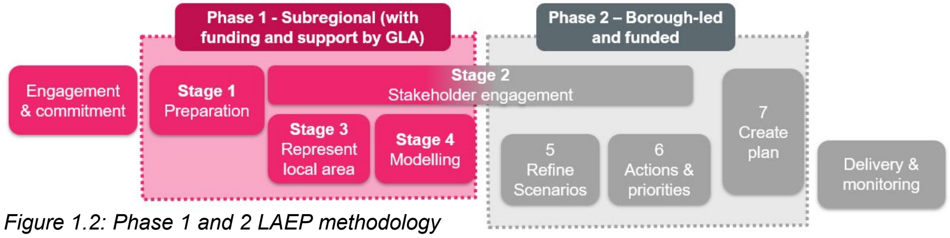

Figure 1.2: Phase 1 and 2 LAEP methodology

Scope of a Phase 1 LAEP for East London Subregion

The LAEP methodology, originally developed by Energy Systems Catapult, is a collaborative process across seven stages that aims to identify the most cost-effective pathway to decarbonisation of the region, across technology areas that include buildings, transport, heat and power.

The Phase 1 subregional LAEP focuses on stages 1 to 4, including preparation and collation of data, stakeholder engagement, baseline representation of the local area, and modelling of technology contributions to reach decarbonisation targets. This will enable boroughs to build on this common evidence base and develop their own borough-specific action plans with greater efficiency.

Energy Systems Catapult has published full guidance on LAEP methodology here.

Objectives & critical success factors

The objectives of this Phase 1 LAEP for East London subregion are as follows:

- **To establish a coordinated approach to local area energy planning across London** – especially consistency of data and evidence base.
- To provide evidence to contribute to network planning
- To understand the impacts of implementing the **Mayor of London's Accelerated Green decarbonisation pathway**, and to identify the effects of this pathway on London's energy systems and wider built environment.
- Identification of **subregional scale issues** and **interdependencies**
- Compilation of **robust datasets** to facilitate a variety of future use cases, via the GLA's LAEP Datahub
- To develop an **evidence base for a project,** including the London Plan Review, that could be implemented at subregional scale following the completion of the LAEP

Through the capacity building and stakeholder engagement embedded throughout the project, this programme aims to empower boroughs to move ahead with implementing actions that will achieve real changes in the energy system and help them achieve net zero goals.

1. Introduction

Overview and additional background information

National Policy Context

The UK Government committed to net zero carbon emissions by 2050 through an amendment to the **Climate Change Act** in 2019, setting the legal foundation for a national transition. This commitment is supported by a suite of strategies and regulations aimed at decarbonising energy, housing, and transport, some of which are described here.

The Future Homes and Buildings Standard, expected in 2025, will require new developments to be gas-free and deliver significantly lower emissions, with solar PV and high-efficiency insulation becoming standard features.

Recent strategies such as the **Plan for Change** and the **Clean Power 2030 Action Plan** outline the UK's ambition to become a Clean Energy Superpower, accelerate infrastructure delivery, and remove barriers to clean energy investment. The **Powering Up Britain Energy Security Plan** complements these efforts by focusing on scaling up technologies like heat pumps, EVs, and smart meters to build a resilient, low-carbon energy system. These national frameworks provide essential context for local energy planning and investment.

Other policies shaping local energy planning include:

RESP (Regional Energy Strategic Plan): Enables coordinated regional planning across electricity, gas, and hydrogen systems.

Energy Act 2023: Introduces **Heat Network Zoning**, identifying areas best suited for low-carbon heat networks.

Planning and Energy Act 2008: Allows boroughs to set local energy efficiency standards beyond national regulations.

These frameworks provide the foundation for London's local energy strategies and support boroughs in delivering net zero.

Mayor's Accelerated Green Pathway

A key foundation for this analysis is the London Zero Carbon Pathways analysis, developed by Element Energy in 2021 for the GLA. This outlines several decarbonisation scenarios, including the Accelerated Green pathway – identified as the Mayor of London's committed route to achieving net zero by 2030.

The Accelerated Green pathway sets out the scale of intervention needed across London, including widespread deployment of heat pumps, solar PV, district heat networks and building retrofit. This modelling at borough-level provides a strategic starting point for the more detailed, locally-tailored analysis presented in this report.

The GLA's LAEP Datahub

To support boroughs and other local stakeholders in the delivery of LAEPs and energy projects, the GLA have developed the LAEP Datahub, which houses the layers of data compiled from previous LAEP projects and will ingest the data from this project once completed. The Datahub holds spatial data on building stock, heat demand, solar potential and infrastructure constraints, and includes interactive tools for visualisation and analysis. By standardising this data the Datahub seeks to streamline decision making and facilitate projects that will align with London's ambitious net zero targets.

Data analysis has been undertaken at the most granulated level appropriate, with some data sets used at the building level, Lower-layer Super Output (LSOA) level (a geographical area of consistent population size of 1000-3000 people), substation level, or Borough level. Providing a balanced approach to data complexity and level of detail, most of the analysis has been undertaken and displayed at the LSOA level.

Further granularity of data can be explored in subsequent analyses such as a Phase 2 LAEP.

1. Introduction

Overview and additional background information

Stakeholder engagement

Stakeholder engagement is key for the development phase a LAEP, to ensure the work utilises the best sources of data and best represents the local area, and it will also be key in the delivery of the outcomes of the LAEP. To this end, stakeholder engagement was carried out throughout the project, and described below. Key stakeholders include Borough officers of the five East London Boroughs, as well as National Grid, UK Power Networks (UKPN), London Councils, Thames Water, Department of Energy Security and Net Zero (DESNZ), Cadent, Cory, SGN and TfL.

The engagement process included:

- Project commencement workshop, with all Boroughs and primary stakeholders, to present an overview of the project approach, objectives, and a request for key information;
- Bilateral meetings with Boroughs and other key stakeholders to discuss data collection, understand borough readiness and capacity building needs;
- An interim all-Borough collaborative workshop, in which we provided an update on the work, developed a long list of actions, and discussed the selection of the decarbonisation project to take forward to SOBC;
- Borough review of draft report;
- Project close workshop to comet at the end of the project to discuss findings and next steps.

Local government funding context

Delivering LAEPs and associated retrofit and decarbonisation programmes requires coordinated support across multiple stakeholders, including local authorities. However, it is important to acknowledge that local government funding is generally constrained and varies significantly across London Boroughs. While some Boroughs may be able to allocate limited resources to support retrofit initiatives, others may currently have no dedicated funding available for such schemes.

This disparity underscores the critical role of national government support mechanisms, such as the Warm Homes programme, which must be expanded and adequately resourced to meet the scale of retrofit required. For households in the "able-to-pay" category, clear signposting to available government schemes will be essential to enable action. The LAEP therefore assumes that future delivery will rely on a combination of national funding, private investment, and targeted local authority support where feasible.

Report structure

This report is split into the following chapters:

1. **Introduction:** this section
2. **Current energy system**: summarises an overview of the subregion, including energy demands and carbon emissions by sector, socio-economic characteristics, an assessment of the built environment and existing infrastructure
3. **Future energy system:** summarises the expected growth in the region based on projected development, and describes three decarbonisation scenarios and their results in terms of technology deployment, energy demand, cost and carbon emissions.
4. **Decarbonisation opportunities & action planning:** includes an assessment of the potential of key decarbonisation measures: heat networks, building retrofit, heat electrification, transport electrification, renewables and grid upgrades, and the recommended actions for unlocking these opportunities.
5. **Next steps:** describes next steps for boroughs beyond LAEP Phase 1.
6. **Appendices:**
   1. Borough profiles
   2. Workflow diagrams
   3. Further results (retrofit and heat networks modelling)

2. Current energy system

Contents:

- Subregion overview
- Subregion baseline
- Buildings: Existing building stock, performance, heating systems
- Networks: Electricity, gas, heat
- Transport: Existing vehicle stock, mileage, charging infrastructure
- Renewables: Existing installed capacity

2. Current energy system
Overview

2.1 Subregional overview

A robust understanding of the existing energy system is essential to inform future planning and scenario development. The baseline assessment provides a detailed picture of current energy demand, infrastructure, and technology deployment across the subregion, forming the foundation for all subsequent modelling.

The baseline includes a comprehensive characterisation of both domestic and non-domestic building stock, using data from the London Building Stock Model and other sources. For domestic buildings, key attributes such as age, construction type, EPC rating, and heating system type are considered. The majority of homes are currently heated by individual gas boilers, with only a small proportion using heat pumps or connected to communal or district heating systems. In the non-domestic sector, typologies such as retail, office, and hospitality are benchmarked using national datasets to estimate energy demand and retrofit potential.

The current extent of low-carbon heating technologies is also captured, including existing heat pumps, communal heating systems, and district heat networks. These are mapped and assessed for their potential to be decarbonised or expanded, particularly in areas of high heat demand density.

The baseline also includes a spatial analysis of electric vehicle (EV) infrastructure, covering the number and distribution of public charge points, large car parks, and fleet depots. This is critical for understanding future electricity demand and identifying where reinforcement or flexibility measures may be needed.

Local renewable electricity generation is assessed with a focus on rooftop solar PV. While current installed capacity remains modest, the subregion has significant untapped potential. The modelling considers both existing installations and the theoretical potential identified through the London Solar Opportunity Map. Battery storage is assumed to be co-located with PV in many cases, enabling greater on-site consumption and reducing export-related grid stress, particularly in areas with summer peak demand.

For new developments, it is assumed that all new homes and non-domestic buildings will be net zero compliant from the outset. This reflects current policy direction and avoids adding to the retrofit burden in the future. Planned growth in housing and commercial floor space is also factored into the baseline, as these developments will influence future energy demand and infrastructure requirements.

The East London subregion is characterised by a predominance of residential buildings, which make up the vast majority of the total floor area across the subregion, although there is notable differences between the make up of each borough. For instance, Bromley has a significant proportion of domestic building stock, whilst in Barking and Dagenham, non-domestic and industrial buildings comprise a larger proportion of the total buildings stock.

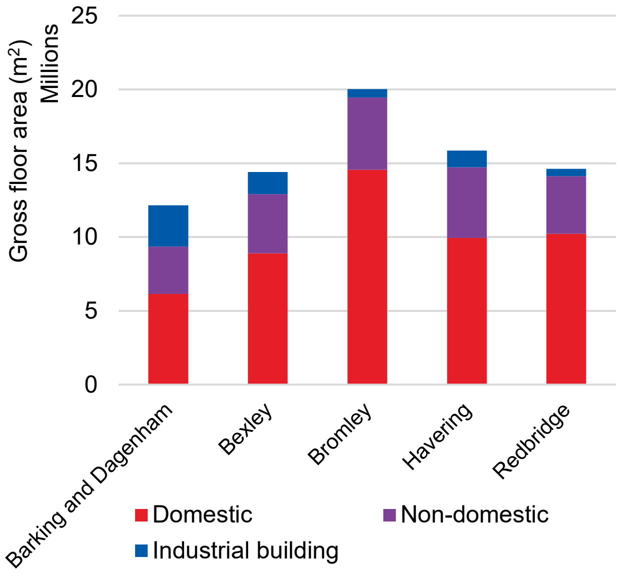

Figure 2.1: Breakdown of existing building floor area by borough, source: London Building Stock Model v2

2. Current energy system
Overview

2.1 Subregional overview (cont.)

The East London subregion is a dynamic and evolving part of the capital, with a rich mix of urban, suburban, and greenbelt landscapes. It is home to several of the Opportunity Areas identified as part of the Mayor's London Plan, which demonstrate them to be priority areas for new developments, jobs and infrastructure.

The East London subregion is home to over 1.27 million people as of 2021 census data. This has risen for the entire subregion by 10% since 2011, with Barking and Dagenham experiencing the largest growth of 18%, Bexley the lowest of 6% and the other boroughs between 8-11%. This entire subregion is experiencing higher growth than the both the Greater London increase of 8% and the national value of 6.6%

With ambitious plans for housing and infrastructure growth, the East London subregion is positioned to become a regional leader in sustainable development, clean energy innovation, and inclusive climate action.

In line with the Mayor's Accelerated Green Pathway, heating and transport energy demands, currently dominated by fossil fuels, are expected to shift rapidly toward electrification. This transition, combined with population growth and new developments, places increasing pressure on the local energy system, which includes ageing grid infrastructure and limited flexibility in some boroughs. The subregion also contains critical energy assets, including substations, industrial estates, and transport corridors, which must be upgraded to support decarbonisation and resilience.

The Index of Multiple Deprivation (IMD) provides a more holistic view of societal vulnerability than fuel poverty alone. It incorporates factors such as income, employment, education, health, crime, housing access, and the living environment. The correlation between high IMD scores and fuel poverty is particularly strong in the eastern corridor of the subregion, where socio-economic challenges are most acute. It is important to consider in delivering a just transition and highlights target areas for subsidies and potential prioritisation of technology deployment.

Figure 2.2 shows Barking and Dagenham with higher levels of deprivation, with dark-shaded areas indicating a high likelihood of fuel poverty. These communities often face compounding issues such as poor housing stock and limited access to retrofit funding. Havering and Redbridge exhibit mixed levels of deprivation, with darker zones around the north of Havering and Ilford. These areas are likely to benefit from targeted interventions to improve energy efficiency and affordability.

Bexley and Bromley show generally lower levels of deprivation, though pockets of vulnerability remain, particularly in peripheral or older housing areas.

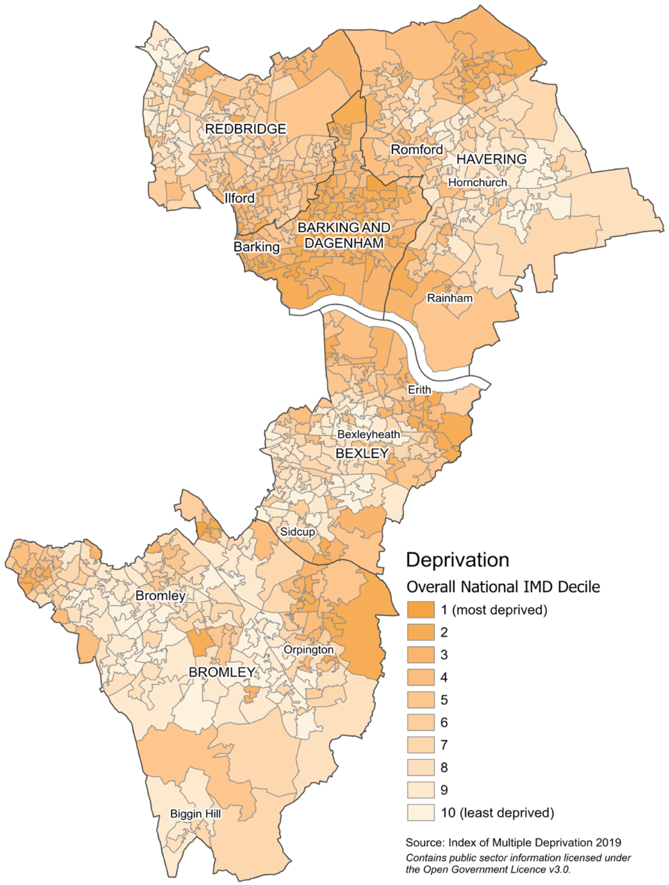

Figure 2.2: Subregional map of overall deprivation. Source: English indices of depreivation 2019

2. Current energy system
Overview

2.2 Net zero plans and initiatives

A comprehensive review of local and regional policy frameworks was undertaken, covering all five East London boroughs, alongside engagement with the Greater London Authority (GLA), utilities, Ofgem, and DESNZ. This review assessed gaps in policy and strategy related to the development of a low-carbon, whole energy system, and captured existing investment plans for infrastructure such as renewable energy projects, heat networks, and EV charging hubs.

The GLA's Net Zero targets aim for London to achieve net zero carbon emissions by 2030. Most East London boroughs have reflected this ambition in their local climate strategies and action plans, though the pace and scope of implementation vary depending on local context, resources, and infrastructure readiness.

The scale of transformation required across East London subregion's energy system is substantial. The Mayor's Accelerated Green Pathway has been adopted as the baseline scenario for this study to mirror a consistent pathway with other London boroughs with 2030 targets. In East London, the committed boroughs have set 2050 targets. However, each borough faces distinct challenges and opportunities, from grid constraints and fuel poverty to regeneration zones and industrial land, which may influence the specific pathway they follow.

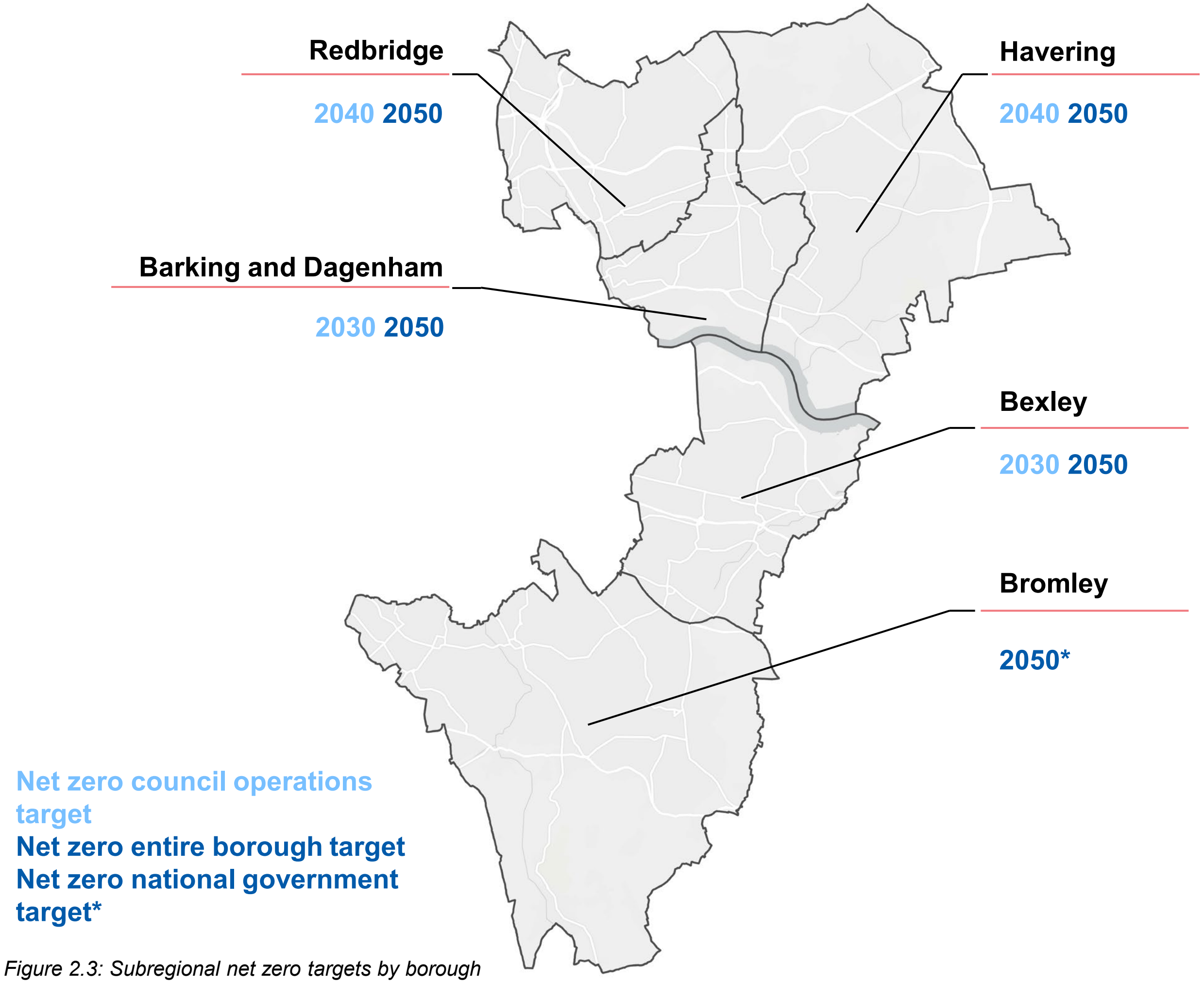

Figure 2.3: Subregional net zero targets by borough

2. Current energy system
Overview

2.3 Subregion baseline

The baseline 2025 energy demand and carbon emissions profiles across the East London subregion reveal distinct patterns in consumption and environmental impact.

Heat demand is the most significant contributor to overall energy use in all boroughs, particularly in Bromley and Redbridge, which also show the highest carbon emissions from heating due to the reliance on gas, a fossil fuel, highlighting the need for low-carbon heating solutions to meet net zero targets.

Electricity demand is high, with Bromley and Havering leading, and electricity for EV charging is most prominent in these same boroughs, suggesting stronger electric vehicle adoption. Transport-related energy demand and emissions are substantial in Havering and Bromley, reflecting continued reliance on fossil fuel vehicles.

Electricity emissions are relatively consistent across boroughs, with Bromley again slightly ahead. These patterns suggest that targeted interventions in heating efficiency, transport electrification, and renewable electricity generation could significantly reduce overall emissions, especially in the highest-consuming and highest-emitting boroughs .

Please see Appendix A2 for baseline data methodology.

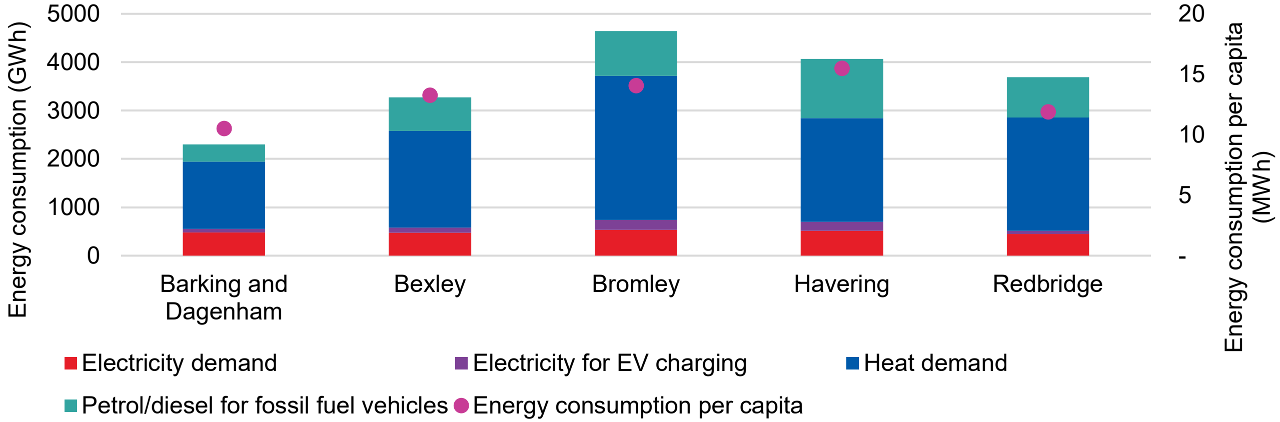

Figure 2.4 Breakdown of baseline annual energy demand, sources: London Building Stock Model v2, transport data – see Appendix A2

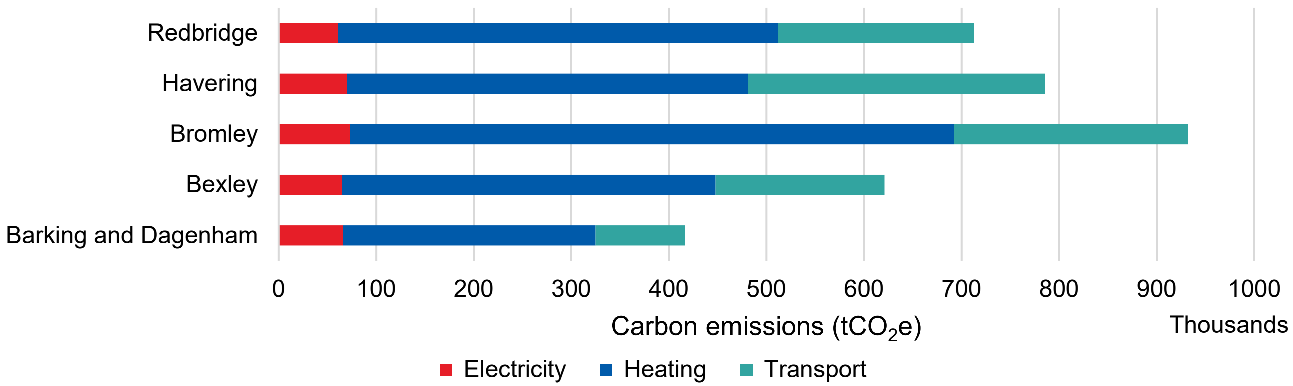

Figure 2.5 Breakdown of baseline annual carbon emissions, sources: London Building Stock Model v2, transport data – see Appendix A2

2. Current energy system
Buildings

2.4 Existing building stock

2.4.1 Domestic housing stock

The East London subregion presents a diverse housing tenure profile, with notable variation across boroughs in the balance between owner-occupied, private-rented, and social housing. This has important implications for the design and delivery of retrofit and decarbonisation programmes.

Owner-occupied homes make up the majority of the housing stock in all five boroughs, particularly in Bromley, Havering, and Bexley.

Private-rented housing is most prominent in Redbridge, where it accounts for nearly a third of the housing stock. This tenure type can be more challenging to decarbonise due to split incentives between landlords and tenants. Policy levers such as minimum energy efficiency standards (MEES) and landlord engagement programmes will be key to driving improvements in this sector.

Social housing is particularly significant in Barking and Dagenham, where it accounts for over 22,000 homes, of which 17,000 are council owned, more than in any other borough in the subregion. This presents a major opportunity for borough-led retrofit programmes, especially where stock is concentrated and under single ownership.

Understanding tenure patterns helps tailor delivery models and funding approaches, ensuring that retrofit and decarbonisation efforts are both effective and

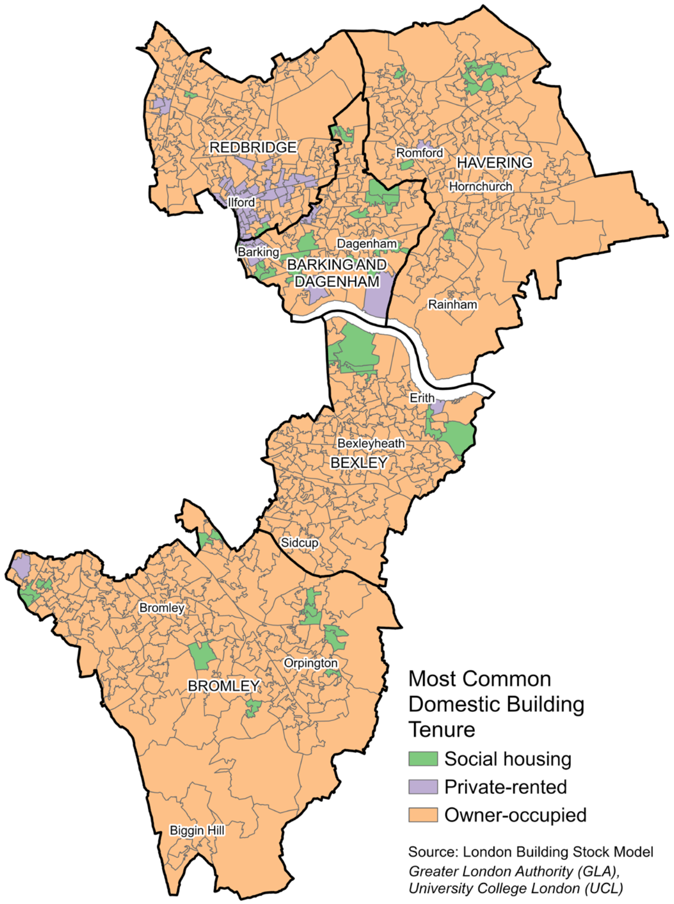

Figure 2.6: Map of most common housing tenure

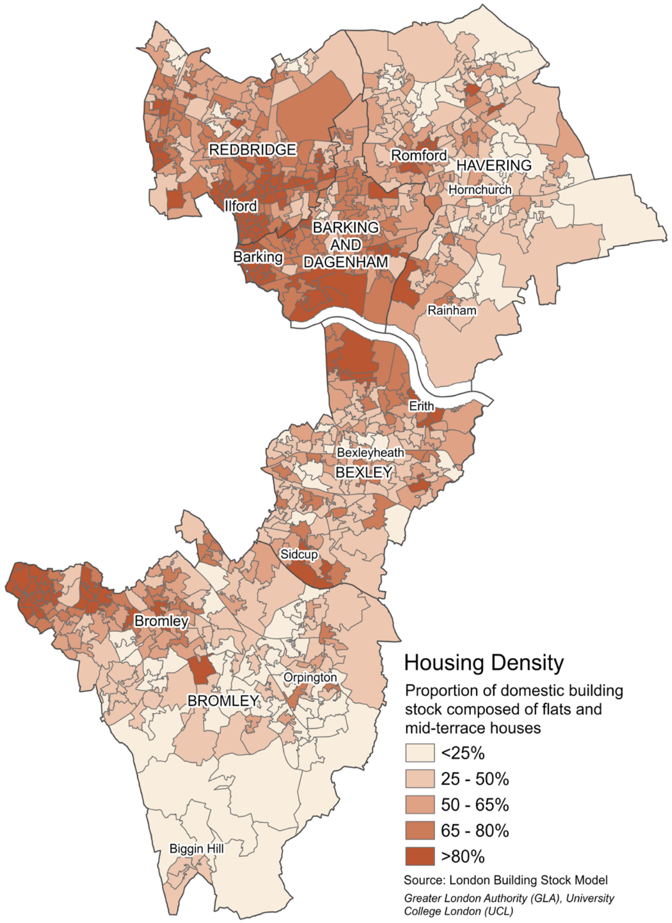

Figure 2.7: Subregion housing density map

2. Current energy system
Buildings

2.4 Existing building stock

2.4.2 Non-domestic building stock

Bromley has a strong commercial presence, while Redbridge and Bexley show a higher concentration of community and cultural buildings, reflecting sustained investment in civic infrastructure. Havering has a significant proportion of buildings classified as mixed use, typically developments with commercial units on the ground floor and residential or office space above, and undefined buildings, which are currently not yet categorised. This pattern suggests an evolving urban landscape, where newer mixed-use developments are becoming more common, often as part of regeneration or densification strategies.

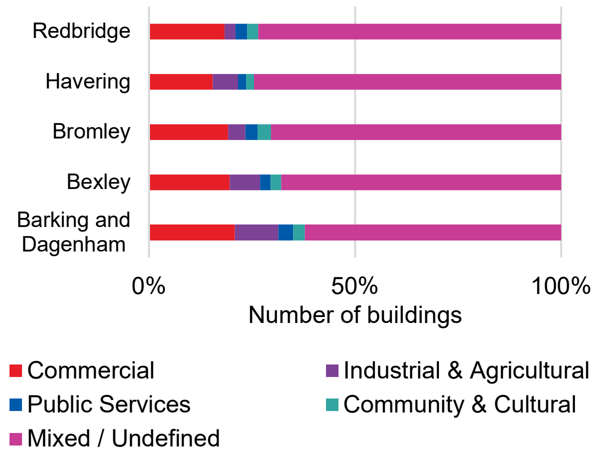

Figure 2.8: Count of non-domestic buildings by typology, sources: London Building Stock Model v2

Barking and Dagenham has the smallest non-domestic stock overall, which may indicate a more residential character or limited provision of public and commercial facilities relative to other boroughs.

2.4.3 Social factors

Fuel poverty is influenced by a combination of factors including household income, energy prices, and the energy efficiency of homes. While decarbonisation offers the potential for more efficient, lower-cost energy systems, there is a risk that the higher unit cost of electricity, compared to gas, could exacerbate fuel poverty if not managed carefully.

The East London subregion is characterised by significant socio-economic diversity, with some of the most deprived communities in the UK alongside areas of affluence. Fuel poverty levels vary widely across the subregion, with several wards largely exceeding the national average of 13.4%. This is most prominent in areas of Barking and Dagenham, with pockets in Bromley, Bexley and Redbridge.

To help address this disparity and reduce fuel poverty, whilst ensuring resilience of the future wider energy system, there is a strong need for energy efficiency improvements in homes – the opportunity for which is explored later.

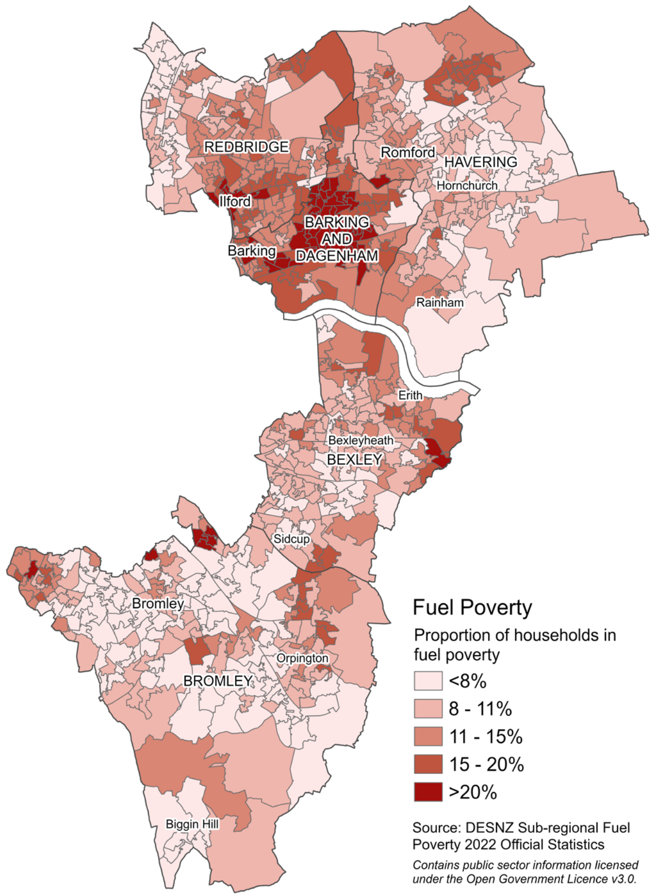

Figure 2.9: Subregional map of fuel poverty

2. Current energy system
Buildings

2.4 Existing building stock

2.4.4 Current energy performance

Figure 2.10 shows the energy performance of the building stock across the East London subregion is generally moderate, with most properties falling into EPC Grades C and D. This pattern is consistent across all five boroughs, indicating that while buildings are not performing at the lowest levels, there is still considerable scope for improvement. The map highlights areas of lower performance, with darker zones, particularly in parts of Redbridge, Havering, and Barking and Dagenham, indicating clusters of poorly performing buildings that may be older or less energy efficient.

Notably, Barking and Dagenham stands out with the highest proportion of higher-performing buildings, with 14% rated A or B. This suggests some success in newer developments and/or retrofit efforts. If the borough were to focus on upgrading buildings currently rated D to a C rating, nearly 90% of its stock would be rated C or above, significantly improving overall performance, such as ongoing schemes supported by the Warm Homes Social Housing Fund. This highlights the potential impact of targeted, incremental improvements across the subregion, particularly in areas where the majority of buildings are already close to meeting higher standards.

Figure 2.11 shows the high-performance buildings (A-B rated) are notably scarce across all tenure types, underscoring the challenge of achieving top-tier energy standards in the current housing landscape. This shortfall is especially pronounced in the private-rented sector, which consistently shows lower energy performance compared to owner-occupied and social housing.

Social housing performs relatively better in the C rating band, indicating some success in energy efficiency initiatives within this tenure. However, it still trails behind owner-occupied properties overall, and a considerable portion remains in the lower E and F-G bands.

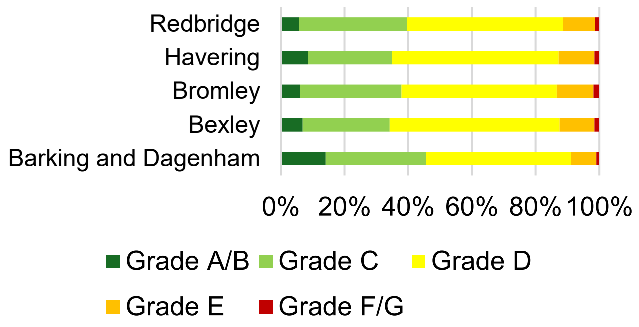

Figure 2.10: Breakdown of domestic buildings per EPC rating

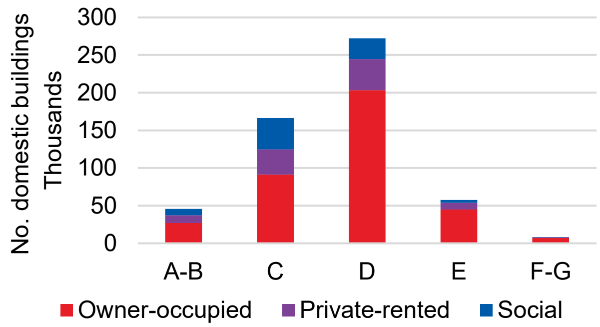

Figure 2.11: EPC rating of domestic stock by tenure

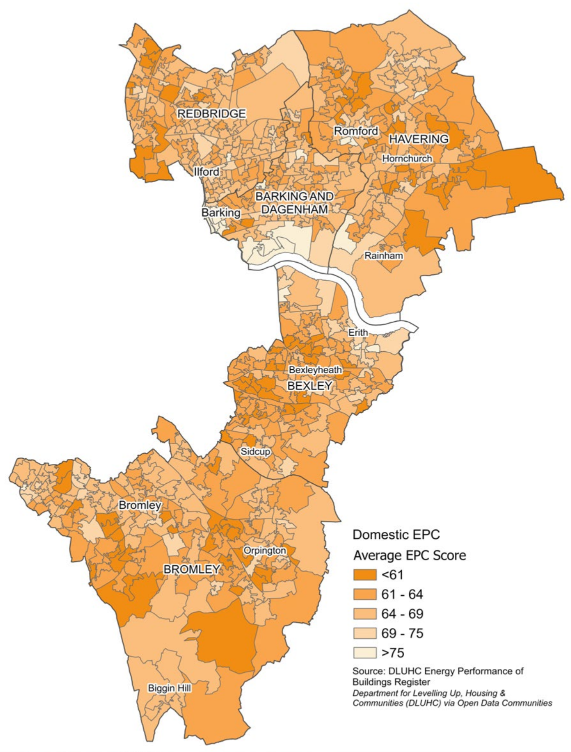

Figure 2.12: Subregion existing energy performance

2. Current energy system
Buildings

2.4 Existing building stock

2.4.5 Heating demand

Heating demand across the East London subregion varies significantly by geography, building typology, and land use. High-density heat demand areas are concentrated in Bromley, west Redbridge, and east Havering, where older housing stock and limited energy efficiency measures contribute to elevated thermal loads. These areas present strong potential for coordinated retrofit programmes and, in some cases, the development of heat networks.

A large proportion of domestic heat demand is associated with semi-detached properties, which are prevalent across all five boroughs. These homes typically have higher heat loss than flats and terraces, making them a key target for fabric efficiency upgrades and low-carbon heating interventions such as heat pumps.

In contrast, Barking and Dagenham and parts of Bexley exhibit lower overall heat demand density, which may reflect a combination of newer housing stock and relatively higher energy performance. Lower-density demand zones are also observed in more industrial areas, where domestic buildings are less concentrated.

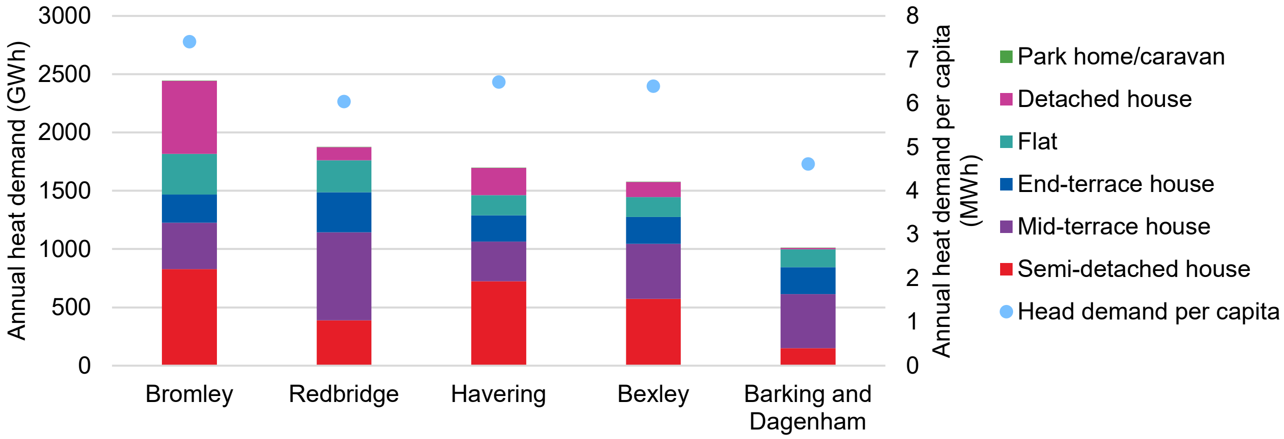

Figure 2.13: Current domestic heating demand by housing type

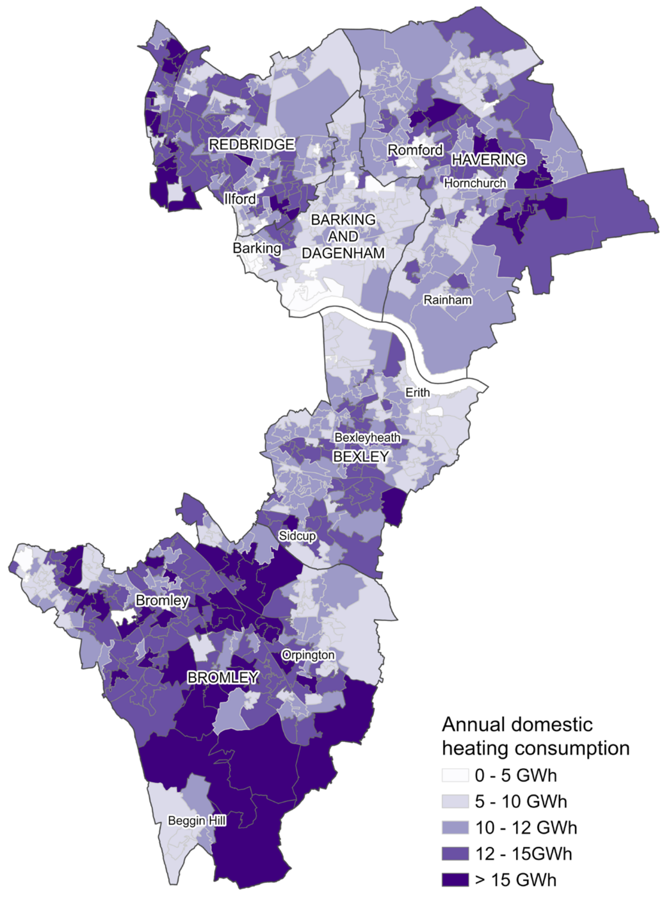

Figure 2.14: Annual domestic heating consumption

2. Current energy system
Buildings

2.4 Existing building stock

In the non-domestic sector, some of the highest areas of heating demand density correspond to built-up industrial zones, particularly in regions of Havering, Barking and Dagenham, and Bexley adjacent to the Thames. Within this sector, retail buildings account for the largest share of annual heat demand, followed by industrial premises and schools. These typologies often have large floor areas and extended operating hours, contributing to sustained thermal loads. Their inclusion in future retrofit and heat network planning will be essential to achieving subregional decarbonisation targets.

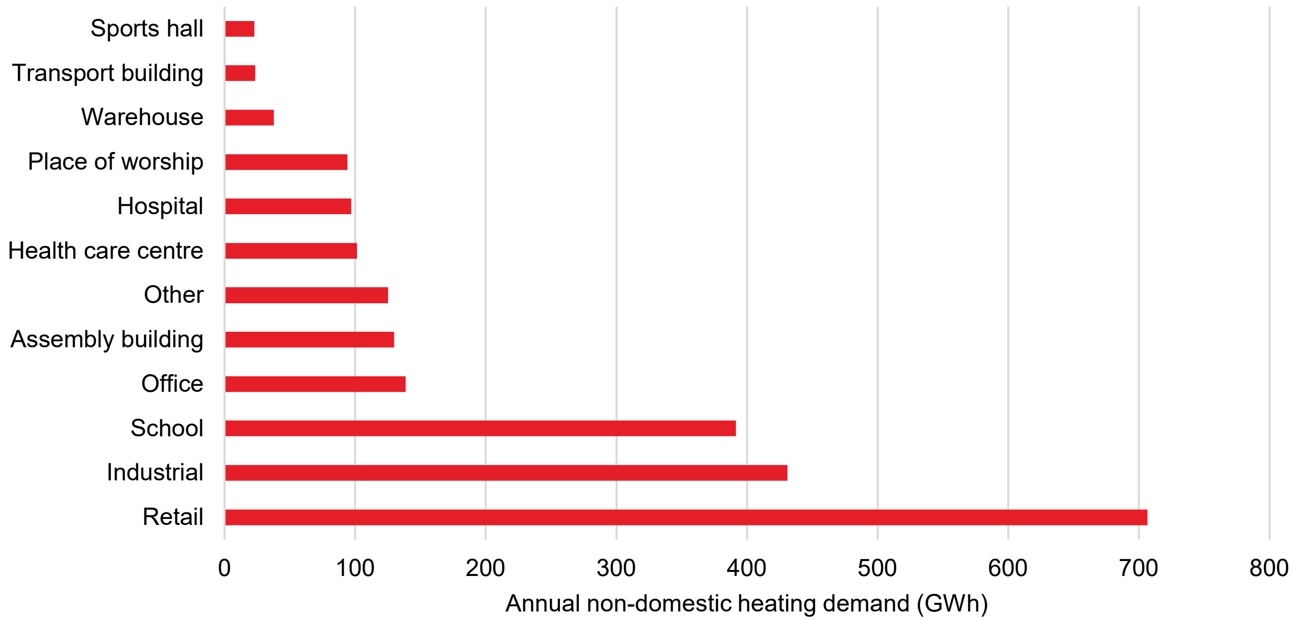

Figure 2.15: Current non-domestic heat demand by typology.
Source: Skenario Labs CRE Modelling Results for East London Boroughs

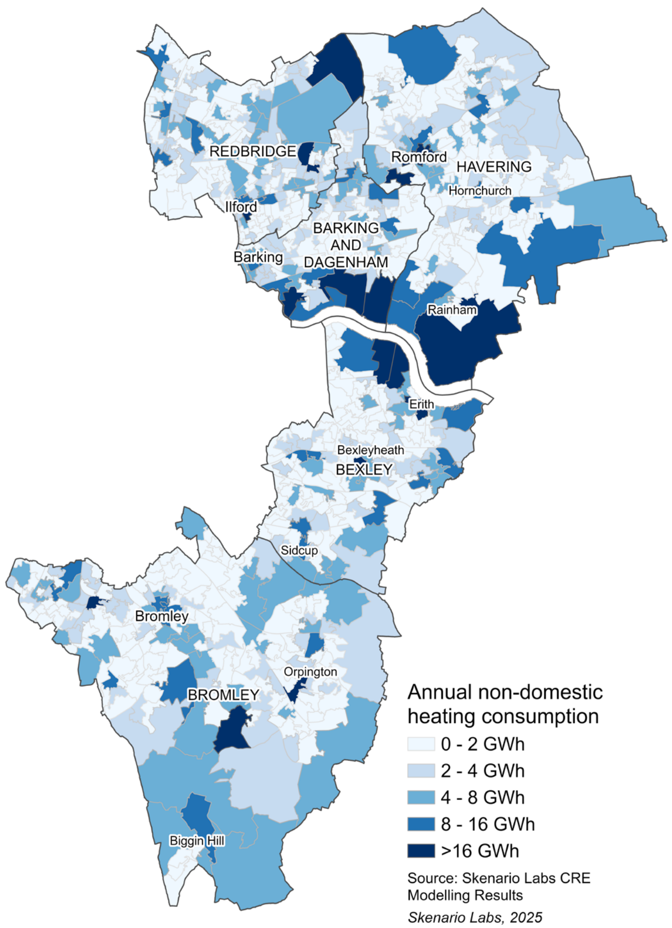

Figure 2.16: Annual non-domestic heating consumption

2. Current energy system
Buildings

2.4 Existing building stock

2.4.6 Heating systems

Across the subregion, gas boilers remain the dominant heating system, particularly in homes rated EPC C and D, which make up the bulk of the housing stock. However, as energy efficiency declines (moving toward EPC E and F-G), there's a noticeable increase in the use of room and storage heaters, which are typically less efficient and more costly to run. Heat pumps, while present, are still relatively rare and mostly found in homes with higher EPC ratings (A-B), suggesting limited uptake of low-carbon heating technologies to date.

When broken down by borough, Barking and Dagenham shows a higher proportion of homes using communal heating systems, likely reflecting its social housing stock. In contrast, Bromley and Redbridge have a greater share of boiler-based systems, aligning with their larger owner-occupied housing segments. The tenure breakdown further reinforces this pattern: owner-occupied homes are more likely to have boilers, while social housing shows a more mixed profile, including communal systems and a small share of heat pumps. Private-rented homes tend to have a higher proportion of less efficient heating types, such as room heaters, which may reflect lower investment in upgrades.

Overall, the data suggests that while traditional boiler systems dominate, there are clear opportunities to improve heating efficiency, particularly in lower EPC-rated homes and private-rented sectors, by expanding access to low-carbon alternatives like heat pumps and improving insulation standards.

For non-domestic buildings, gas boilers and electric heating systems make up the majority of the heating systems across the subregion. Gas boilers are most common in schools, assembly buildings, health care systems and industrial buildings. Gas boilers are typical to larger or public-use buildings with consistent heating demand and legacy infrastructure. Additional , electric heating is most prevalent in retail buildings and offices, and also common in light commercial and mixed-use buildings, likely due to lower installation costs and simpler infrastructure.

Figure 2.18 shows existing heat pumps are distributed across the subregion, particularly in areas of low deprivation, such as East Havering and areas of Bromley. Communal systems are spread across the subregion, with gas-led systems clustered around Ilford and Bromley representing an early opportunity for intervention. Electric based communal systems are prominent in Barking.

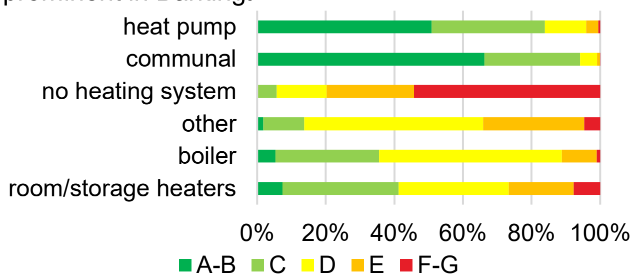

Figure 2.17: Domestic building performance by heating system

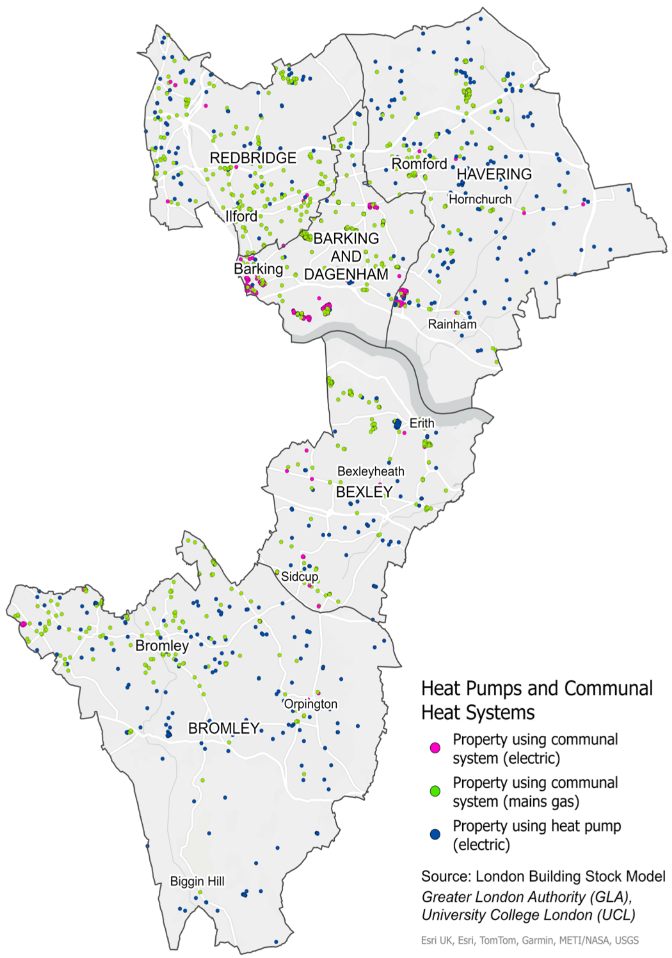

Figure 2.18: Existing domestic properties with heat pumps and communal heat systems

2. Current energy system
Buildings

2.4 Existing building stock

2.4.7 Domestic electricity demand

Electricity demand across the East London subregion shows clear spatial variation, shaped by building typologies, occupancy patterns, and energy performance. High-density electricity demand areas are typically associated with blocks of flats, which, while contributing less to heat demand, account for a disproportionately large share of electricity use, particularly for lighting, appliances, and communal services.

In contrast, Barking and Dagenham and the northern parts of Bexley exhibit lower electricity demand density, which may reflect a combination of newer housing stock and relatively higher energy efficiency. These areas may also have lower concentrations of high-rise residential buildings, contributing to reduced aggregate demand.

Electricity demand density is typically lower in industrial areas due to lower building density and the intermittent or low-intensity nature of some industrial activities. However, this is not always the case, for example, the southern industrial zone of Barking & Dagenham shows high electricity demand, driven by large-scale, energy-intensive industrial operations in smaller more compact industrial zones.

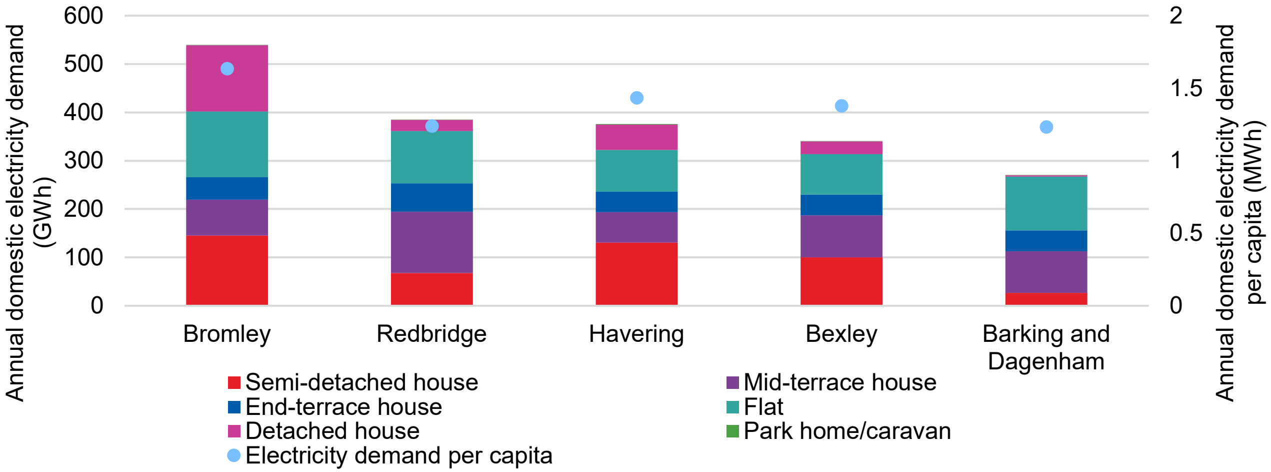

Figure 2.19: Annual domestic electricity demand by housing type

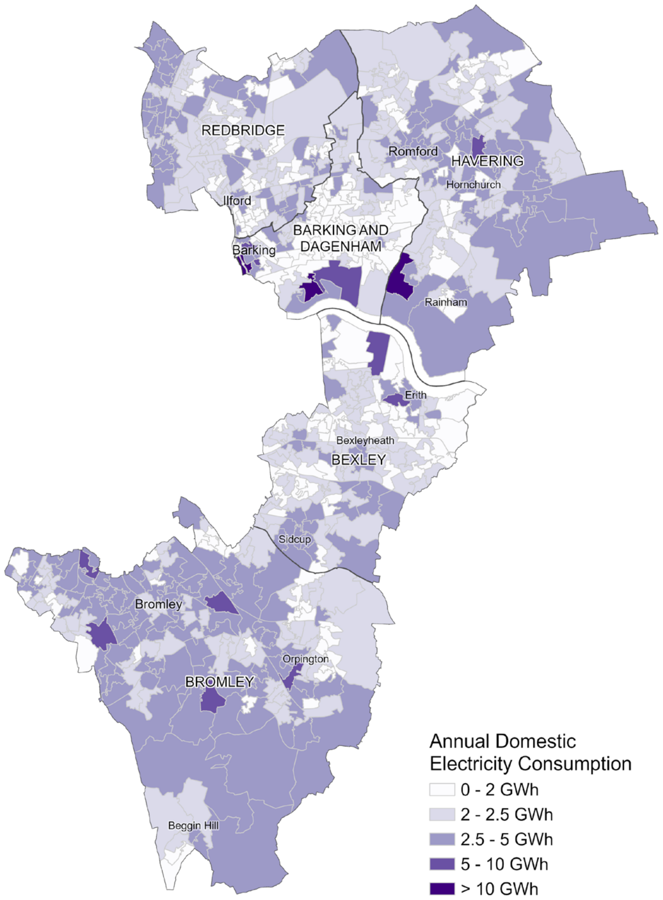

Figure 2.20: Annual domestic electricity consumption

2. Current energy system
Buildings

2.4 Existing building stock

In the non-domestic sector, some of the highest electricity demand densities are found in built-up industrial areas, particularly in parts of Havering, Barking and Dagenham, and Bexley adjacent to the Thames.

These areas include large-format retail, warehousing, and light industrial uses, all of which contribute to sustained electricity loads. Retail buildings account for the largest share of non-domestic electricity demand, followed by industrial premises, which often operate extended hours and require significant power for machinery, lighting, and HVAC systems. Data centres are not included as they typically connect into the

Outside these zones, electricity demand density is relatively low, particularly in more suburban areas of Bexley, Bromley, and Havering, reflecting a lower concentration of energy-intensive commercial activities.

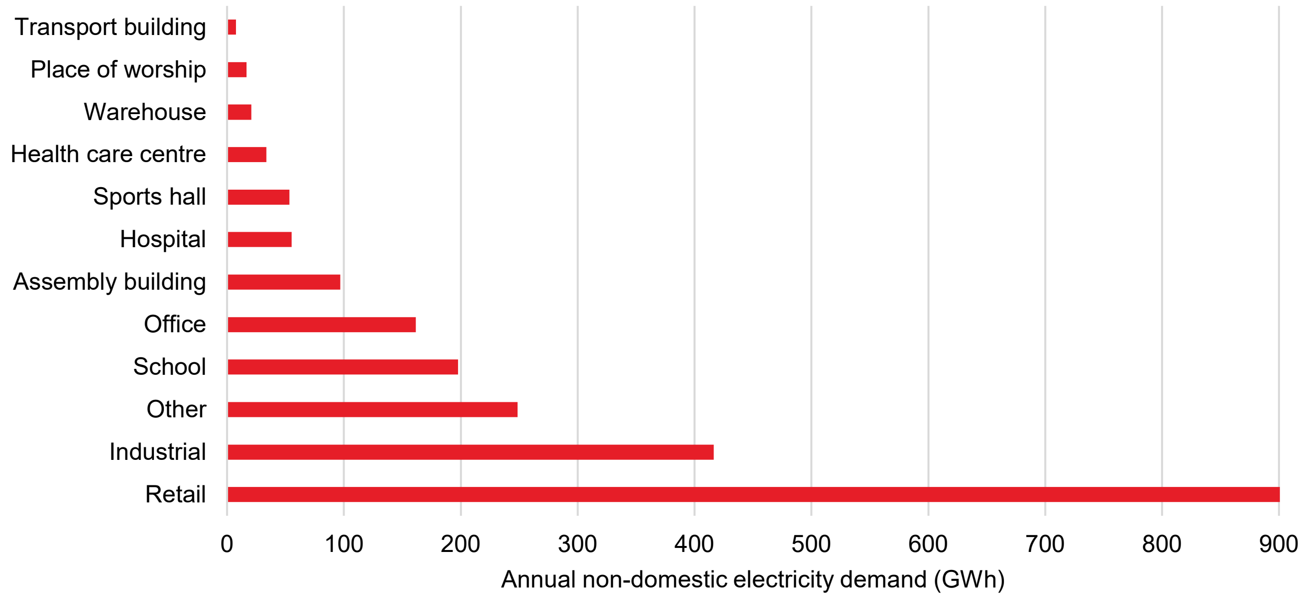

Figure 2.21: Annual non-domestic electricity demand by typology.
Source: Skenario Labs CRE Modelling Results for East London Boroughs

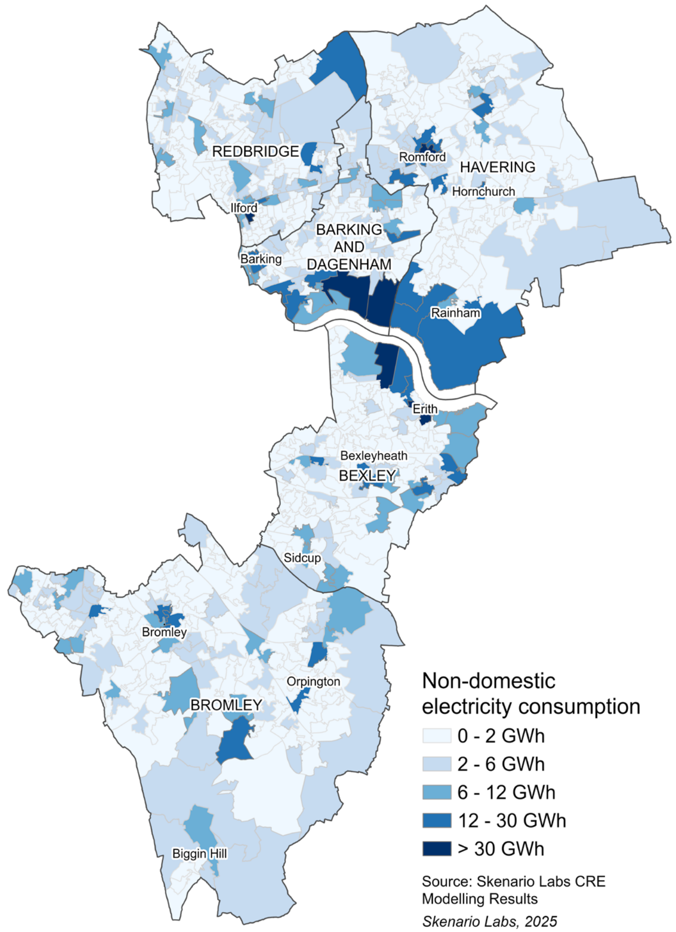

Figure 2.22: Annual non-domestic electricity consumption

2. Current energy system
Networks

2.5 Electricity infrastructure

2.5.1 Electricity Grid

Electricity infrastructure across the subregion presents a mixed picture, with limited headroom at the primary substation level observed across all five boroughs. While capacity constraints vary, most substations are operating close to their limits, which may restrict the connection of new demand loads or generation assets without reinforcement. An exception is noted north-west of Romford, which currently shows relatively high headroom. This may present a short-term opportunity for strategic deployment of electrified technologies, including heat pumps, EV charging hubs, and rooftop solar PV.

At the secondary substation level, headroom varies widely across the subregion, with localised pockets of both high and low capacity. These variations are critical to understanding the feasibility of electrification at the neighbourhood scale and will inform borough-level LAEPs and future infrastructure planning.

UK Power Networks are the Distribution Network Operator responsible for this subregion, with energy supplied to them from National Grid via Grid Supply Points. Data gaps, shown in grey on network maps, may reflect incomplete datasets or limited visibility. Planned projects are not always captured. Overlapping secondary substation polygons indicate multi-substation coverage, which complicates analysis but potentially enhances resilience and planning flexibility.

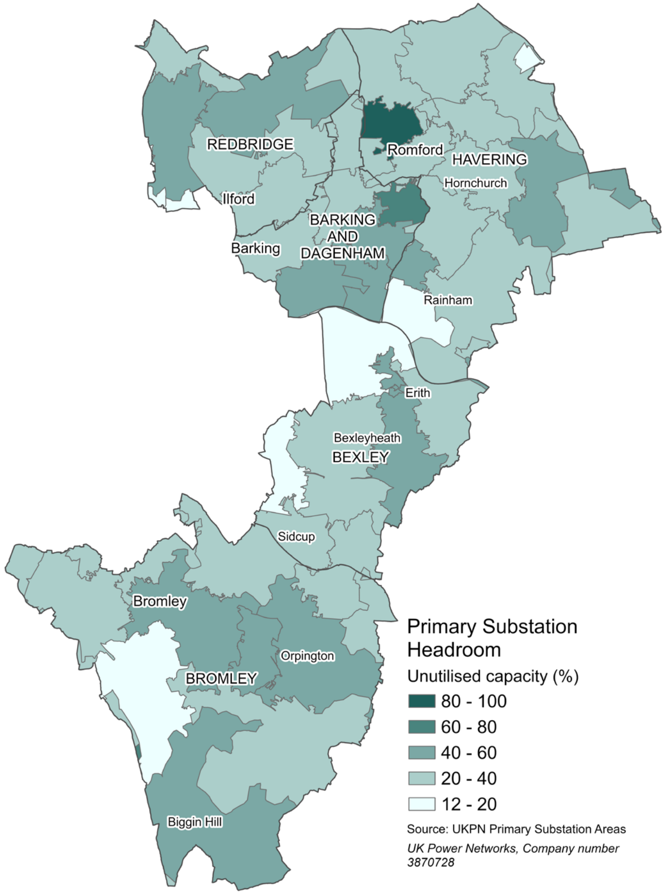

Figure 2.23: Primary substation headroom % (source)

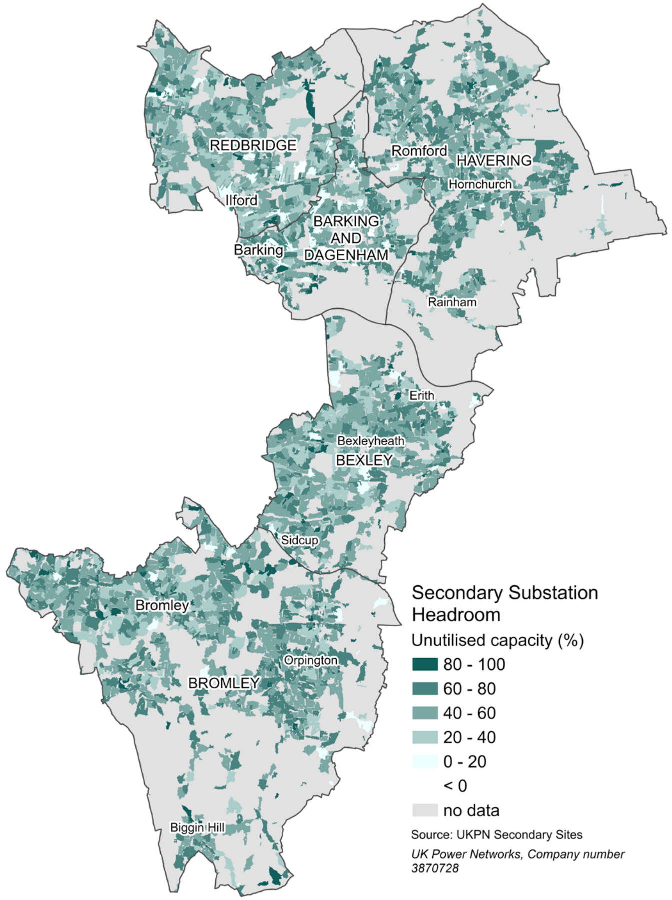

Figure 2.24: Secondary substation headroom % (source)

2. Current energy system
Networks

2.5 Electricity infrastructure

Understanding these spatial patterns of network capacity is essential for aligning low-carbon technology deployment with infrastructure readiness and for identifying where flexibility measures or reinforcement may be required.

2.5.2 Data centres

The East London subregion is experiencing growing interest in data centre development, driven by proximity to central London, availability of industrial land, and increasing demand for digital infrastructure. However, this growth presents significant challenges for electricity infrastructure, particularly in boroughs like Barking and Dagenham and Havering, where land availability and grid access are relatively scarce.

Data centres, defined by NESO as "dedicated buildings for computing, excluding servers within other commercial buildings", are among the most energy-intensive facilities, requiring continuous, high-capacity power supply. According to National Grid, data centre electricity demand is expected to increase six-fold over the next decade, driven by AI, cloud computing, and digital services. This surge places additional pressure on already constrained grid infrastructure in London and the Southeast.

In East London:

- Primary substations near industrial zones (e.g., Barking Riverside, Rainham, and Romford) are likely candidates for data centre connections, but many are already operating close to capacity.
- Secondary substations may experience indirect impacts, especially where data centres are co-located with other electrification initiatives (e.g., EV hubs or heat networks).

It is worth noting that many data centres connect directly at transmission level, rather than at distribution level. This may not affect capacity at substation level, i.e. does not affect available headroom, but it could affect the ability to accommodate future reinforcement to the grid.

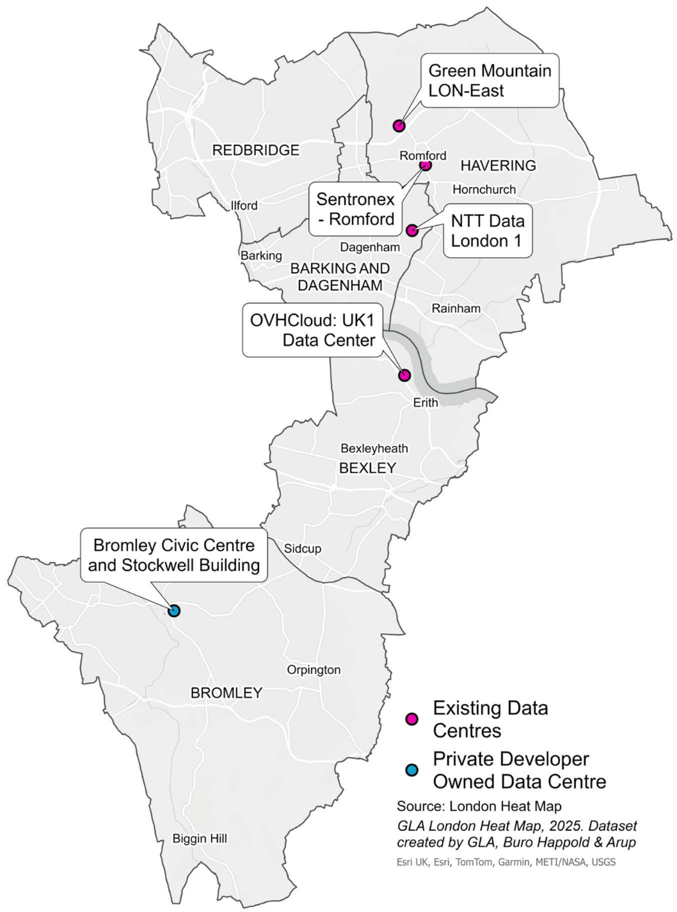

Figure 2.25: Existing data centres

2. Current energy system
Networks

2.6 Gas infrastructure

2.6.1 Gas network

Gas is supplied to buildings across East London subregion via a regional distribution network. Cadent and SGN are the Gas Distribution Network Operators (GDNO) responsible for delivering gas to this area, transporting it from the National Transmission System, operated by National Grid Gas, to domestic and non-domestic consumers.

Gas consumption in East London subregion is split across approximately 85% domestic and 15% non-domestic demand, reflecting the predominance of residential buildings in the subregion. This pattern underscores the importance of targeting domestic energy efficiency and heat decarbonisation measures to reduce overall gas consumption.

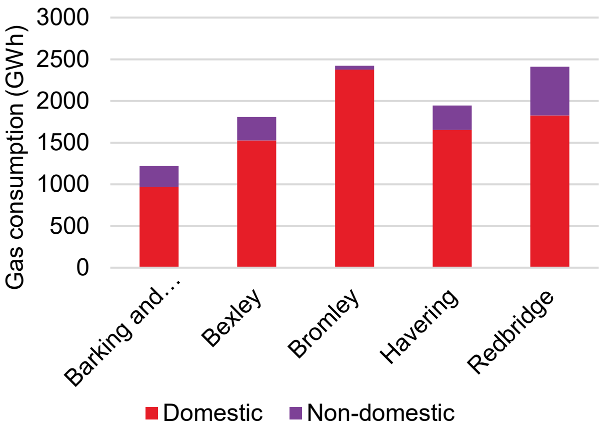

Figure 2.26: Existing gas consumption

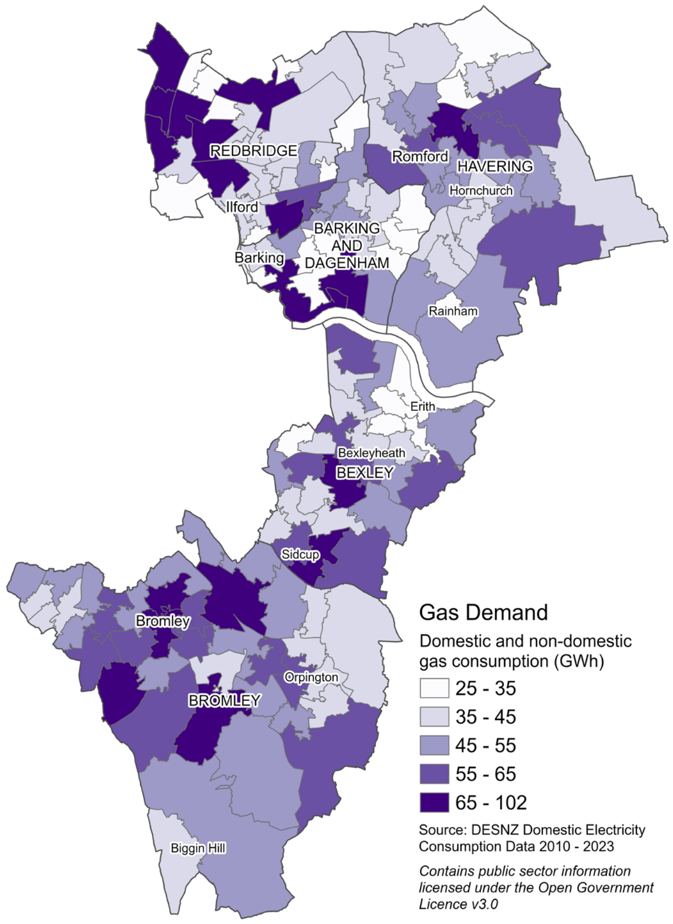

Figure 2.27: Existing gas consumption

2.6.2 Hydrogen network

While hydrogen may play a role in decarbonising high-temperature industrial processes and transport, its relevance to domestic heating and broader energy systems remains uncertain, with electrification and energy efficiency far more feasible.

Hydrogen in the East London subregion

The East London Hydrogen Pipeline (ELHP) is an infrastructure project that plans to deliver low-carbon hydrogen to industrial zones across East London and South-East of England. Spanning 75 km underground along the north bank of the Thames, the pipeline will connect key sites from Stanford-le-Hope to Newham.

This could be relevant to industrial users in Barking & Dagenham and in Havering, and potentially for heat production in heat networks, subject to availability and cost. Other potential off-takers of hydrogen could include City Airport and Tate and Lyle.

The ELHP is expected to be operational post-2035. Given the focus of this LAEP on buildings and transport sectors and on the short to medium term, this report has not explored further the role of hydrogen in the region.

2. Current energy system
Networks

2.7 Heat networks

Heat networks are expected to play a crucial role in decarbonising heat in UK buildings. Heat networks take heating, cooling or hot water from a central source(s) and deliver it to a variety of premises such as public buildings, shops, offices, hospitals, universities, and homes. They are also an important part of securing the UK's energy independence through local, low carbon heat sources and reducing the cost of living through efficient, affordable heating in densely populated areas. Analysis by the Climate Change Committee suggests that heat networks could provide around 20% of total heat in the UK by 2050. They currently provide around 3%.

While heat networks play a minor role in the UK's current energy system, heat networks are much more prevalent in other countries, particularly in Scandinavia, and are often similar to gas and electricity networks with large transmission and distribution pipes providing heat across city scale networks.

The tables on this page provide an overview of the heat networks currently registered via the Heat Networks Metering and Billing Regulation dataset. This includes Communal Heating Networks, which typically connect homes within a single building; and District Heating Networks, which connect multiple buildings across a campus or neighbourhood.

As shown by the tables, there are existing communal and district heating networks in all five boroughs, with a large amount of variation in the number of customers connected to each network.

The majority of existing customers are residential, in alignment with the fact that most existing networks are communal networks.

The Department for Energy Security and Net Zero (DESNZ) are enabling the development of heat network infrastructure through a range of targeted funding, policy and legislative support to de-risk projects and attract investment. The Energy Act 2023 establishes the regulatory framework for heat networks in Great Britain and provides powers to introduce heat network zoning in England through secondary legislation. A heat network zone (HNZ) is a formally designated geographical area where heat networks are expected to provide the lowest-cost solution for decarbonising heating.

Table 2.1 Number of registered heat networks by network type [1]

Local Authority	Number of Communal Heating Networks	Number of District Heating Networks
Barking & Dagenham	14	8
Bexley	29	4
Bromley	33	2
Havering	13	4
Redbridge	37	6

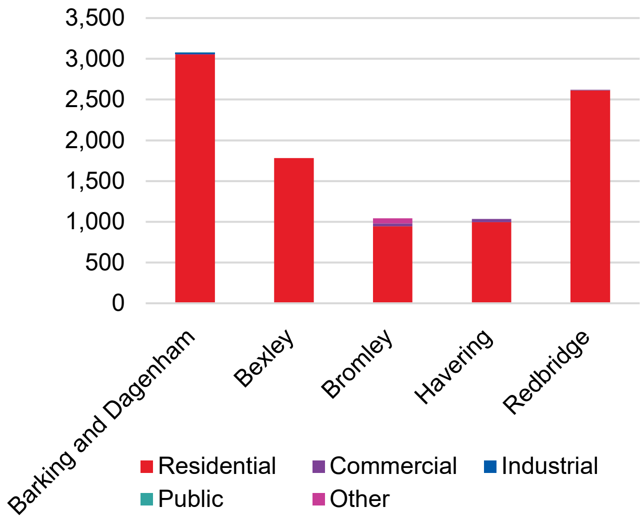

Figure 2.28: Total customers connected to heat networks

Table 2.2 Number of customers served by a registered heat network by customer type [1]

Local Authority	Residential	Commercial	Industrial	Public	Other
Barking & Dagenham	3,051	10	16	1	0
Bexley	1,783	0	0	0	0
Bromley	944	36	0	0	63
Havering	994	40	0	0	0
Redbridge	2,612	2	0	3	1

1. https://www.gov.uk/government/statistics/heat-networks-registered-under-the-heat-network-metering-and-billing-regulations-statistics-december-2022

2. Current energy system
Networks

2.7 Heat networks

As with the national picture, there are relatively few operational heat networks in the East London subregion. There are, however, strategic plans to expand and deploy new heat networks in the subregion. The location and extent of the existing and proposed networks are shown in Figure 2.29 and are discussed in further detail in Section 4.

Early work as part of the Advanced Zoning Programme has already identified Barking & Dagenham as an area of particular potential for new networks. A Zoning Opportunity Report has been completed for this area highlighting the Initial Zone Opportunities based on the most recent National Zoning Model data at the time of its production. This includes advanced planning for the expansion of existing zones in the borough.

At present, the majority of heat networks in the country are gas-fired. In line with the latest policy developments, future heat networks will be required to utilise low carbon heat sources. This can include waste heat captured from a number of potential sources including industrial processes, supplementary heat from data centres, cold stores and other facilities with high cooling loads, heat abstraction from aquifers, heat extraction from rivers etc. Energy from Waste facilities are one of a number of such opportunities and are particularly attractive due to their high offtake temperatures compared with sources like rivers and sewage treatment works. The existing Energy from Waste facility operated by CORY, Riverside 1, and the plans for a new facility, Riverside 2, have been captured in this analysis alongside other waste heat opportunities. These EfWs could be of particular strategic interest in this subregion but may also offer opportunities for a possible strategic heat main connecting neighbouring boroughs in the South Subregion, similar to that explored in the LBBD AZP analysis.

Data centres, such as those in Havering, also offer a strong opportunity for waste heat offtake. Figure 2.30 maps the opportunities for waste heat offtake that have been identified in this study, including the planned and existing EfW facilities in Bexley. The map only shows existing heat networks where geospatial data was available to include.

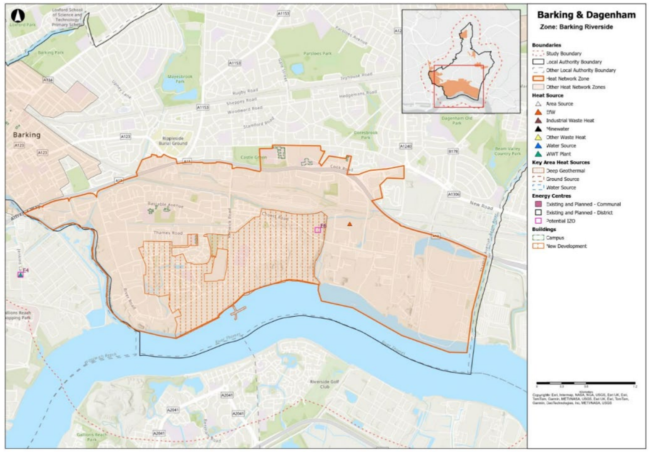

Figure 2.29: Excerpt from AZP Zoning Opportunity Report for LBBD

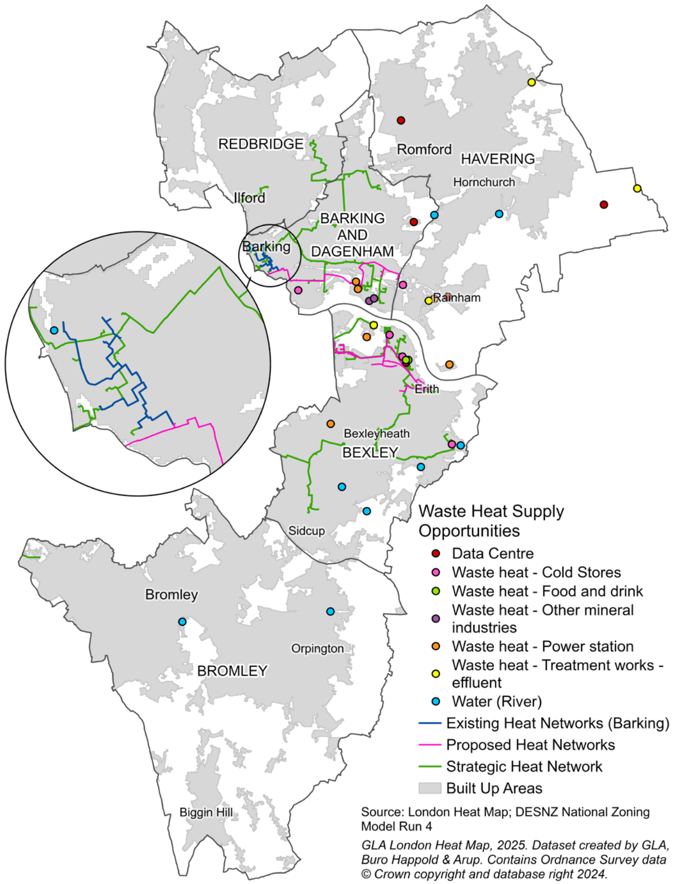

Figure 2.30: Heat networks and waste heat supply opportunities

2. Current energy system
Transport

2.8 Electric vehicles

Transport is a major energy demand driver and a key factor for achieving net zero targets across Barking & Dagenham, Bexley, Havering, Redbridge, and Bromley.

2.8.1 Methodology

The methodology for assessing the current and future transport vehicle and infrastructure requirements for the boroughs is outlined below. The approach combines current EV and charging infrastructure baselines with future scenarios to align with net zero targets.

Baseline assessment and mapping: data is provided by DfT for cars, motorcycles, buses, LCVs (Light Commercial Vehicles) and HGVs (Heavy Goods Vehicles) for the current situation for each borough.

Car ownership data from Census data 2021 in each lower super output area (LSOA) was used to estimate the figures at substation level by apportioning the data to each zone based on the proportional contribution of each borough. Only road transport data was considered for both current and future scenarios, excluding non-road mobile machinery.

2.8.2 Current vehicle statistics

Currently, on-road transport for East London remains dominated by petrol and diesel vehicles. Registered ownership of fossil fuel vehicles in these boroughs are 98%, while electric vehicle ownership stands at 2%. Bromley and Bexley have the highest levels of vehicle ownership, in terms of number of vehicles, while Havering has a higher share of diesel vehicles, due to number of light commercial vehicles.

The sale of ICE cars and vans will end in the near future in the UK, with a ban from 2030 on new petrol and diesel cars and for all new cars and vans by 2035.

Bromley is leading in overall ownership and has the highest uptake of electric vehicles, showing the need for charging infrastructure. Conversely, Barking and Dagenham has the lowest absolute number of EVs, indicating a need for targeted infrastructure to help future adoption.

Uptake may also reflect wider factors such as deprivation and the availability of off-street parking. It may be higher in boroughs with lower deprivation and higher levels of off-street parking, such as Bromley.

Table 2.3 Quantity of registered EV vehicles across sub-regions

Boroughs	Current registered EV vehicles	% of registered vehicles across sub-region
Barking and Dagenham	1,698	13%
Bexley	2,186	16%
Bromley	4,185	31%
Havering	2,520	19%
Redbridge	2,983	22%
Total	**13,572**	**100%**

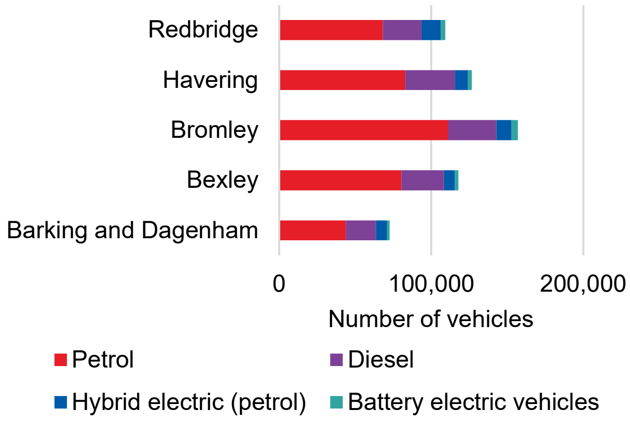

Figure 2.31: Existing vehicles count by borough

2. Current energy system
Transport

2.8 Electric vehicles

2.8.3 Current energy consumption for transport

The current energy consumption for transport was calculated based on vehicle miles travelled for each borough, using conversion factors to estimate energy use (miles/kWh) from miles to kWh for both EV and fossil fuel vehicles.

Havering has the highest baseline consumption as they have the highest number of fossil fuel vehicles, while Bromley was the leader in vehicle ownership statistics.

As EV uptake accelerates, energy demand will shift from fossil fuels to the electricity grid.

2.8.4 Current vehicle mileage

Annual mileage for the vehicles is the highest in some boroughs, such as Havering, Bromley and Bexley. Also, highest for cars, aligning with the vehicle statistics. This was caused by the car dependency and where public transport, walking and cycling alternatives are limited.

The current vehicle mileage distribution significantly impacts the energy consumption and emissions, with fossil fuel vehicles accounting for 95% of total mileage compared to only 5% for EVs, as shown in Figure 2.30.

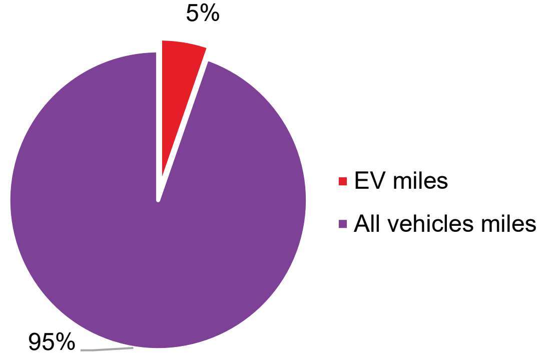

Figure 2.30: Proportion of annual miles

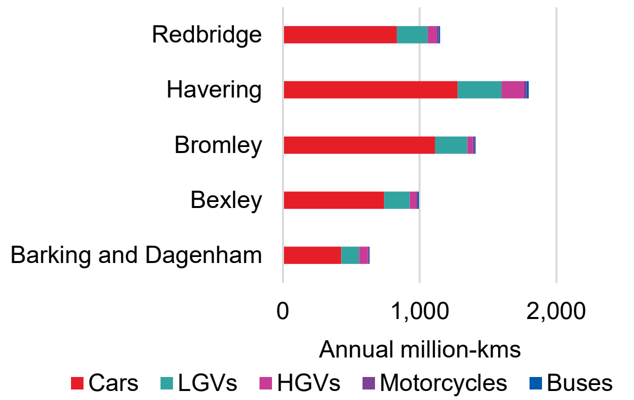

Figure 2.31: Annual vehicle kms in boroughs with different fuel types

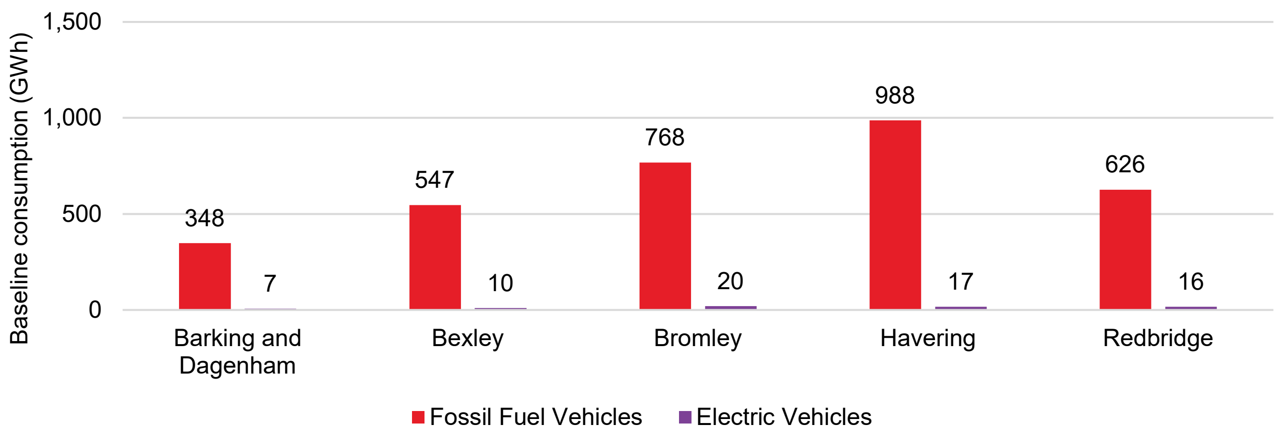

Figure 2.32: Baseline consumption of existing fleet by borough

2. Current energy system
Transport

2.8 Electric vehicles

2.8.4 Existing public EV charge points and infrastructure

EV charging infrastructure such as public chargers across the East London subregion varies between boroughs, reflecting differences in car ownership numbers and car usage patterns. Baseline public EV charge point data are derived from DfT and NEVIS data, assuming a high EV uptake scenario.

Redbridge currently leads the way in public EV charge points, and areas like Barking & Dagenham and Havering have some of the lowest numbers of chargers compared to the amount of EVs. Similarly, Bromley and Bexley face challenges because of their higher car dependency but limited charging infrastructure. However, these areas have more proportion of homes with off-street parking, which means that a significant share of charging demand can be met through at-home charge points, not relying on public ones. As a result, reliance on the public charge points in Bromley and Bexley will not be as high as in Redbridge. Other factors include density of housing and access to public transport.

Current charge point demand is spread across different charger types and the data from NEVIS is used to distribute them across the boroughs.

- Standard (≤7 kW)
- Fast (7–22 kW)
- Rapid (43–150 kW)
- Ultra-Rapid (≥150 kW)

Most existing chargers in these boroughs are slower 3–7 kW or 22 kW units, with only a small number of rapid or ultra-rapid options.

While EV ownership is still growing, the demand for more and faster chargers is becoming clear.

The balance between these charger types will be critical in meeting both private EV ownership growth and the electrification of commercial fleets.

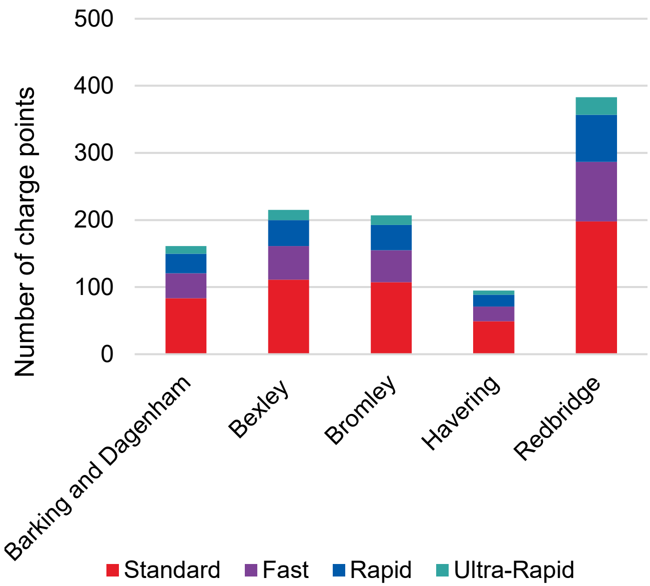

Figure 2.33: Number of baseline charge points

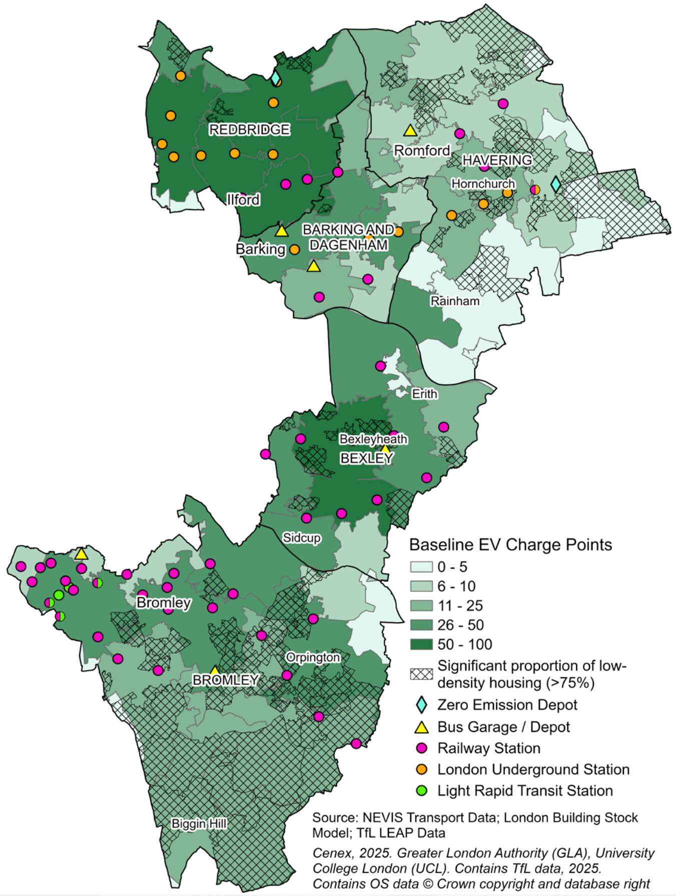

Figure 2.34: Map of current public EV charge points and existing infrastructure

2. Current energy system
Transport

2.8 Electric vehicles

2.8.6 Current EV demand

Current EV capacity and demand have been assessed using assumptions for the miles per energy data for each vehicle type within each borough. This enables estimation of EV demand to be determined, as the adoption accelerates through the years.

EV capacity factor is used to estimate the required electrical capacity for EV, which is derived from the EV energy demand. With the total energy demand and capacity from EV charging, it can be identified where local networks will face the greatest pressure. Battery storage at charge points has not been included.

The areas which already have high levels of private vehicle ownership such as Bromley and Havering, requires more charging infrastructure and grid capacity to meet the demand. The current EV charger demand is higher in boroughs such as Redbridge and Bexley as shown in the map. The level of demand varies by charger numbers, types and utilisation rates, which need to be considered assessing infrastructure requirements.

UKPN substation headroom data was reviewed to understand the available grid capacity across the boroughs. By aligning demand forecasts with available capacity, this work provides a foundation for targeted planning and investment in EV charging infrastructure.

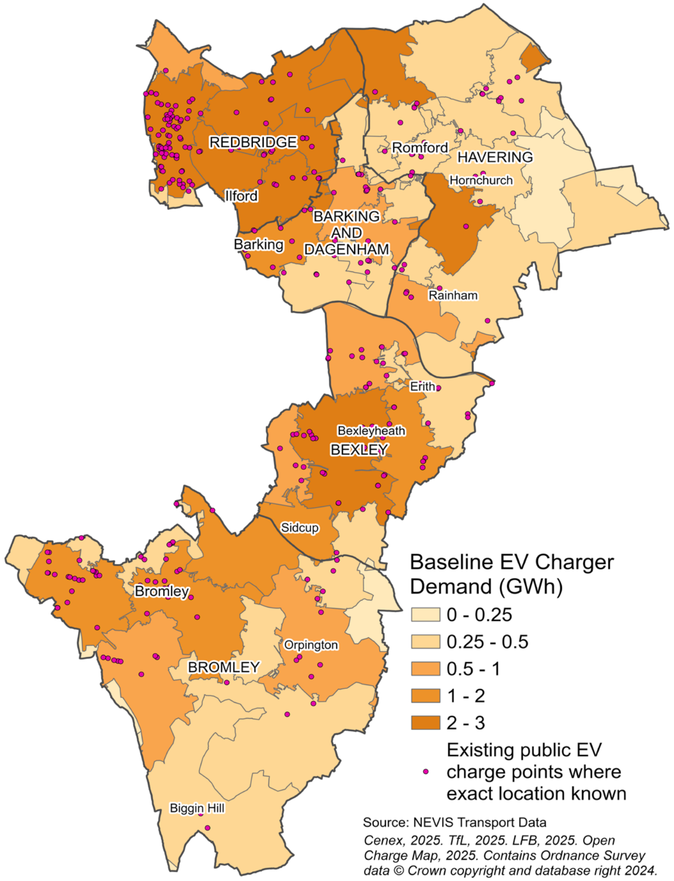

Figure 2.35: Baseline EV Charger demand map as kWh with the Existing charge points

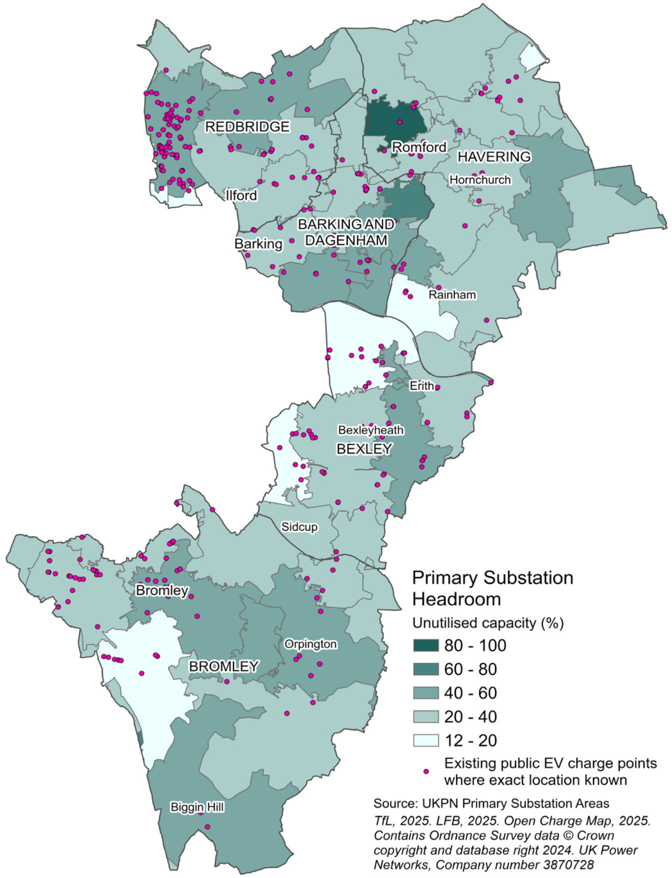

Figure 2.36: primary substation headroom map with existing EV charge points

2. Current energy system
Renewables

2.9 Renewables baseline

2.9.1 Overview

In dense urban areas like London, rooftop solar PV offers the most practical route to local renewable electricity generation.

Photovoltaic (PV) systems enable buildings to contribute directly to decarbonisation while enhancing energy resilience. Their suitability is largely influenced by roof type and orientation, flat and south-facing roofs typically offer optimal performance. These roof types are commonly found across residential, commercial, and public buildings, making PV a scalable and widely applicable solution. Where possible, installations should be aligned with wider retrofit programmes, such as loft insulation, to minimise disruption and maximise benefits. This integrated approach supports both energy efficiency and occupant comfort.

To support integration, flexibility technologies such as battery storage, time-of-use tariffs (TOUT), and demand-side response can help manage demand in line with solar generation. While not a substitute for grid upgrades, these measures can reduce peak loads, defer reinforcement, and lower energy bills.

2.9.2 Installed capacity

The total estimated installed rooftop solar PV capacity across the East London subregion is approximately 29MW, generating around 24GWh annually, about 5% of the current subregion electricity demand.

Havering currently leads the subregion in installed capacity, followed by Bromley and Barking and Dagenham. These boroughs benefit from a combination of factors, including a higher proportion of detached and semi-detached homes and greater availability of roof space. In contrast, Bexley and Redbridge show slightly lower baseline capacity, which may reflect a higher proportion of flats, more complex ownership structures, or lower levels of uptake to date.

The spatial distribution of PV capacity, shown in Figure 2.38, highlights localised clusters of higher capacity in areas such as Rainham, Romford, and parts of Bromley. These areas are likely to have favourable roof typologies, higher rates of owner-occupation, and fewer planning constraints. In contrast, lower-capacity zones are observed in denser urban areas, where roof space is more constrained or fragmented.

These patterns underline the importance of targeted engagement and policy support to unlock PV potential in underperforming areas, while continuing to scale up deployment in locations with favourable conditions

Please see Appendix A3 for baseline data methodology and source.

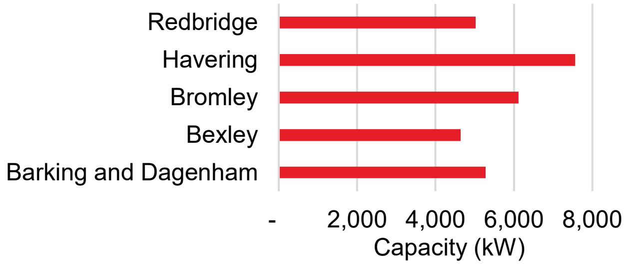

Figure 2.37: Existing capacity of solar per borough

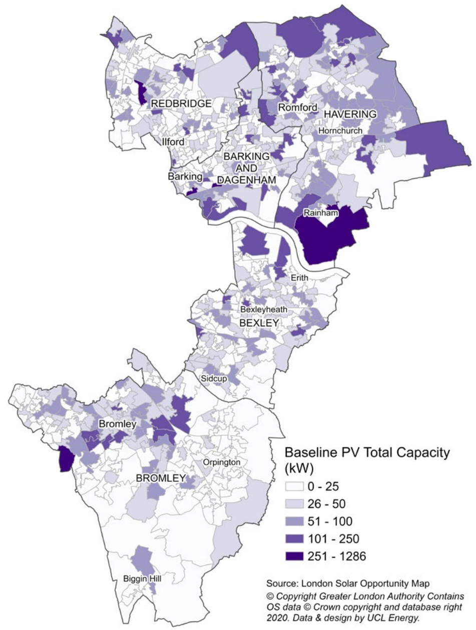

Figure 2.38: Subregion map of baseline rooftop PV capacity

2. Current energy system
Renewables

2.9 Renewables baseline

2.9.3 Policy and incentives

At the national level, the UK Government continues to back solar PV through the Smart Export Guarantee (SEG), which enables households and businesses to receive payments for surplus electricity exported to the grid. Introduced in 2020 as a successor to the Feed-in Tariff (FIT), SEG remains a key mechanism for improving the financial viability of small-scale solar generation, despite being less generous than its predecessor. Tariffs are set by individual energy suppliers and typically range from 1p to 30p per kWh, with average rates around 10.8p/kWh.

Regionally, the Greater London Authority's Accelerated Green Pathway sets a target of 1.2 GW of rooftop solar PV across London by 2030. Figure 2.39 shows the ambition, in terms on annual generation, set by Accelerated Green by borough.

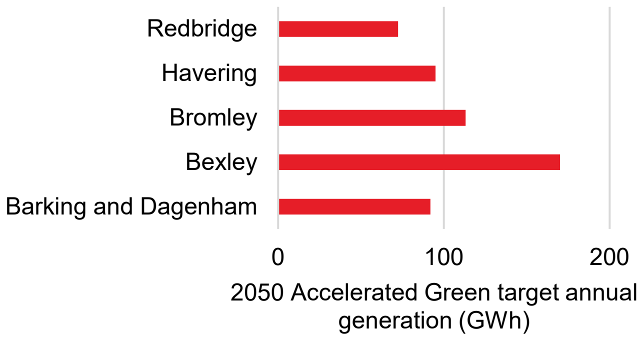

Figure 2.39: Accelerated Green targets for solar generation

This ambition is underpinned by tools such as the London Solar Opportunity Map, which identifies viable rooftops for PV deployment, and the London Plan, which embeds energy efficiency and on-site generation into planning policy for new builds through the "Be Lean, Be Clean, Be Green" energy hierarchy.

Locally, boroughs are encouraged to lead by example, installing solar PV on council-owned buildings, schools, and leisure centres, and to support residents and businesses through signposting to funding schemes and community energy initiatives. In areas with high grid constraint, behind-the-meter solar generation paired with battery storage is particularly valuable, helping to reduce peak demand and improve local energy resilience.

2.9.4 Barriers and challenges

While solar PV presents a clear opportunity for local renewable electricity generation, several barriers continue to limit its deployment across London, including in East London subregion boroughs.

Distribution level grid constraints remain a critical issue. In areas with limited headroom on the electricity network, particularly at the secondary substation level, new PV installations may face curtailment if generation is exported rather than consumed or stored locally. This risk is particularly acute in summer-constrained zones, where air conditioning loads coincide with peak solar output. Behind-the-meter systems and private wire networks offer a practical workaround, enabling local consumption and reducing pressure on the grid.

Planning restrictions and land availability also present challenges. Rooftop PV is the most viable option in built-up areas, but deployment is often slowed by restricted access to roofs, especially in leasehold properties or conservation areas. Opportunities for ground-mounted PV are limited due to competing land uses and the need to preserve green space. However, innovative solutions such as solar canopies in car parks and floating PV on reservoirs offer potential for scale-up, particularly where boroughs can coordinate across sites.

Public perception and uptake are further barriers. Despite growing awareness of climate issues, uptake of solar PV remains relatively low. This is partly due to high upfront costs and limited understanding of available incentives. Many homeowners are unaware of schemes like the Smart Export Guarantee or local grant programmes, and concerns around disruption or aesthetic impact can deter installations. Boroughs have a key role to play in addressing these issues—through targeted engagement, clearer guidance, and support for community energy initiatives.

Overcoming these barriers will require coordinated action across boroughs, utilities, and the GLA, with a focus on enabling local generation, improving planning processes, and building public confidence in solar PV as a core component of the energy transition.

3. Future energy system

Contents:

- Planned growth
- Scenario modelling approach
- Modelling results: Energy, cost, carbon

3. Future energy system
Planned growth

3.1 New developments

Residential and non-residential growth across East London boroughs will impact future energy demand and infrastructure needs, particularly with the substantial increase in the number of homes planned in the area. Table 3.1 outlines projected development to 2050, including new homes, commercial floor space, and associated peak heating demand, in order to assess just how significant this new development will be on the energy system.

These projections highlight the need for strategic electricity network planning, particularly in Barking & Dagenham and Havering, where growth will place substantial pressure on local infrastructure. In areas like Barking & Dagenham, where housing stock is expected to increase by around 50%, low- and car-free development approaches could help reduce per-household transport energy demand over time, supporting wider decarbonisation goals.

Table 3.1: Number of new homes and new commercial floor space

	Number new homes	New commercial floor space (m²)
Barking and Dagenham	34,500	1,116,400
Bexley	11,600	152,300
Bromley	1,500	59,000
Havering	16,000	1,091,600
Redbridge	6,000	18,500
Total	**69,600**	**2,437,800**

The projected East Havering Data Centre project has the largest electrical demand of a single development and is a prime example of the need for increasing electrical power provision in line with the advancing technological industry.

LAEPs must account for power capacity upgrades to meet rising demand; integration of low-carbon technologies in new developments; and coordination with DNOs to ensure timely and cost-effective connections.

Note – this data was collected through engagement with borough officers, drawing from different sources including London Planning Database and Local Plans.

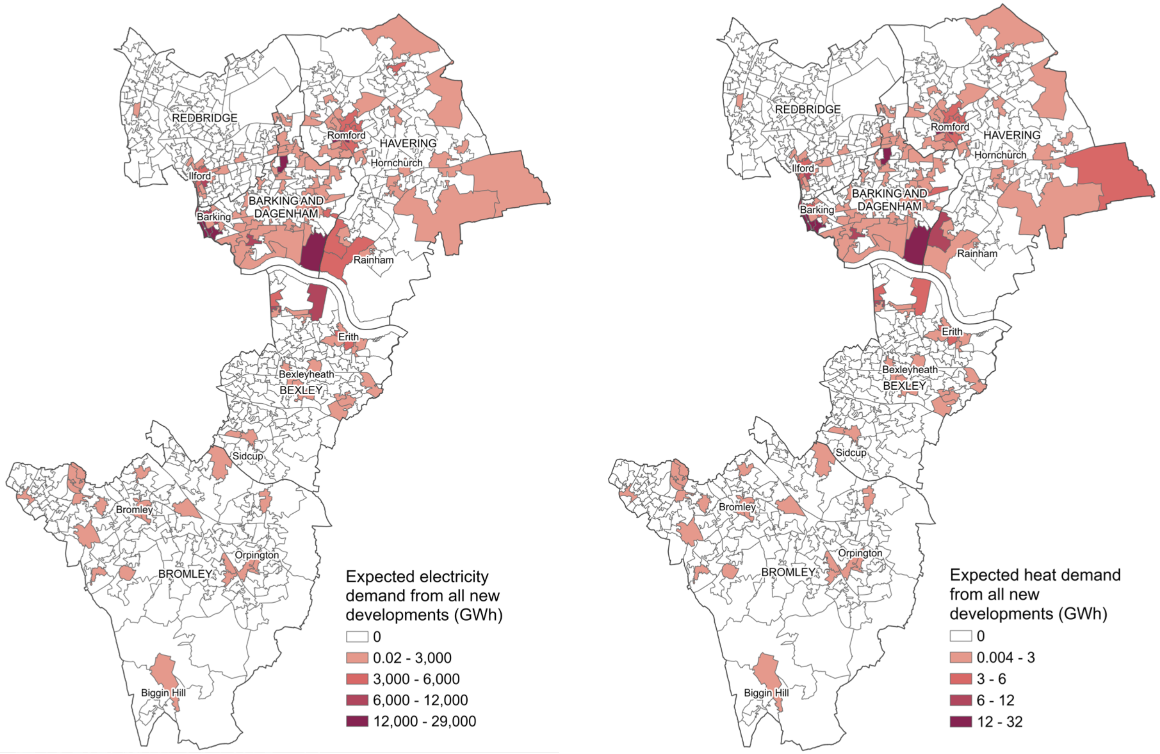

Figure 3.1 Energy demand from new developments by 2050

3. Future energy system
Scenario modelling

3.2 Subregional scenarios

3.2.1 Introduction

Building on the baseline, a set of future energy system scenarios has been developed to explore how different technologies and interventions could shape the pathway to net zero. These scenarios are designed to test the implications of various decarbonisation trajectories across the subregion, helping to identify opportunities, risks, and low-regret actions.

Scenarios serve several purposes:

- Allow us to explore trends and uncertainties in relation to local and subregional priorities.
- Help identify borough-level decarbonisation opportunities aligned with different policy targets.
- Support better planning by highlighting where early action is most impactful.
- Reveal commonalities across pathways, enabling the identification of low-regret strategies and scalable interventions.
- Help assess and mitigate risks associated with technology deployment, infrastructure capacity, and delivery timelines.

Scenarios mitigate risk by testing the potential limits of the uncertain aspects of the energy system

Accelerated Green is one of the core scenarios used in UK energy system planning, particularly within the Future Energy Scenarios (FES) framework developed by the National Energy System Operator (NESO). This scenario assumes a rapid and coordinated transition to net zero, driven by strong policy support, high societal engagement, and significant investment in low-carbon technologies.

UKPN DFES are prepared annually and are aligned with the national-level Future Energy Scenarios (FES) developed by the National Energy System Operator. They incorporate local data and stakeholder input to produce geographically specific projections that support strategic network planning, investment decisions, and climate action planning

3.2.2 Modelled scenarios

Three scenarios have been selected for this analysis:

- Scenario 1 – Accelerated Green (AG): aligns with the Mayor of London's 2030 targets, drawing on the Accelerated Green pathway from the Element Energy report.
- Scenario 2 – Net Zero 2040 (NZ2040): assumes a slower deployment of retrofit and heat pump programmes than the Mayor's Accelerated Green Pathway, with targets for these technologies being met in 2040 rather than 2030. This scenario reflects a case where progress in these challenging sectors that require significant investment by individual consumers is slower than is currently being targeted at a city-wide level. The remaining technologies follow the same deployment as Scenario 1.
- Scenario 3 – UKPN DFES: aligns with the national Holistic Transition pathway from the Distributed Future Energy Scenarios (DFES), which aims at reaching net zero ambitions in 2050.

Each of the modelled scenarios provides a different lens through which to understand the scale, pace, and spatial distribution of change required. Together, they offer a robust evidence base to inform local decision-making and support the development of borough-specific LAEPs.

The scenario deployment rates per technology are shown on the following page.

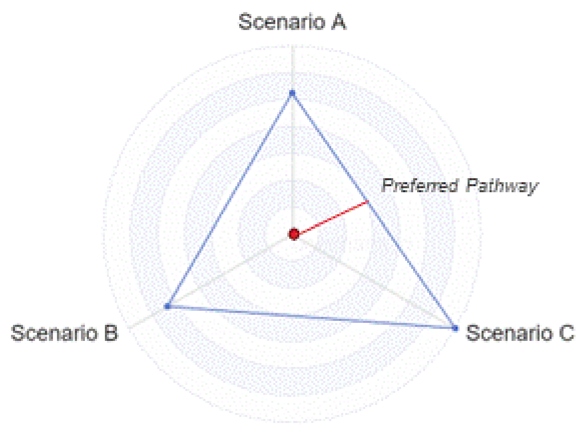

Figure 3.2 Scenario assessment methodology

3. Future energy system
Scenario modelling

3.2 Subregional scenarios

3.2.3 Technology deployment rates

Figure 3.3 illustrates the deployment rates of each technology under the three scenarios. The majority of these deployment rates have been calculated from energy consumption in 2050 for each technology and therefore some deployment surpasses 100% for heating technologies. Heat network deployment is calculated from building connection count and electric vehicles from distance travelled in kms.

The Accelerated Green scenario demonstrates a rapid and large-scale deployment of technologies, designed to meet the Mayor's 2030 targets. In contrast, the DFES scenario reflects a more gradual rollout, with technologies such as heat pumps and retrofit programmes starting slowly and gaining momentum between 2030 and 2035. NZ 2040 follows the same deployment trajectory as Accelerated Green for most technologies but introduces a delay for heat pumps and retrofit programmes. In this scenario, the deployment levels originally targeted for 2030 are postponed by a decade, reaching those levels only by 2040.

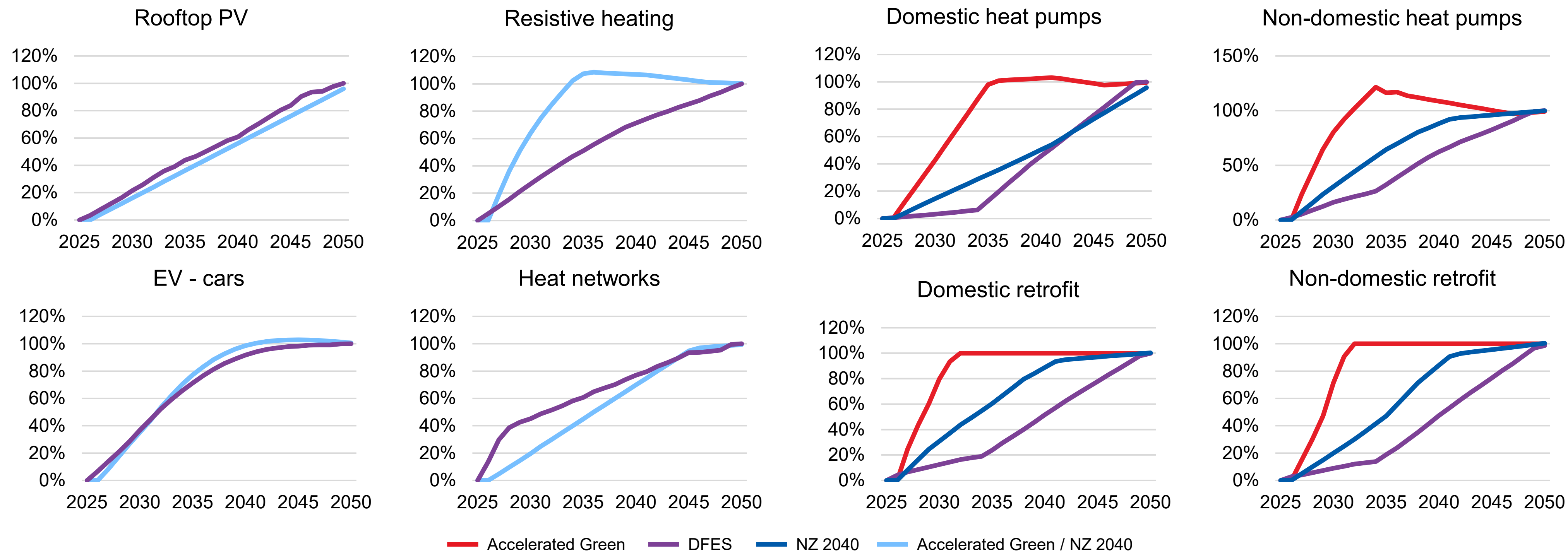

Figure 3.3 Technology deployment rates by scenario

3. Future energy system
Scenario modelling

3.2 Subregional scenarios

3.2.4 Overview

Table 3.2 shows the energy savings associated with retrofit without the inclusion of new developments.

Despite rising electricity use, carbon emissions are expected to fall sharply due to grid decarbonisation. The carbon reductions from baseline for each modelled scenario is shown in Figure 3.4, on the next page. The carbon intensity of electricity will reduce substantially overtime with the decarbonisation of the grid, which is reflected in all modelled pathways. The removal of fossil fuels from heating and transport will have a transformative impact on East London subregion's carbon trajectory, supporting boroughs in meeting Net Zero targets.

This highlights regardless of the pathway, a significant scale-up in low-carbon heating technologies is expected. As such, local policies, funding mechanisms, and delivery frameworks will need to be aligned to support this transition, ensuring that infrastructure, supply chains, and consumer engagement are adequately prepared.

Table 3.2 also shows the fast deployment of retrofit which is modelled in the Accelerated Green scenario, with a large portion of the energy savings achieved by 2030, when compared to DFES 2050.

Note 1: the deployment of heat networks demonstrated here is based on the assumed deployment in Accelerated Green, which is lower than what the most up to date analysis of the opportunity suggests. The results associated with maximising the identified opportunity can be found in Section 4.

Table 3.2 Deployment by scenario

Intervention	Metric	Year	Accelerated Green	DFES
Domestic heat demand after retrofit	Energy saving	2030	860 GWh	134 GWh
		2050	920 GWh	900 GWh
Non-domestic heat demand after retrofit	Energy saving	2030	220 GWh	150 GWh
		2050	480 GWh	240 GWh
Heat pumps	Heat provided	2030	5,350 GWh	630 GWh
		2050	8,800 GWh	8,700 GWh
Heat networks[1]	Heat provided	2030	75 GWh	60 GWh
		2050	300 GWh	340 GWh
Solar renewables	Electricity generated	2030	112 GWh	95 GWh
		2050	460 GWh	420 GWh
EV infrastructure	Electricity capacity	2030	820 MW	650 MW
		2050	2,200 MW	2,200 MW

3. Future energy system
Scenario modelling results: energy demand

3.3 Subregional scenario results

3.3.1 Energy demand

Figure 3.4 illustrates the projected energy demand across the East London subregion out to 2050, following Accelerated Green. The data shows a clear upward trend in overall electricity demand, driven in large part both by the anticipated electrification of heating and growth in electric vehicle (EV) charging infrastructure. While this increase in electricity use contributes to higher total energy demand, it is offset by the elimination of petrol and diesel fuels, which represents a major step forward in reducing transport-related carbon emissions.

The overall demand increase also reflects new developments, including residential growth and a large data centre in Havering. As shown in Figure 3.5, Havering has the largest increase in demand between 2025 and 2050.

These new developments can skew the total figures upward, masking efficiency gains at the building level. Heat demand shows a slight decline over time, but deeper savings are evident when excluding new developments.

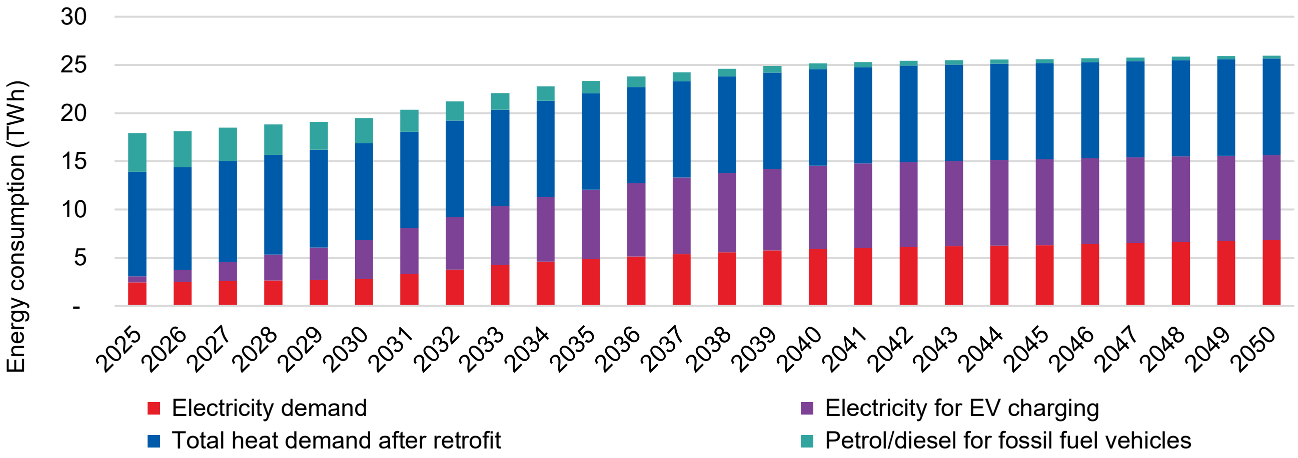

Figure 3.4: Annual energy demand over time in Accelerated Green

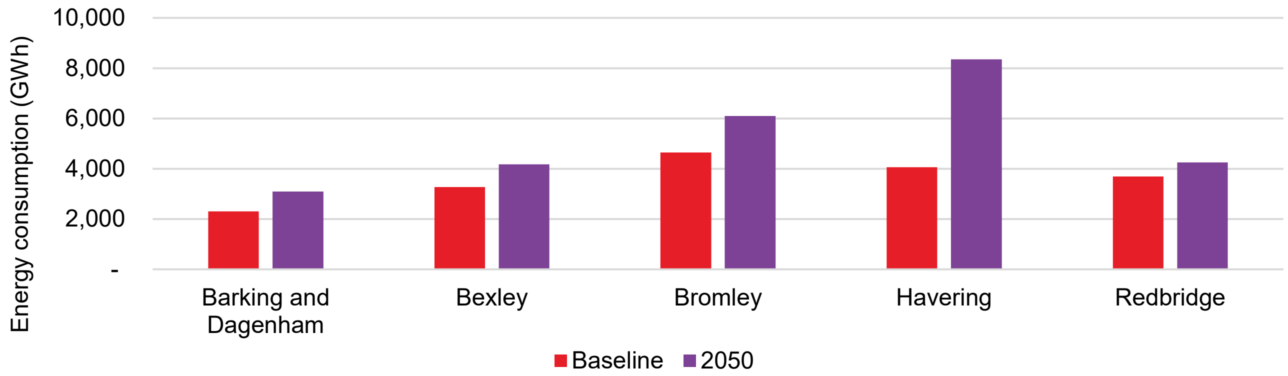

Figure 3.5: Annual energy demand in baseline year and in 2050 by Borough in Accelerated Green

3. Future energy system
Scenario modelling: operational carbon

3.3 Subregional scenario results

3.3.2 Operational carbon emissions

Figure 3.6 shows the results of the three modelled scenarios:

Accelerated Green shows higher pace and scale of the roll out of low carbon technologies, achieving a 48% reduction in carbon for the whole subregion by 2030, and 91% reduction by 2040. The DFES scenario reflects a slower deployment of interventions over time, but still achieves a 94% reduction by 2050.

NZ 2040 explores a pathway in which the adoption of retrofit programmes and heat pump installations progresses at a slower pace than the more ambitious Accelerated Green scenario. Given that these technologies are largely consumer-led and often depend on private investment to upgrade homes and businesses, uptake may be more gradual—particularly with 2030 approaching rapidly. As such, NZ 2040 offers a reflection of potential delivery timelines under less ambitious conditions.

Business as usual (BAU) represents the carbon emissions associated if no decarbonisation or low carbon technologies are deployed. The small reduction over time is dependent on the decarbonisation of the grid. This shows the importance of the interventions outlined in this report towards decarbonisation, and how the reliance on grid decarbonisation is insignificant without move to low carbon technologies.

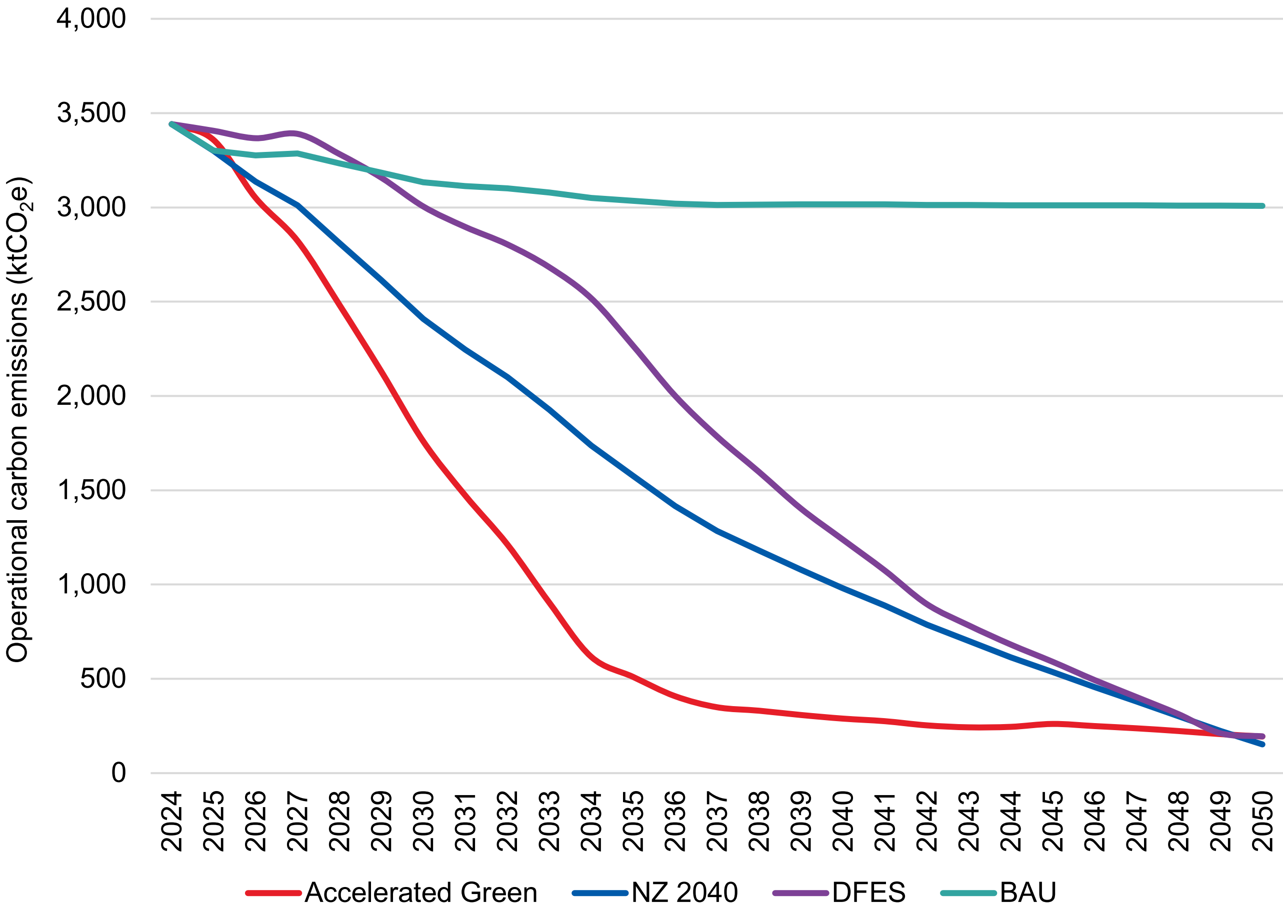

Figure 3.6: Annual operational carbon emissions by scenario

3. Future energy system
Scenario modelling: operational carbon

3.3 Subregional scenario results

Figure 3.7-3.8 presents the operational carbon emissions associated with each scenario.

Under the Accelerated Green scenario (Figure 3.7), carbon emissions decline rapidly, with significant reductions achieved by 2035. Emissions from heating become negligible by this point, driven by the large-scale deployment of heat pumps and retrofit programmes. These measures not only reduce energy demand across buildings in the subregion but, when combined with the electrification of heat and the decarbonisation of the electricity grid, result in minimal associated emissions. Transport-related emissions remain relatively stable year-on-year until 2035. This trend reflects the gradual transition to electric vehicles and the corresponding reduction in fossil fuel use. Meanwhile, residual carbon emissions, those not directly addressed by electrification or efficiency measures, remain relatively steady through to 2050.

In contrast, DFES scenario (Figure 3.8) shows a much slower pace of carbon reduction. This is primarily due to the delayed deployment of low-carbon technologies and schemes, such as heat pumps and retrofits. As a result, the scenario relies more heavily on the decarbonisation of the electricity grid to achieve emissions reductions.

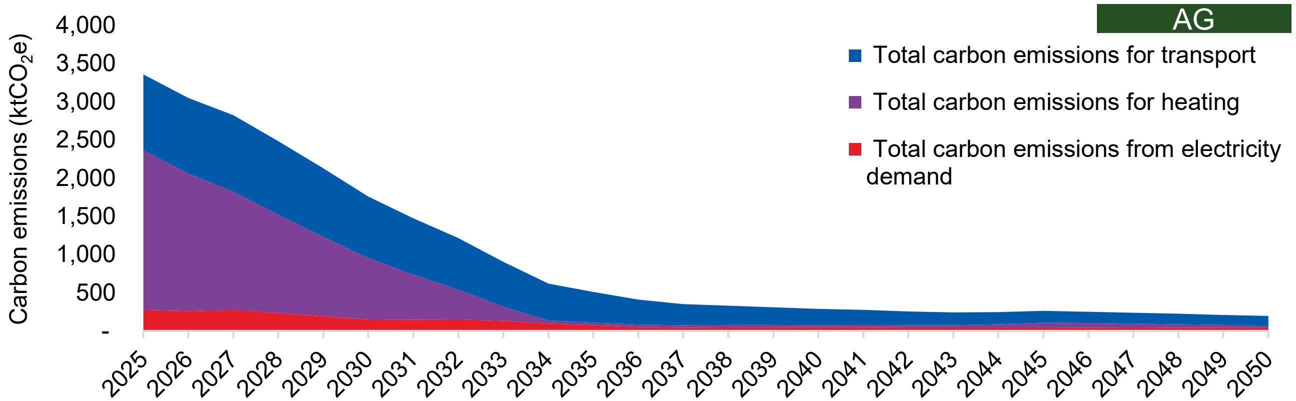

Figure 3.7: Annual operational carbon emissions over time under Accelerated Green

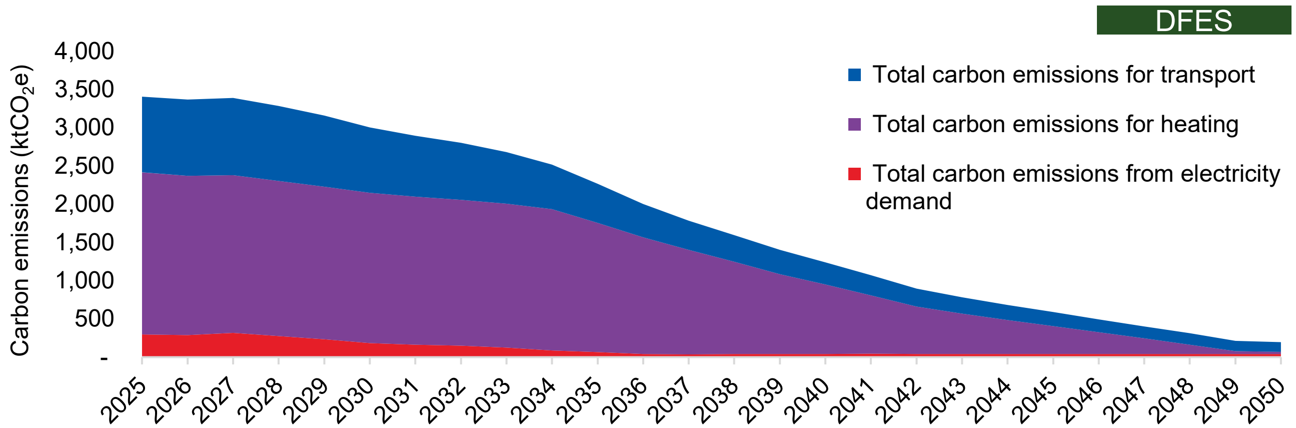

Figure 3.8: Annual operational carbon emissions over time under DFES

3. Future energy system
Scenario modelling: operational carbon

3.3 Subregional scenario results

Residual emissions under DFES are notably higher than in Accelerated Green, highlighting the critical importance of early and accelerated deployment of clean technologies in achieving net zero targets.

Figure 3.9 illustrates NZ 2040, an alternative modelled pathway that delays the rollout of heat pumps and retrofit programmes.

As a result, carbon emissions associated with heating decline more slowly compared to the Accelerated Green scenario. This delay underscores the critical importance of early engagement and robust funding mechanisms to accelerate the adoption of low-carbon heating technologies.

Since these upgrades often require homeowners and building owners to invest in improvements themselves, it is essential to ensure that financial support, accessible information, and clear communication of the benefits are available. Additionally, strengthening the supply chain and improving market conditions are key to making these technologies more affordable and accessible, thereby enabling broader uptake and faster emissions reductions.

Table 3.3 shows the high-level results for each scenario at key years - Accelerated Green in 2030, NZ 2040 in 2040 and DFES in 2050.

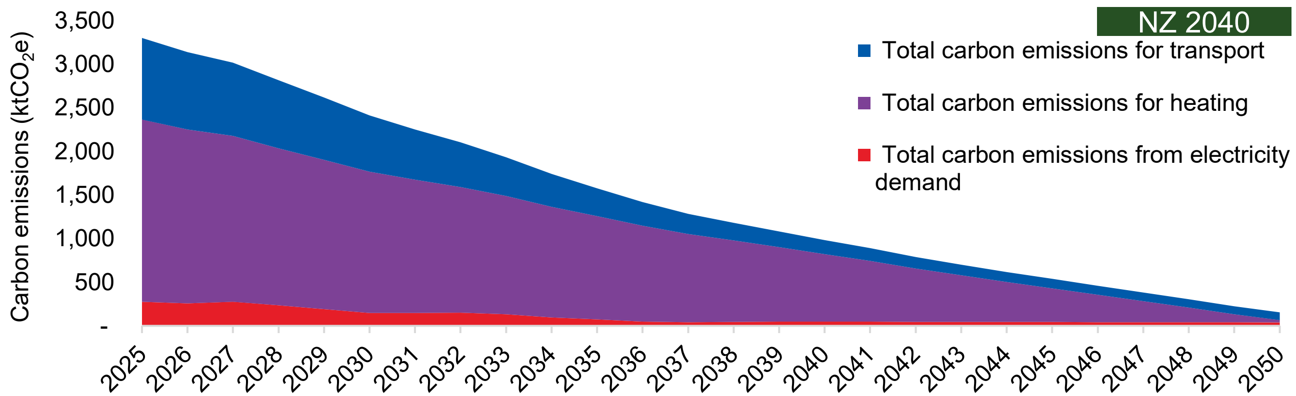

Figure 3.9: Annual operational carbon emissions over time under NZ 2040 (above)

Table 3.3: Annual operational carbon emission reductions at key years (below)

Scenario (key year)	Baseline (2025)	Accelerated Green (2030)	NZ 2040 (2040)	DFES (2050)
Annual emissions from electricity (tCO_2e)	276,000	148,000	50,000	39,000
	Reduction from baseline	-46%	-85%	-85%
Annual emissions from heating (tCO_2e)	2,000,000	800,000	730,000	30,000
	Reduction from baseline	-60%	-63%	-97%
Annual emissions from transport (tCO_2e)	990,000	800,000	160,000	126,000
	Reduction from baseline	-19%	-83%	-87%
Total (tCO_2e)	3,358,000	1,759,000	983,000	195,000
	Reduction from baseline	-48%	-71%	-94%

3. Future energy system
Scenario modelling: embodied carbon

3.3 Subregional scenario results

3.3.3 Embodied carbon emissions - overview

Heat decarbonisation (heat pumps & electric heating)

- Embodied carbon: Heat pumps and electric heating systems typically have moderate embodied carbon, primarily from the manufacturing of compressors, refrigerants, and associated electronics. These are generally higher than for a new gas boiler. Installation can also contribute, especially where significant building modifications or upgrades to distribution systems are needed.
- Operational impact: However, the operational carbon savings from heat pumps are substantial, potentially reducing heating emissions by 70–80% depending on the electricity mix. Their high efficiency (COP) means less energy is needed for the same heat output. Over the system's lifetime, these operational savings typically outweigh the higher embodied carbon, resulting in a net reduction in total carbon emissions compared to gas boilers.

Retrofit (shallow and deep)

- Embodied carbon: Shallow retrofits (e.g. draught-proofing, LED lighting) have low embodied carbon and quick payback periods. Deep retrofits (e.g. insulation, window replacement, ventilation systems) involve more materials and labour, increasing embodied carbon. However, when designed carefully, deep retrofits can be carbon-positive over time, especially when combined with renewable energy.
- Operational impact: Retrofits dramatically reduce operational energy use. Deep retrofits can cut heating demand by 50–80%, improving EPC ratings and reducing fuel poverty. The operational benefits often outweigh the embodied carbon within a few years.

Heat networks (waste heat or large-scale heat pumps)

- Embodied carbon: Heat networks require substantial infrastructure, pipes, pumps, heat exchangers, which can result in high upfront embodied carbon, especially in dense urban areas. Using waste heat sources (e.g. from data centres or industrial processes) can offset this by leveraging existing energy flows.
- Operational impact: Once operational, heat networks offer low-carbon, scalable heating solutions, especially when powered by large-scale heat pumps or renewable sources. They reduce emissions at the building level and can be more efficient than individual systems.

EV charging infrastructure

- Embodied carbon: EV chargers, especially rapid and ultra-rapid units, have moderate embodied carbon from electronics, cabling, and civil works. The impact increases with grid upgrades and battery storage integration.
- Operational impact: EV infrastructure supports the transition from fossil-fuelled transport to electric mobility. While the chargers themselves don't reduce emissions directly, they enable zero-emission vehicle use, which has a major operational impact when paired with renewable electricity.

PV renewables (solar photovoltaics)

- Embodied carbon: Solar panels have notable embodied carbon, mainly from silicon processing, aluminium framing, and transport. However, their carbon payback period is typically 1–3 years, after which they generate clean energy for decades.
- Operational impact: PV systems offer direct operational carbon savings, displacing grid electricity and reducing peak demand. When combined with batteries, they enhance local energy resilience and reduce reliance on fossil fuels.

Proportional impact of upgrades

Across all categories, the operational carbon savings generally outweigh embodied carbon within a few years, especially when systems are designed for longevity and efficiency. Retrofit and PV offer the most immediate building-level benefits, while heat networks and EV infrastructure support broader systemic change. Strategic planning should aim to minimise embodied carbon through material choices, reuse, and efficient design, while maximising operational performance through smart controls and integration with renewables.

3. Future energy system
Scenario modelling: embodied carbon

3.3 Subregional scenario results

3.3.5 Embodied carbon emissions - results

The embodied carbon associated with each scenario has been calculated for each borough, and summed across the subregion. Benchmarks for each intervention category have been used and applied to the annual deployment of each technology.

For retrofit, embodied carbon limits from the Net Zero Carbon Building Standard have been used for deep retrofit, which differ per typology, and assumptions for shallow retrofit embodied carbon as a proportion of these limits. For heat pumps, rooftop solar PV and electric vehicles, a combination of EPDs and Arup expertise have been applied to estimate the total embodied carbon for the deployment of these technologies. For heat networks, benchmarks for the network build and connection equipment have been considered separately, in order to apply different lifetime assumptions to each component.

The benchmarks used are considering embodied carbon stages A-C. It should be noted, these are indicative benchmarks.

Stage A: Product and Construction Process Stage

- A1–A3 (Product stage): emissions from raw material extraction, transport to manufacturing, and manufacturing of construction products.
- A4 (Transport): emissions from transporting materials to the construction site.
- A5 (Construction/Installation): emissions from on-site construction activities, including energy use and waste generation.

Stage B: Use Stage

- Covers emissions during the building's operational life, such as maintenance, repair, replacement, and refurbishment. While operational energy is typically considered separately, embodied carbon in this stage includes materials and processes used to maintain the asset.

Stage C: End-of-Life Stage

- C1–C4: emissions from deconstruction, transport of waste, waste processing, and final disposal. This stage captures the carbon impact of dismantling and managing materials at the end of the building's life.

Results for the three scenarios are shown below compared to the BAU, which is much lower, as this only includes the replacement of gas boilers.

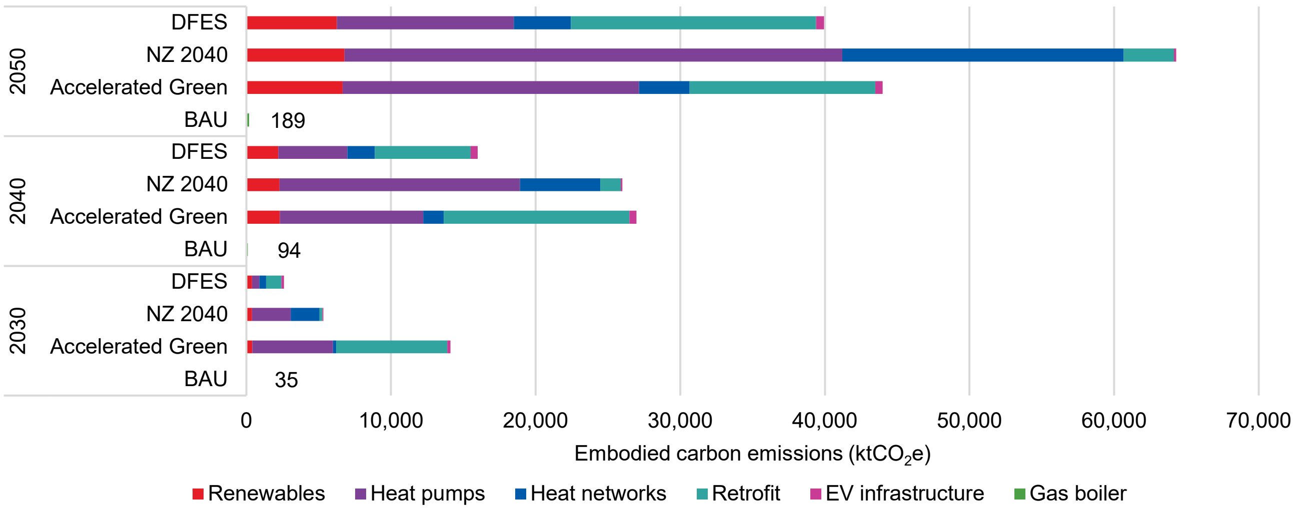

Figure 3.10: Embodied carbon associated with each scenario

3. Future energy system
Scenario modelling: embodied carbon

3.3 Subregional scenario results

The Accelerated Green scenario, as shown in operational and energy consumption results, deploy technologies at higher pace and scale. This results in higher embodied carbon, particularly in retrofit. The NZCBS benchmarks used, capture embodied carbon associated with retrofit decreasing over time.

The DFES scenario, which models a slower pace of retrofit deployment, appears to perform more favourably in terms of embodied carbon. This is primarily due to the reduced volume of materials and construction activity in the early years. However, it is important to note that while DFES assumes a slower rollout of low-carbon heating technologies, this does not imply that like-for-like boiler replacements are not occurring. In practice, many gas boilers are likely to be replaced prior to the widespread adoption of heat pumps. The embodied carbon associated with these interim replacements is not captured within the current modelling and may therefore understate the true emissions impact of the DFES pathway.

Figure 3.11-3.12 shows the results from the different deployment scenarios, with the top graph showing DFES-aligned deployment. This shows a step up in 2034 in heat pumps, which mainly comes from the deployment of hybrid heat pumps into heating technologies, which step up in deployment in 2033 and have a higher embodied carbon contribution.

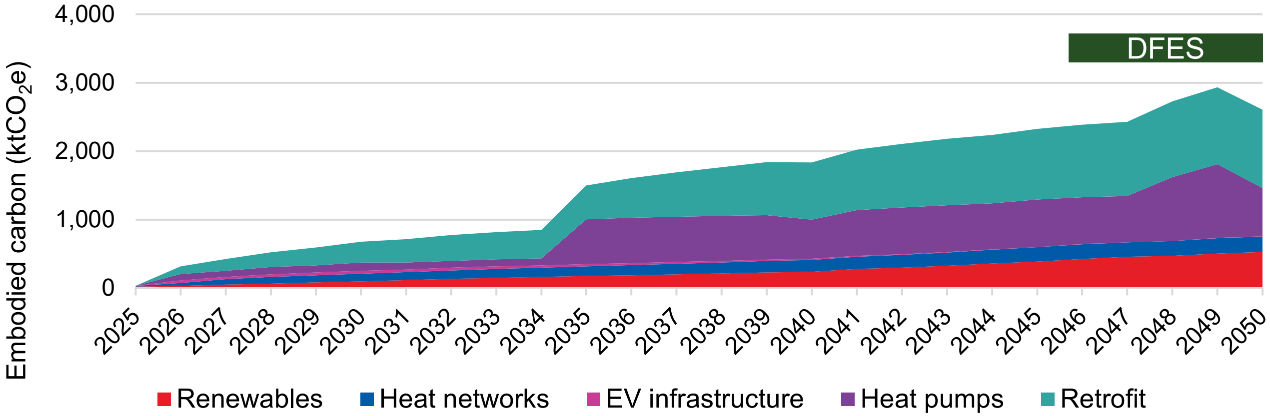

Figure 3.11: Embodied carbon over time under DFES

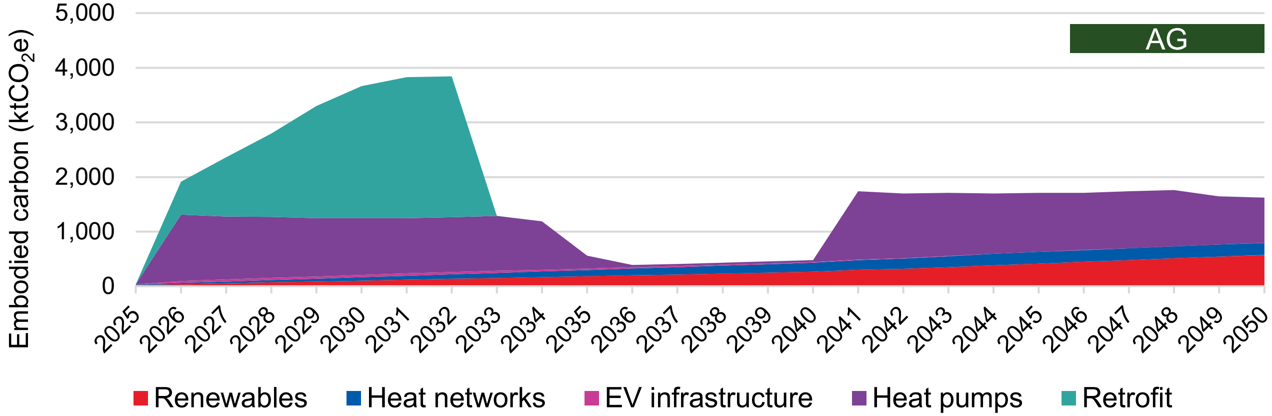

Figure 3.12: Embodied carbon over time under AG

3. Future energy system

Scenario modelling: embodied carbon

3.3 Subregional scenario results

There is also small step up across the 25-year period which come from replacement of heat pumps and solar panels.

Figure 3.13 is aligned to AG deployment. This shows a large initial retrofit deployment. Due to heat pumps also being deployed quickly, this results in lower embodied carbon between 2033-2040, before these systems are replaced.

Figure 3.13 shows the slower and stretched out rollout of heat pumps and retrofit when compared to Accelerated Green. This shows a step up in 2040 where initial plant and equipment replacements begin and deployment of retrofit and heat pumps step up in order to meet 2050 levels in time.

Figure 3.14 shows the embodied carbon results for the business-as-usual (BAU) scenario, which assumes no additional deployment of PV, heat networks, EV infrastructure, heat pumps, or retrofit measures. All heating systems are assumed to be gas boilers, installed either as new systems or replacements at end of life. This scenario results in very low reported embodied carbon. However, this is primarily due to the exclusion of embodied carbon from gas boiler replacements, which is challenging to quantify reliably at scale. Crucially, the low embodied carbon in BAU should not be interpreted as environmentally preferable, this scenario is associated with significantly higher operational emissions, as shown overleaf, which far outweigh any embodied carbon savings.

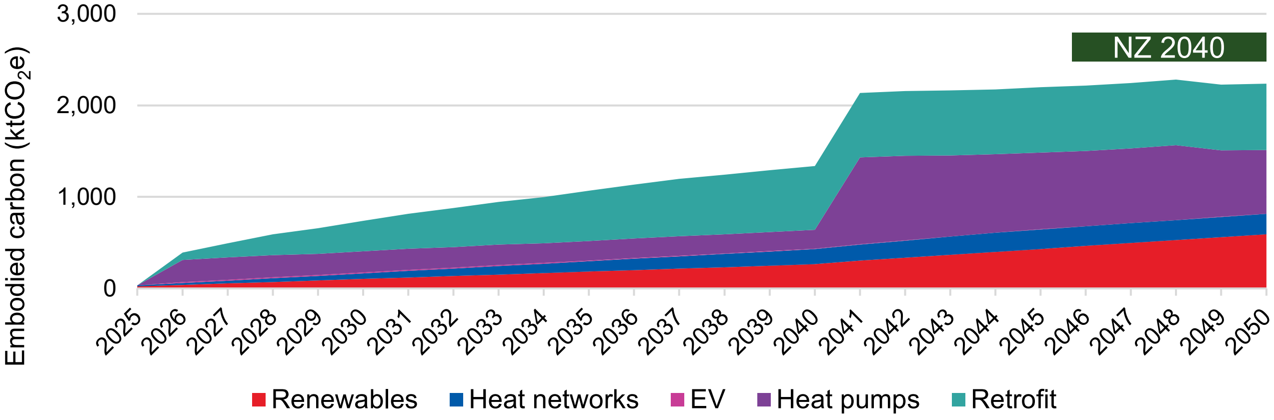

Figure 3.13: Embodied carbon over time under NZ 2040

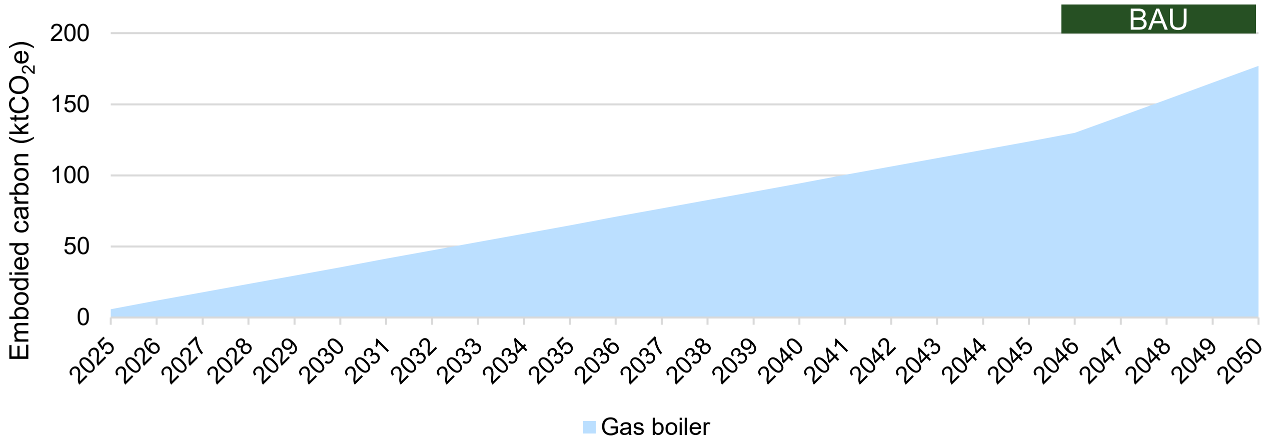

Figure 3.14: Embodied carbon over time under BAU

3. Future energy system
Scenario modelling: total carbon emissions

3.3 Subregional scenario results

Figure 3.15 presents a year-by-year comparison of embodied carbon emissions vs operational emissions through to 2050.Under the DFES pathway, operational emissions dominate in the first decade. This is primarily due to the slower rollout of low-carbon technologies, resulting in continued reliance on gas-based systems. Consequently, fewer new installations occur during this period, leading to relatively low embodied carbon emissions. Over time, as technology deployment accelerates and the electricity grid becomes increasingly decarbonised, operational emissions decline. Simultaneously, embodied carbon emissions rise due to the increased installation of new equipment.

In contrast, the Accelerated Green pathway shows operational emissions as the primary contributor in the early years. However, the rapid and large-scale deployment of technologies leads to a sharp increase in embodied carbon emissions. This initial surge tapers off before rising again later in the timeline, driven by the replacement of early-installed equipment.

NZ 2040 shows similar relative embodied emissions to the DFES scenario. Although due to higher total amounts of deployment of low carbon technologies, results in larger embodied emissions over time.

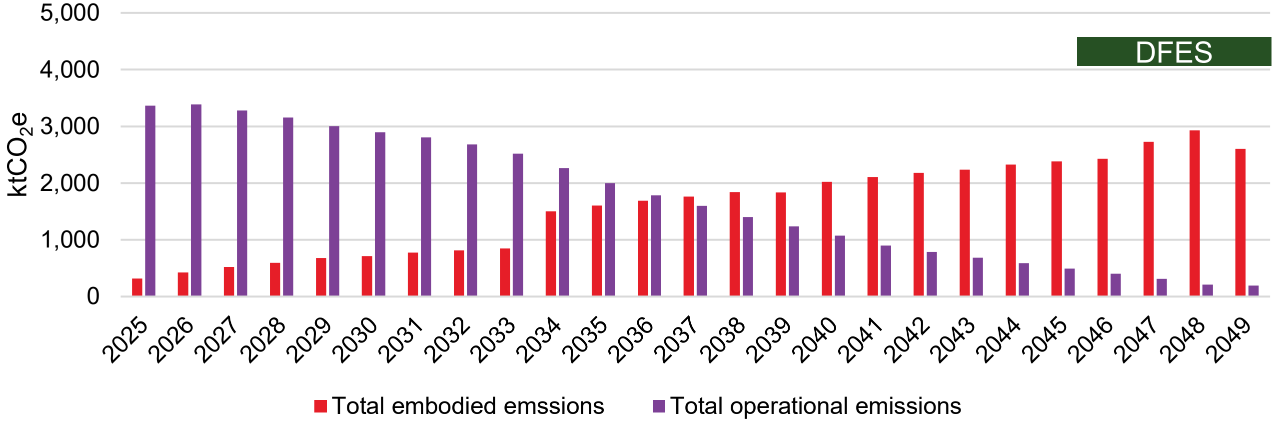

Figure 3.15: Total embodied carbon emissions vs operational emissions year by year under DFES

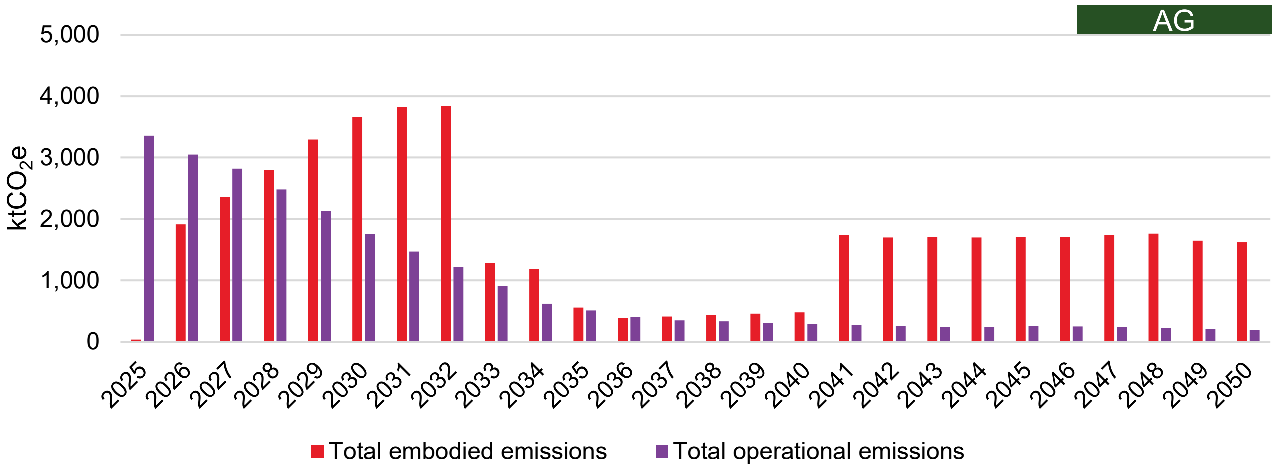

Figure 3.16: Total embodied carbon emissions vs operational emissions year by year under AG

3. Future energy system
Scenario modelling: total carbon emissions

3.3 Subregional scenario results

It is important to note that the embodied carbon calculations for all heat pumps assume the use of medium Global Warming Potential (GWP) refrigerants. In reality, technological advancements are likely to result in wider availability of low-GWP refrigerants, which could significantly reduce the embodied carbon associated with these systems and alter the overall emissions profile.

Figure 3.19 below shows a comparison of cumulative operational and embodied emissions between 2025-2050. BAU is the highest due to high operational emissions, however it has not considered some deployment of low carbon technologies that would naturally occur. The other three scenarios show the trade-off between delaying deployment of decarbonisation technologies and cumulative operational emissions.

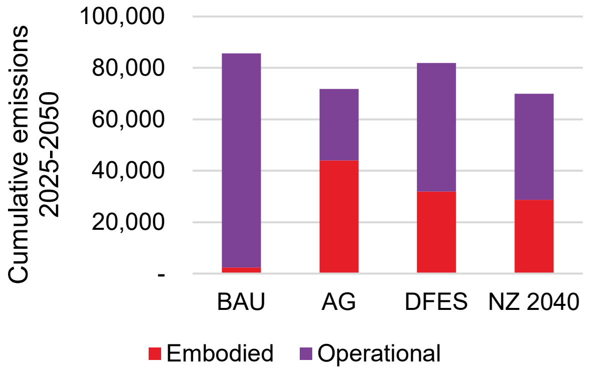

Figure 3.19: Cumulative operational vs embodied carbon emissions between 2025 to 2050

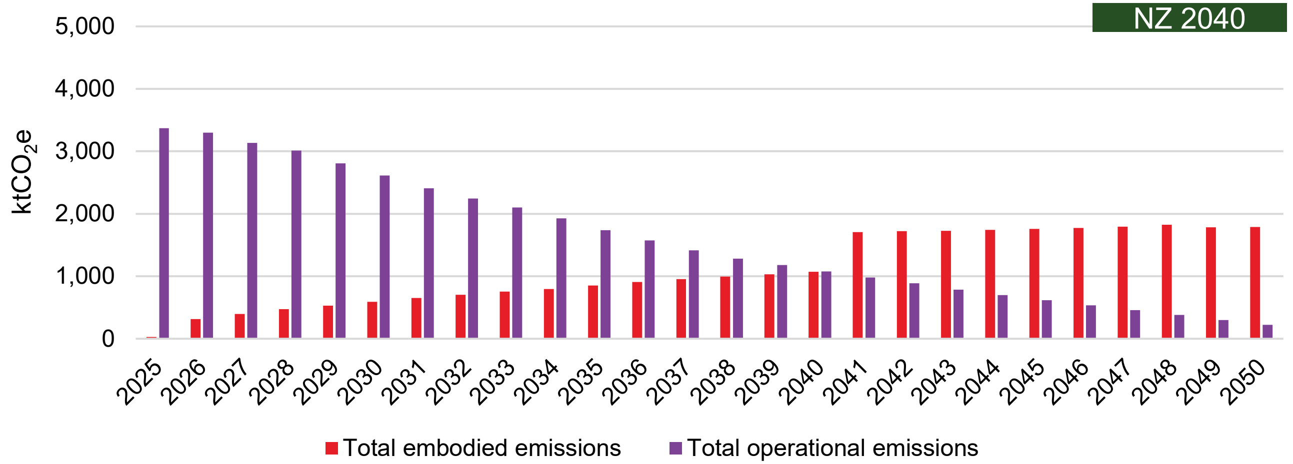

Figure 3.17: Total embodied carbon emissions vs operational emissions year by year under DFES

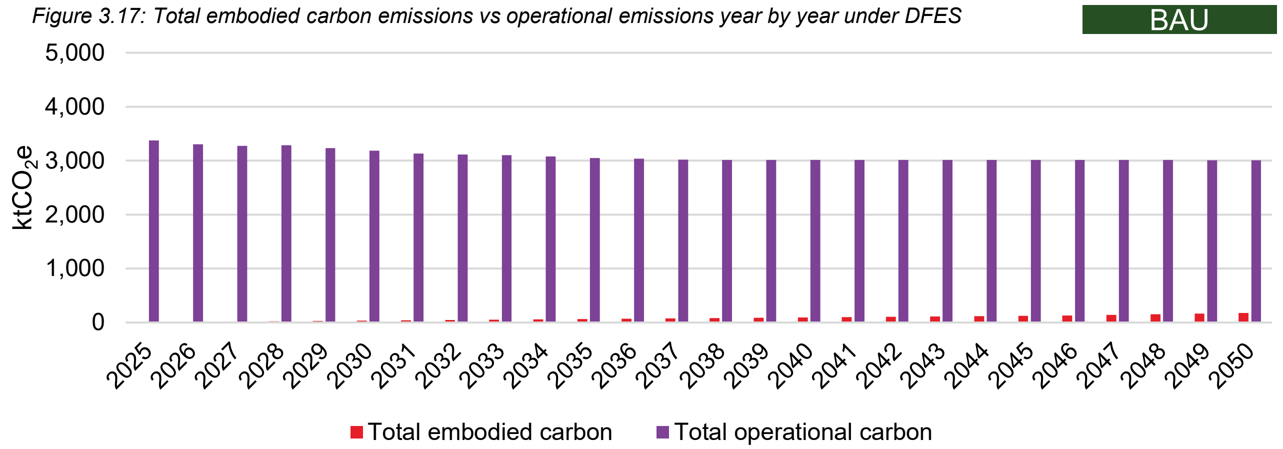

Figure 3.18: Total embodied carbon emissions vs operational emissions year by year under BAU

3. Future energy system
Scenario modelling: costs

3.3 Subregional scenario results

3.3.4 Capital costs

Figure 3.20 shows the estimated cumulative capital costs to achieve each of the scenarios in 2030, 2040 and 2050, as well as BAU.

Accelerated Green incurs significantly higher capex by 2030, primarily driven by an ambitious early rollout of retrofit measures. NZ 2040 has lower capital costs by 2030, due to slower deployment of heat pumps and retrofit programmes, which both are large contributors to the overall capital costs. DFES has reduced deployment across all technologies, therefore with significantly less capital costs in 2030.

By 2040, the cost gap begins to narrow as NZ 2040 begins to catch up in both retrofit and heat pump deployment, although Accelerated Green still maintains a higher cumulative investment.

In 2050, the overall capital cost for Accelerated Green and NZ 2040 are fairly similar, with only small differences in retrofit and heat pump roll out. However larger differences in retrofit deployment result in lower costs in the DFES scenario. It should be noted, these capital costs do not include inflation and therefore, realistically the longer-term deployments in the DFES scenario would in real terms likely be higher, than presented.

It is also important to consider the costs associated with offsetting cumulative residual emissions. When these are factored in, the DFES pathway could become substantially more expensive in the long term, due to its slower decarbonisation trajectory and delayed retrofit implementation. This does not include the cumulative operational costs.

The cost of full roll out for technology by 2050 shows that retrofit costs are the major contributor, with rooftop solar, heat pumps and EV infrastructure contributing similar overall totals.

These are only indicative cost estimates, and while these figures offer a useful indication of potential costs, further modelling is recommended to support more robust decision-making.

As in the embodied carbon results shown previously, costs for a BAU scenario of no further deployment of decarbonisation technologies are very low, as they consider only the installation of new and replacement gas boilers.

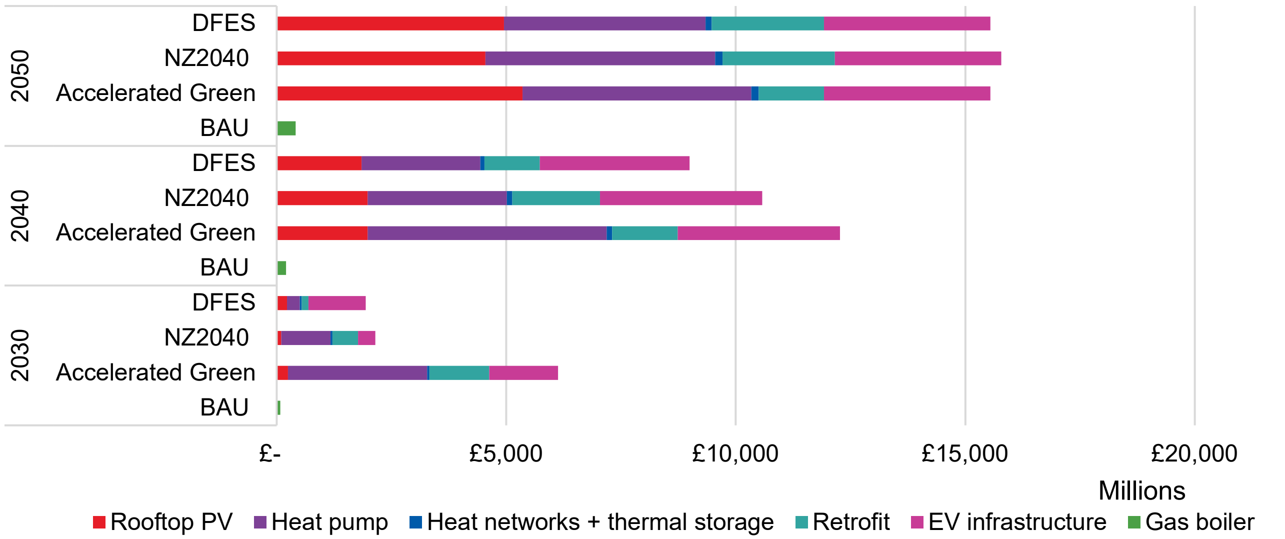

Figure 3.20: Estimated cumulative capital costs required to achieve scenarios in 2030, 2040 and 2050

3. Future energy system

3.4 Future subregional electrical capacity

The projected increase in electricity demand across East London subregion by 2050 reflects the combined impact of electrification of heating systems in both domestic and non-domestic buildings, alongside the rapid expansion of electric vehicle (EV) charging infrastructure. Potential additional demand for cooling has not been considered. As shown in Figure 3.21, which presents 2050 electrical capacity by primary substation under the Accelerated Green scenario, all boroughs are expected to experience significant growth in electrical capacity requirements, with some areas forecasted to exceed 100 MW. This is equivalent to the connection required to supply approximately 1000 homes.

It should also be noted that small-scale renewables such as rooftop PV have not been included in this analysis. This is because of complexity in modelling the impact of renewable installation, particularly on domestic homes to the grid. Private owners may choose to generate excess electricity to export to the grid, or to only generate their own electrical demand.

Data centres have also been excluded from this analysis due to the assumption that they connect into the transmission and distribution system at a higher level, although their significant impact on local grid capacity and impact on forecasting available headroom is to be noted. They do however, present an opportunity for waste heat for heat networks, which could relieve pressure on the grids caused by individual heat pumps.

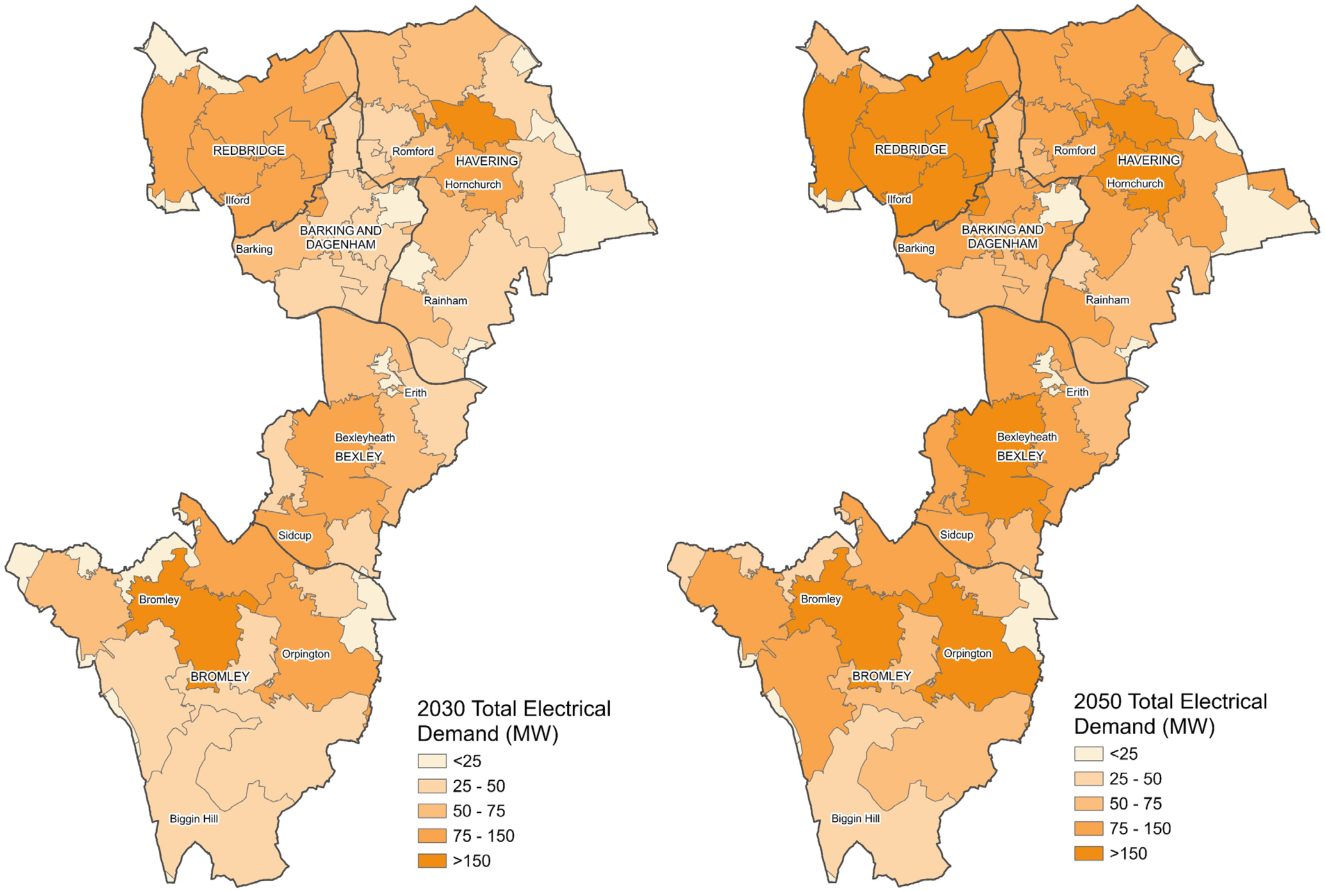

Figure 3.21: Modelled 2050 electrical demand for buildings and EV infrastructure (Accelerated Green)

4. Decarbonisation opportunities & action planning

Contents:
- Heat networks
- Retrofit and heat pumps
- Electrification of transport
- Renewables
- Other

4. Decarbonisation opportunities
Focus areas for the delivery of the LAEP

Recommendations overview

The data and analysis presented on the previous pages demonstrate the scale and change which is necessary to achieve East London subregion's net zero carbon targets while supporting continued growth and a resilient energy system. The changes required can be categorised in priority intervention areas, including:

- Heat networks
- Building retrofit
- Heat electrification
- Decarbonising transport
- Renewable generation
- Grids and flexibility

The following pages presents the opportunity for deployment of the above-mentioned technologies across the subregion, and the actions required to unlock these opportunities. These actions are colour-coded as shown in Figure 4.1, distinguishing whether actions would be contained in borough-specific LAEPs, or could be covered sub-regionally.

For sub-regional recommendations, responsibility for the delivery of actions across these intervention areas will vary, but key roles will be played by the GLA, National Grid, UK Power Networks, SGN, Cadent and will also require collaboration with individual boroughs, business leaders and residents.

Similarly, while borough-specific recommendations seek to address more locally-owned aspects of the energy system, close engagement and collaboration with stakeholders will be critical in successfully delivering integrated energy system change.

The borough-specific recommendations should be seen as an indication of where analysis and detailed recommendations in a full Local Area Energy Plan (Phase 2) could be focused. Further borough specific context on next steps can be found in Appendix A1 – Borough Profiles.

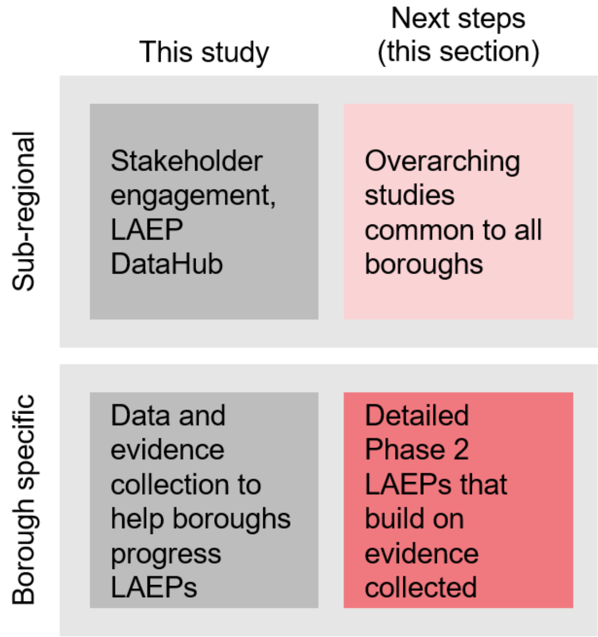

Figure 4.1: Categorised actions into borough specific or sub-regional

4. Decarbonisation opportunities
Heating

4.1 Future heating technologies

The decarbonisation of heating represents the single biggest opportunity to reduce emissions across the subregion, and also the most challenging. The selection of heating technologies across East London's building stock was developed to reflect both current energy use and future decarbonisation pathways. Heating technologies were assigned to the existing and projected building stock according to the following logic (more details can be found in Appendix A2):

- Buildings flagged for connection to a heat network are assigned district heating
- Buildings not connected to a heat network but previously heated by gas boilers are assigned heat pumps;
- Buildings not undergoing retrofit and previously heated using resistive heating (electric heating systems, often domestic electric heaters/boilers) retain resistive heating, reduction in electric heating is captured through application of falling demand, following scenario specific deployment rates.

Annual and peak profiles of energy demand were then calculated and aggregated to borough-level.

Figure 4.3 illustrates the distribution of heating systems across boroughs in the East London subregion. The data clearly shows that gas heating is the dominant system across all areas. Heat networks, while present, account for only a small fraction of the heating mix, indicating limited current deployment and infrastructure.

Note – 2050 values exclude new developments for clearer comparison.

Achieving the transition to electrification and heat networks will require coordinated efforts across policy, funding, and public engagement. Understanding the scale and location of feasible heat networks will be crucial in providing more certainty around where heat pumps will be no-regret solutions. The expansion of heat networks, supporting building owners in retrofitting buildings, strengthening grids are all critical enabling components to the decarbonisation of heat.

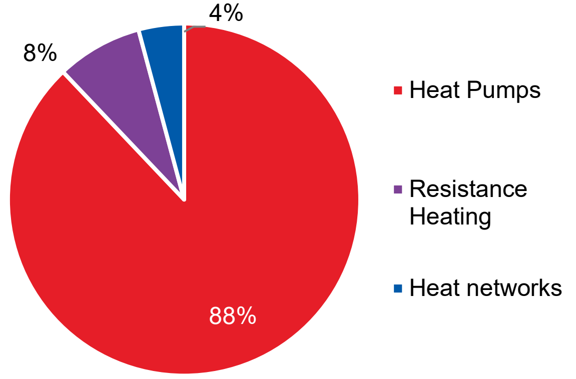

Figure 4.2: Heating technologies in 2050

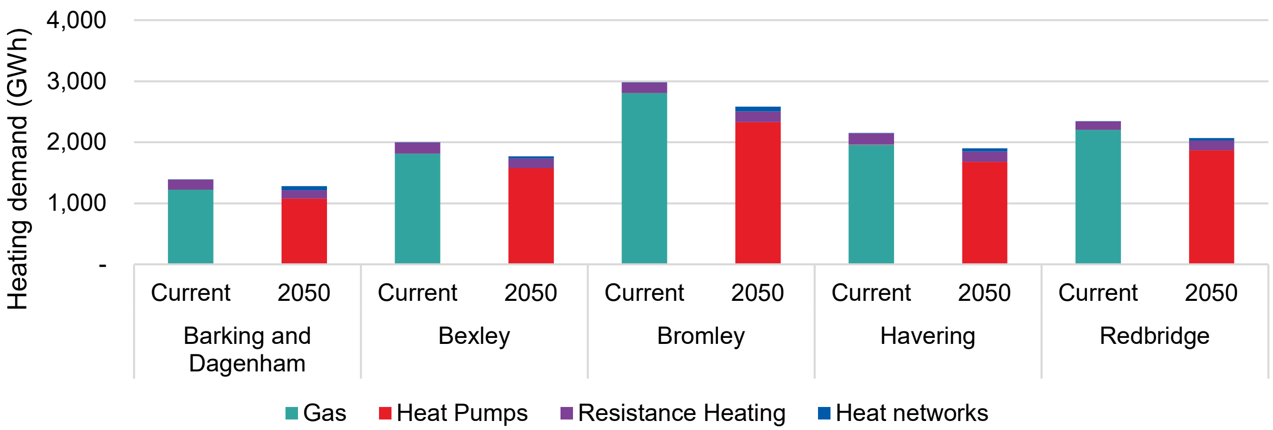

Figure 4.3: Annual heat demand by heating technology, with current figures based on London Building Stock Model

4. Decarbonisation opportunities
Heat networks

4.2 Heat networks

4.2.1 Heat networks overview

Heat networks are generally most viable where there is a high density of heating demand, with stable anchor loads. Their potential is further enhanced when a source of low carbon heat is locally available, such as a data centre, waste heat from industrial plant, power station or wastewater treatment plant, or a water body. While they represent a significant opportunity for heat decarbonisation, they require significant capital investment, and coordination among many stakeholders including potential heat customers or providers.

Under the Government's Heat Network Zoning programme (HNZ), central, regional and local governments are working with industry and local stakeholders to identify and designate areas of England where heat networks are expected to be the lowest-cost solution to decarbonising heat. This is expected to increase certainty and promote investment by the private sector while also providing an indication of where heat pumps are more likely to be a no-regret option (e.g. in locations where heat networks are not likely to be feasible).

Analysis undertaken as part of this LAEP builds on a number of existing studies, and aims to highlight the scale and location of the most significant opportunities for heat network development[1]. The basis of the analysis includes:

- HNZ's National Zoning Model (NZM) outputs
- Barking and Dagenham Advanced Zoning Programme
- London Waste Heat Study, which identifies the size, nature and location of London's main recoverable waste heat sources and illustrate the opportunity that they provide for developing **strategic** multi-borough heat networks.
- In addition, the GLA has been collating plans for **proposed** heat networks that are in various stages of planning or development, including feasibility, detailed feasibility, commercialisation, in planning and under construction. Proposed extensions to existing heat networks are also included in the data collection. The data is collated from local authorities and/or their consultants and was last updated in August 2024.

Please refer to Appendix A2 for further details on the heat networks methodology.

Table 4.1 Heat Network Key Findings

Heat Networks Key Findings
32 heat networks opportunity areas distributed across subregion
1 operational district heat network in Barking town centre
900 properties potentially required to connect[3] (existing)
100 planned developments
650 GWh/year[4] all buildings connected to heat networks (existing + planned)
400 GWh/year[4] potentially required to connect properties (including planned)
900 GWh of waste heat supply opportunities matched to heat networks opportunities areas

Footnotes:
[1] This report contains outputs of the NZM prior to full details of the Government's Heat Network Zoning (HNZ) policy being available. Therefore, the contents, including data on heat networks areas shown in maps, technical and economic data within the report, are likely to change. The information on indicative heat networks zones, refined here as heat networks opportunity areas, should not be relied upon for any business decisions, as further engineering and business case analysis is required in tandem with policy developments.
[2] Numbers are rounded for clarity (nearest 50 GWh, nearest 100 buildings)
[3] Potentially required to connect buildings are buildings that may be required to connect under the Heat Network Zoning policy. This assumes the proposal as per the 2023 consultation - new buildings, large non-domestic buildings, and communally heated residential blocks in zones and within connection distance to an existing or proposed heat network. NMR4 outputs include potentially required to connect flag for all buildings.
[4] Baseline heat demands only.

4. Decarbonisation opportunities
Heat networks

4.2 Heat networks

4.2.2 Heat network opportunity areas

The map (right) shows indicative heat networks opportunity areas as identified across the subregion. The map also includes data on the existing, proposed and strategic networks, demonstrating alignment with these studies.

Overall, the indicative heat networks opportunity areas are located where heating demand is high, densely concentrated and within proximity to a centralised, low carbon heat source.

Heat network opportunity areas have also been identified beyond the proposed and strategic networks routes, suggesting scope for further opportunities beyond the existing work, and therefore scope for further development.

Some of the analysis presented in this report centres around the opportunity for heat from the CORY Energy from Waste facility on the edge of the Thames in Bexley. As has been studied in other parts of London, there may be an opportunity for this source of heat to be utilised in a transmission route connecting to neighbouring boroughs such as Greenwich and Newham. The subregion considered as part of this study should not be considered isolated from the rest of Greater London, particularly for cross-boundary sectors such as this.

Full results for the 32 identified opportunity areas can be found in Appendix A3.

More detailed heat networks analysis, which involves deriving indicative heat networks routing and performing high-level techno-economic analysis, was undertaken for nine of these 32 opportunity areas and are presented overleaf.

The basis of prioritisation for further analysis includes the scale of total heat demands for the area, the availability of waste heat sources as well as ensuring good coverage of the sub-region. Alignment with proposed and strategic networks is also considered.

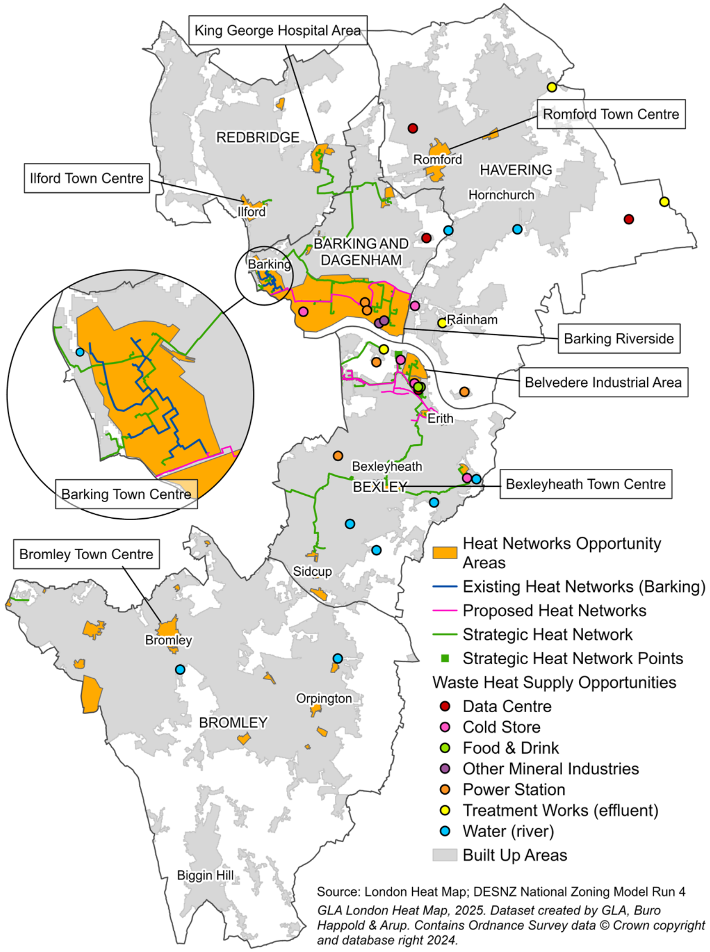

Figure 4.4: Heat networks and waste heat opportunities across the East London sub-region

4. Decarbonisation opportunities
Heat networks

4.2 Heat networks

4.2.3 Refined heat network opportunities

This page summarises the results of the more detailed heat networks analysis undertaken for nine of the thirty-two heat networks opportunity areas, which supports Boroughs in identifying which opportunities are most worth pursuing.

This analysis is based on using Arup's HeatNet tool, which involves modelling indicative heat networks routing and performing high-level techno-economic analysis, maximising internal rate of return (IRR).

A summary of these results is provided in table 4.2. The results show that only one of the networks has a negative Net Present Value (NPV). Otherwise, the IRR values suggest that many of the networks could be attractive for private sector investment, and warrant further investigation in order to better understand their viability. Please refer to Appendix A2 for further details on the methodology for HeatNet and the wider heat networks modelling. Also refer to the Borough Profiles (Appendix A1) for mapped HeatNet outputs and specific actions for each opportunity area.

Table 4.2: Summary of heat network characteristics for nine priority zones

	1. Barking Town Centre (B&D)	2. Barking Riverside (B&D)	3. Becontree Heath* (B&D)	4. Belvedere Industrial Area (Bexley)	5. Bexleyheath Town Centre (Bexley)	6. Bromley Town Centre (Bromley)	7. Romford Town Centre (Havering)	8. King George Hospital Area (Redbridge)	9. Ilford Town Centre (Redbridge)
Annual heat offtake (GWh/year)	71	177	7	17	24	57	110	38	54
Connections	1852	2773	93	43	970	1561	1794	46	1268
Heat sources	River source heat pump (RSHP), Air source heat pump (ASHP)	2x Energy from Waste (EfW), ASHP	Data centre (DC)	EfW	EfW	ASHP	DC	ASHP	ASHP
CAPEX (£m)	48	172	19	20	28	49	53	19	33
Network length (km)	6.4	34.4	5	5.5	7	8.5	11.5	2.1	4.1
IRR (%)	14	10	1	10	10	11	21	18	15
NPV (£m)	87	181	-6	24	32	58	179	52	68
LHD (MWh/m)	11.1	5.2	1.4	3.2	3.4	6.7	9.6	18	13.1

* The identified zone in the Becontree Heath area extends beyond the existing DH network in this area, which has a length of approx. 0.8km. The analysis carried out here focused on the wider network opportunity.

Key	
(light pink)	Cross-cutting, sub-regional actions
(dark pink)	Borough specific LAEP actions

4. Decarbonisation opportunities
Heat networks – action planning

Recommended actions

The mapped opportunity areas provides the most contemporary and strategic picture on heat networks opportunities across the subregion, from zonal scale opportunities down to indicative heat networks, including those networks with strong economic metrics utilising some of the most strategically important sources of waste heat across the subregion.

Heat network opportunities and economic modelling for each of the opportunity areas as identified by the NZM are provided in the Borough Profiles and within the LAEP DataHub.

The actions summarised here and continued in the Borough Profiles support the continuation of the existing work and seek to join up key additional stakeholders as well as further align planning with the work carried out by DESNZ in preparation for the Heat Network Zoning policy.

Table 4.3: East London subregion energy potential next steps – heat networks

East London subregion energy planning potential next steps – heat networks		
Task	**Description**	**Potential action owners**
Strategic engagement with suppliers of waste heat	Develop relationships with industrial facilities, wastewater treatment, data centres, and other large energy users to capture waste heat through formal heat supply arrangements. Utilise the findings from the Heat Reuse from Data Centres study, to enable identified heat network opportunities within the subregion Undertake early engagement with known planned developments	GLA, Boroughs, existing and planned potential heat providers
Engage with DESNZ and GLA on heat network zoning in wider area	Monitor development of Heat Network Zoning policy and collaborate with GLA to engage with DESNZ and neighbouring boroughs on how to identify viable zones across borough boundaries and maximise opportunities for heat network expansion	Boroughs, GLA, DESNZ
Multi-borough strategic heat networks	Develop further upon the recommendations from the Strategic Waste Heat Summary Areas Study and convene together the boroughs of Tower Hamlets, Newham, Barking & Dagenham and Redbridge. Also convening Bexley with Cory, with also Greenwich, Lewisham, Southwark and Lambeth.	GLA, East London Boroughs and neighbouring Boroughs
Establish a delivery vehicle to lead on delivery of heat networks	Consider creating a dedicated energy delivery unit responsible for further developing opportunity areas and leading on engagement with off-takers and heat providers. One such example is B&D Energy in Barking and Dagenham.	Borough
Heat networks opportunities implementation	Technical design, business case development, procurement of private sector delivery partners and financing for multiple phases, especially for heat networks opportunity areas that have indicative networks with strong economic metrics	Borough, heat network developer

4. Decarbonisation opportunities
Retrofit

4.3 Retrofit

4.3.1. Assessing the retrofit opportunity

In order to explore the opportunity and most feasible strategy for deploying retrofit across the subregion, three building retrofit scenarios have been modelled: deep, shallow and blended approach.

Shallow interventions could be actioned with minimal disruption to the building use or operation, while deeper retrofit interventions are more costly and may require the building to be vacant.

Details of the specific measures associated with each retrofit type, segmented by building classification and EPC rating, are provided in Appendix A2.

A blended retrofit approach reflects a more realistic deployment strategy, where the level of retrofit applied to buildings is dependent on their current energy performance. Aiming for a retrofit mix of predominantly shallow retrofit, and selective deep, the blended scenario was compiled as follows:

- Shallow retrofit for all buildings connected to a heat network and those with EPC rating D-E
- Deep retrofit for buildings with EPC F or below, as well as a selected number of high heat load non-domestic buildings

Table 4.4 describe the total scale of heat demand reductions achievable with a blended retrofit approach. Note that negative savings from non-domestic buildings represents increased heating demand resulting from savings from lighting efficiency.

4.3.2 Retrofit deployment

The deployment of the total savings from retrofit was scaled to the targets set by Accelerated Green and DFES, and shown on the right.

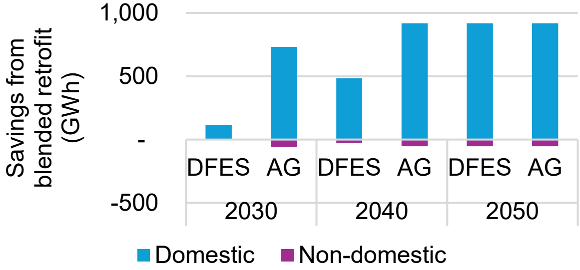

Figure 4.5: Heating demand savings from blended retrofit

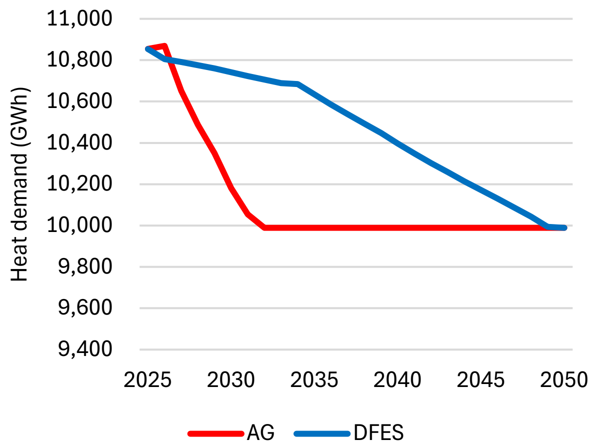

Figure 4.6: Heat demand after retrofit in AG and DFES

Table 4.4: Domestic heating demand savings from blended retrofit (below)

	Shallow retrofit	Deep retrofit	Blended
Measures	• Building automation, BMS and smarter energy controls • Building services interventions e.g. recommissioning of ventilation and cooling • Fabric improvements including glazing, air tightness and roof/loft insultation in appropriate building types	• All shallow measures • Solid wall and floor insultation • Replacement of poor-performing double-glazed windows	• No retrofit for existing high performing buildings • Shallow and deep retrofit dependent on current performance
Impact	12% average reduction to baseline heat demand	41% average reduction to baseline heat demand	13% average reduction to baseline heat demand

ARUP

4. Decarbonisation opportunities
Retrofit

4.3 Retrofit

Once the total scale and deployment of the retrofit opportunity has been defined, the next step is to establish a pipeline of actions that can be taken by Boroughs and other stakeholders in order to unlock progress. Retrofit measures require targeted approaches that differ across building tenure and type, and much of the investment in retrofit is outside of the Borough's control. Actions that can be taken to stimulate progress on retrofit are detailed in the following pages.

The definition of the blended retrofit scenario represents one potential pathway to achieving the stated targets. Alternative approaches could include:

- Prioritising deep retrofit of social housing to maximise the use of available grant funding.
- Targeting council-owned buildings for retrofit to demonstrate leadership and set a precedent for wider adoption.

In practice, further analysis could be undertaken, such as in a Phase 2 LAEP, to develop a pipeline of well-defined retrofit bundles that are appropriate to building tenure, building type and current performance.

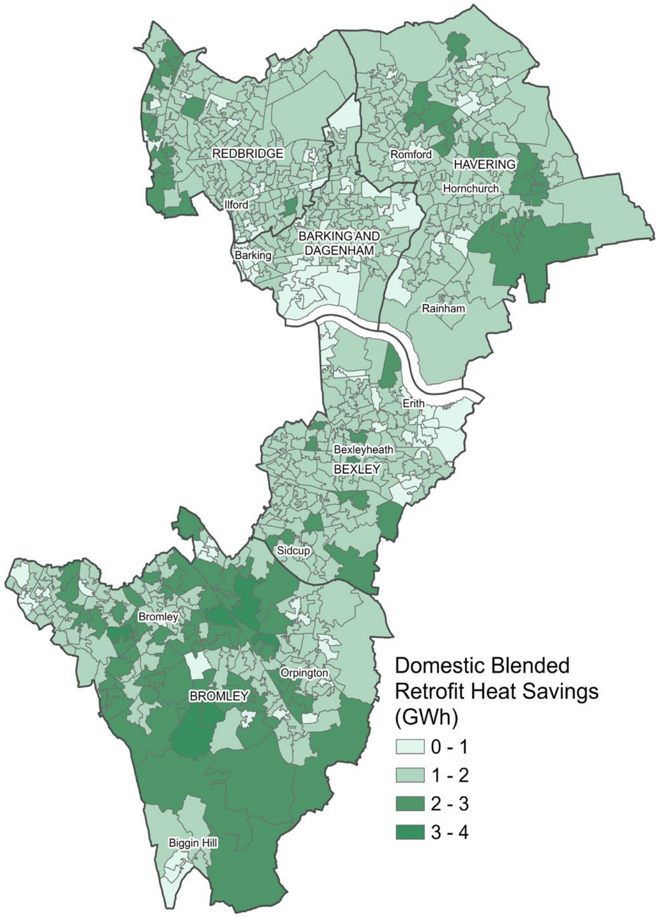

Figure 4.7: domestic heating demand savings from blended retrofit in 2050 in Accelerated Green

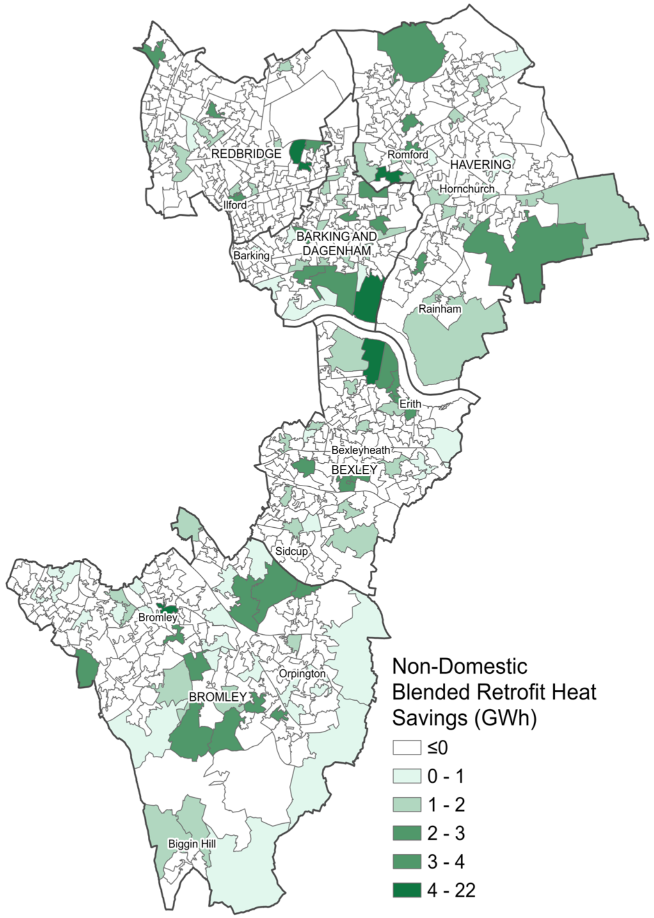

Figure 4.8: non-domestic heating demand savings from blended retrofit in 2050 in Accelerated Green

4. Decarbonisation opportunities
Heat electrification

Heat pumps

Heat networks and heat pumps are the two primary technologies for decarbonising heating. However, as explored above, heat networks are only viable in selected zones, meaning the majority of buildings—especially those outside designated opportunity areas—will need to transition to heat pumps. This presents a significant challenge, as deployment is largely dependent on individual homeowners and landlords, and the upfront capital investment is high, with limited short-term financial return.

Similar to retrofit measures, heat pump adoption faces barriers such as uncertainty around future infrastructure (e.g. hydrogen or heat networks), lack of consumer confidence in performance, and low desirability compared to technologies like electric vehicles. Targeted communications, roadshows, and pilot schemes can help build trust and awareness, especially in areas where heat networks are unlikely.

Priority areas for heat pump deployment include council-owned buildings not in heat network zones, and communal heating systems currently running on gas—these represent "no regrets" opportunities.

Owner-occupied homes, particularly those with the ability to pay, should be encouraged to bundle heat pumps with other measures such as solar PV, battery storage, and EV charging, to improve value and appeal.

Grid capacity is another concern. Without parallel efforts to reduce demand through fabric efficiency upgrades, widespread heat pump deployment could strain local electricity networks. Coordinated planning with DNOs and boroughs is essential.

Coupling heat pumps with flexibility measures such as thermal or battery storage could mitigate strain on local grids, and should be investigated further, in particular to assess where these are most needed, and what value proposition could be made to support investment by homeowners (e.g. could there be significant bill savings available).

Supply chain readiness is also a limiting factor. Investment in skills, training, and installer capacity is needed, alongside efforts to grow demand. Bulk procurement programmes led by boroughs or regional authorities could help reduce costs and stimulate market maturity.

Using LAEP data, boroughs can identify priority zones for heat pump rollout based on building type, tenure, and grid constraints. This data-driven approach can support the development of a pipeline of projects, aligned with local decarbonisation goals and funding opportunities.

Figure 4.9 shows the scale and pace of heat deployment needed across the region in the Accelerated Green Scenario.

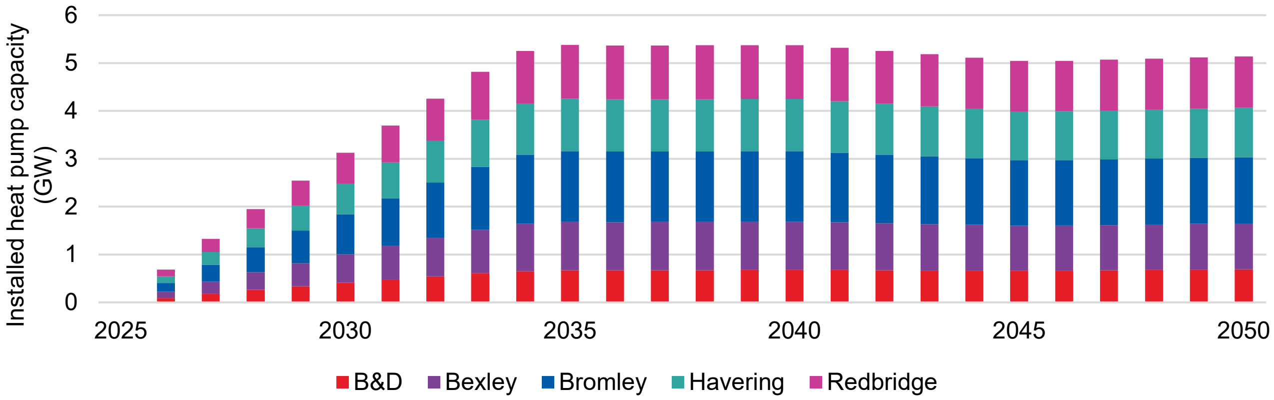

Figure 4.9: Installed heat pump capacity by Borough for Accelerated Green

4. Decarbonisation opportunities
Retrofit and heat electrification

Retrofit and heat electrification

How to target deployment across the subregion

The greatest opportunities for heat demand reductions in domestic buildings can be found in Bromley, due to the high prevalence of semi-detached and detached houses and therefore greater heating demand, suggesting a greater focus on accelerating uptake of retrofit measures by able-to-pay homeowners. This approach will also be key in Havering, which also has a high proportion of semi-detached and detached housing stock.

Redbridge, with its relatively high share of private-rented and mid-terrace housing and flats, will need to focus on incentives for landlords for improving fabric efficiency.

Bexley, Bromley, Havering, and to a lesser extent, Barking & Dagenham given its higher proportion of efficient buildings, will also need to adopt a combination of measures to target owner-occupied, rented and social homes. Examples of targeted actions most suitable to each building type are listed overleaf.

Hotspots for non-domestic building retrofit lie in southeast Dagenham, northern Bexley, Upminster, around Chislehurst, Bromley town centre and Bexley town centre (see map for blended retrofit savings in non-domestic buildings in Section 4.3.2).

Using LAEP data to prioritise retrofit action

The data collected as part of this LAEP, and compiled in the LAEP DataHub for use by Borough officials, can be used to represent different competing priorities, for example to target different tenure types.

These can be scored according to Borough-specific priorities, and mapped, resulting in a pipeline of building upgrade projects, with a clear evidence based as to why they have been selected. Such data could include: deprivation index, current EPC level, and whether a heat network is planned in the vicinity. The example showed to the right shows that priority action on social housing could be taken in e.g. northeast Bexley, while larger savings in heat demand might be achieved by targeting the western part of the Borough.

These factors (e.g. social issues vs total heat saved) can be scored and weighted, resulting in a “heat map” of priority areas, which can form the basis of a pipeline of projects. This exercise could be further refined a Phase 2 LAEP.

While a high-level assessment of embodied carbon of measures has been undertaken and shown in section 3, a more detailed whole-life carbon assessment is recommended in order to understand the trade-off between upfront embodied carbon (e.g. of insulation) and its resulting savings in operational carbon, across the whole lifetime of the measure (typically 60-years), enabling the design of retrofit programmes that result in maximum overall carbon emission reductions.

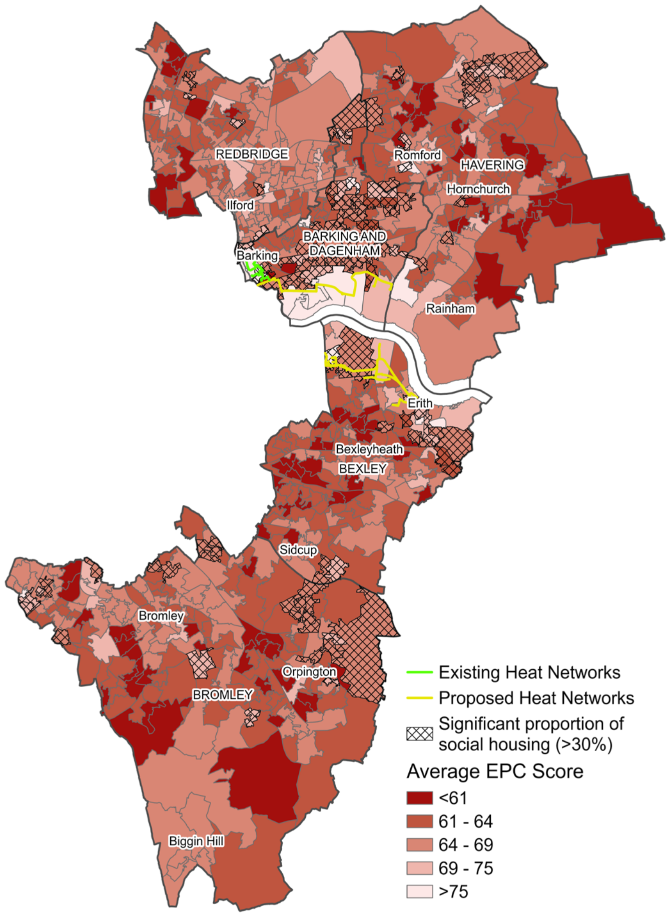

Figure 4.10: Prioritising retrofit and heat pumps with EPC rating

Key

(light pink)	Cross-cutting, sub-regional actions
(dark pink)	Borough specific LAEP actions

4. Decarbonisation opportunities
Retrofit and heat electrification – action planning

Retrofit and heat electrification

The analysis in the previous pages has shown the extent of retrofit and heat electrification required to meet subregional targets, and demonstrates that there are significant opportunities for energy savings across all boroughs. Reflecting a "fabric first" approach, building retrofit is a key enabling activity that intersects with several other decarbonisation measures like heat networks, and could lower the additional demand on electricity caused by heat electrification. It also is a key measure to address fuel poverty by reducing bills and increasing occupant comfort. This section aims to identify specific next step actions that boroughs can take in order to unlock these opportunities.

Priority focus areas for retrofit are:

- Social housing, although ownership and sphere of control of social housing varies across the Boroughs, where control is held there is ability to address fuel poverty, and availability of funding, particularly for deep retrofit through the Warm Homes London programme and dedicated Social Housing Fund;
- Owner-occupied housing, due to being the largest share of domestic building stock, which benefit from the Boiler Upgrade Scheme;
- Retail, industrial and school buildings, due to being the largest share of non-domestic heating demand.

The actions opposite reflect actions the LA can take on its own building stock, as well as enabling actions to stimulate investment by the private sector.

Table 4.5: East London subregion energy planning potential next steps – retrofit and heat pumps

East London subregion energy planning potential next steps – retrofit and heat pumps

Task	Description	Potential action owners
Develop an approach for able to pay homeowners	Signpost to available funding sources (e.g. central government schemes, private finance). Promote demonstration projects and local "roadshows" to share information on benefits. Develop approaches for the "able-to-pay" segment. Assess benefits of bundling measures for maximum bill and carbon reductions (e.g. PV, heat pump, battery, EV) and identify incentives for uptake e.g. the Boiler Upgrade Scheme	Boroughs, homeowners, retrofit supply chain
Develop an approach for small non-domestic buildings, SMEs	As above. Identify building archetypes and suitable retrofit interventions. Demonstration projects could draw on the learnings from the Warm Homes Local Grant Scheme for the domestic sector.	Boroughs, small business owners, retrofit supply chain, WHL
Refine analysis on embodied carbon	Assess whole life carbon of proposed measures to inform decision-making and ensure maximum carbon reductions	Boroughs, GLA
Develop a pipeline of priority areas	Use LAEP data to layer up and score selected factors to prioritise focus areas for funding applications such as Warmer Homes London	Boroughs
Develop a pipeline of council retrofit and electrification projects	Survey council buildings to determine a strategy for which measures to undertake in which buildings, targeting a coordinated application to WHL and DESNZ for funding. Bundle measures across retrofit, solar PV and heat pumps, and utilise available technical support	Boroughs, WHL
Strengthen supply chains	Assess availability of local skills and supply chain capacity for the installation of retrofit and heat pump measures, and work with local businesses and education facilities to develop a plan to strengthen supply chain capacity	Boroughs, retrofit and heat pump supply chain

4. Decarbonisation opportunities
Transport

4.4 Electrification of transport

The electrification of the transport system is crucial to reach the targets of net-zero transition. For the future growth projections, NEVIS data EV uptake, vehicle statistics and DFES EV projections were considered. As EV uptake accelerates under scenarios such as Accelerated Green 2030 and 2040 and the DFES Future Scenarios, there will be requirements for new charge points across boroughs. By integrating borough-level Net Zero targets with transport demand forecasts, this analysis identifies how future energy requirements for EVs can be met and aligned with local decarbonisation strategies.

The Accelerated Green (AG) scenario sets an ambitious pathway for achieving net zero in London. By 2030, it targets a 27% reduction in car mileage, significant uptake of zero-emission vehicles (ZEVs), and accelerated rollout of EV charging infrastructure. By 2040, the scenario envisions near-complete decarbonisation of road transport and the electrification of commercial fleets, supported by large-scale public and private sector investment.

However, replacing private car use with EVs alone will not be sufficient to meet net zero targets. A broader shift toward sustainable public transport and active travel, such as walking and cycling, will also be essential to reduce overall transport emissions and deliver co-benefits for health, air quality, and urban space.

UK Power Networks' (DFES) provide a borough-level view of electricity demand growth driven by transport electrification. Boroughs such as Barking & Dagenham and Havering, with higher levels of car dependency, will require more rapid EV infrastructure deployment compared with other boroughs. Meanwhile, boroughs with better public transport links, such as Redbridge, may achieve a greater share of mode shift away from private vehicles.

Results of the scenario results are given in table 4.6 regarding EV miles, demand and total transport demand:

Growth in EV market share, will be supported by extensive charging infrastructure.

- EV miles and demand will be increased while total transport demands will be decreasing.
- As petrol and diesel vehicles switch to EVs, the EV demand will increase.

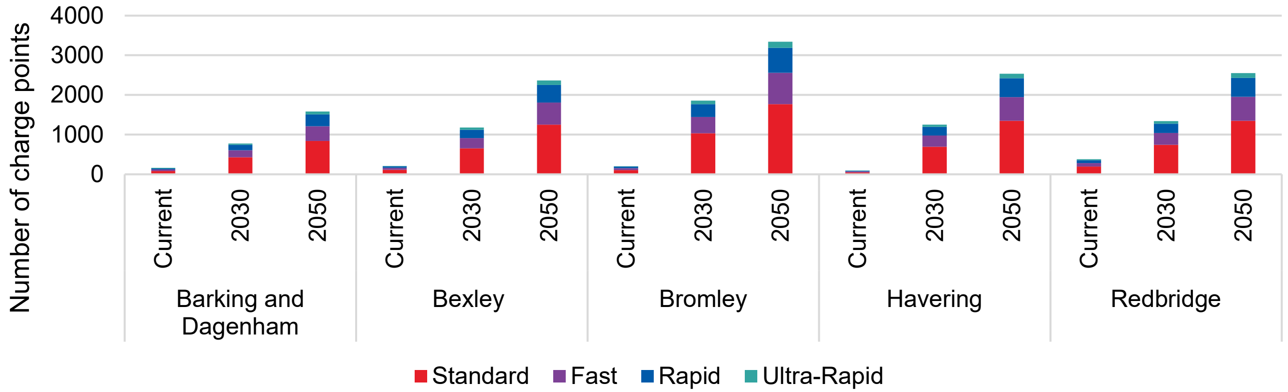

Figure 4.11: Number of current and future charge points for each borough with device types in Accelerated Green

Table 4.6: Projected Electric Vehicle (EV) Demand by scenario

	EV Miles (million miles)	EV demand (GWh)	Total transport demand (miles)
Baseline	283	87	5,013
AG	**2030:** 1,675	562	4,878
	2050: 3,615	1,550	4,338
DFES	**2030:** 1,548	521	4,955
	2050: 4,341	1,784	4,672

4. Decarbonisation opportunities
Transport

4.4 Electrification of transport

4.4.1 Projections

The projections for the future transport system indicate a significant transition aligning with the Accelerated Green and DFES Holistic scenarios. The projections inform the modelling of EV demand, charging infrastructure requirements and energy needs.

These projections are developed using transport decarbonisation scenarios and local vehicle ownership data to estimate substation-level demand and assess charging infrastructure needs and grid capacity to support the transition.

Future vehicle statistics

EV ownership is projected to grow rapidly by 2040, as replacements for petrol and diesel vehicles, rather than in addition to them, especially in car-dependent boroughs such as Havering and Bromley.

Future EV charge points and energy consumption

EV charger numbers must meet projected EV growth, considering the residential, public, rapid charging points as well as car parks and transport hubs.

EV charging demand is forecast to increase significantly, as the number of charge points will increase. The EV forecasts include numbers with the charger types, and utilisation rates.

Future mileage and emissions

Under Accelerated Green scenario, 27% reduction in vehicle mileage is targeted, to be achieved by reduced travel demand, and a shift to public transport.

In areas, where active and public transport accessibility is low so it is more convenient to use a private vehicle, a more targeted rollout of EV charging infrastructure will be required.

Different tiers of the government are responsible for the achieving the targeted reduction in vehicle miles, therefore requires close coordination between these levels, with integrated policies and aligned investment strategies. This LAEP should highlight the responsibilities where boroughs should implement. Boroughs, as highways and planning authorities, control policies such as on and off-street parking, while TfL and GLA have limited powers in this area.

Phase 2 LAEPs can therefore look more closely at options like parking requirements, linked to modal shift analysis or reductions in this area, to show the borough-level fit into their net zero pathway.

The reduction in CO2 emissions will be primarily driven by the uptake of electric vehicles and reduced fossil fuel mileage, where internal combustion engine vehicles ownership is higher.

By 2030, a 35-45% cut in emissions is expected, and by 2050, the borough emissions will be brought to near zero, as can be seen in Figure 4.12.

Havering is expected to see a significant decrease in emissions due to its higher car dependency; while Barking and Dagenham is projected to achieve faster early reductions because of its lower vehicle ownership rates and higher reliance on public transport.

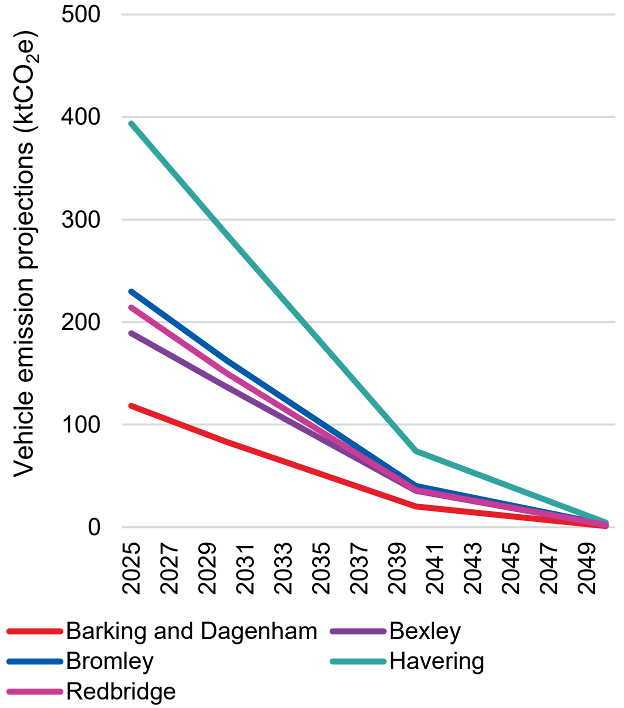

Figure 4.12: Vehicle emission projections from NEVIS and LEGGI data for each borough

4. Decarbonisation opportunities
Transport

4.4 Electrification of transport

4.4.2 Future EV charge points and infrastructure

The forecasted growth in EVs will require a balanced mix of standard, fast, rapid, and ultra-rapid chargers. Rapid and ultra-rapid chargers' growth would be higher than the others as can be seen in Figure 4.13.

Public charging hubs, workplace charging, and residential solutions will all be needed. The EV infrastructure planning must respond to gaps in public charging required and the actions must be taken to meet 2030 and 2050 goals. The integration of the data must provide a clear framework to prioritise the investment in charging infrastructure across the boroughs.

Heavy goods vehicle (HGV) charging is a different challenge compared to cars and vans because of power demand, space requirements and operational patterns. Engagement with fleet operators and logistic companies is essential to forecast demand, plan charging locations and align infrastructure delivery.

Utilisation data, borough-level EV ownership trends, UKPN substation headroom data and future EV uptake demand for charge points have been mapped to identify priority areas for investment. The planning should also align with borough net zero plans and transport strategies, so information from boroughs with stakeholder collaboration has also been considered. Collaboration with other stakeholders including TfL, local authorities, charging providers to coordinate the infrastructure rollout is also important.

It is also essential to focus on funding alignment, leveraging LEVI and other public funding mechanisms to accelerate deployment in the boroughs.

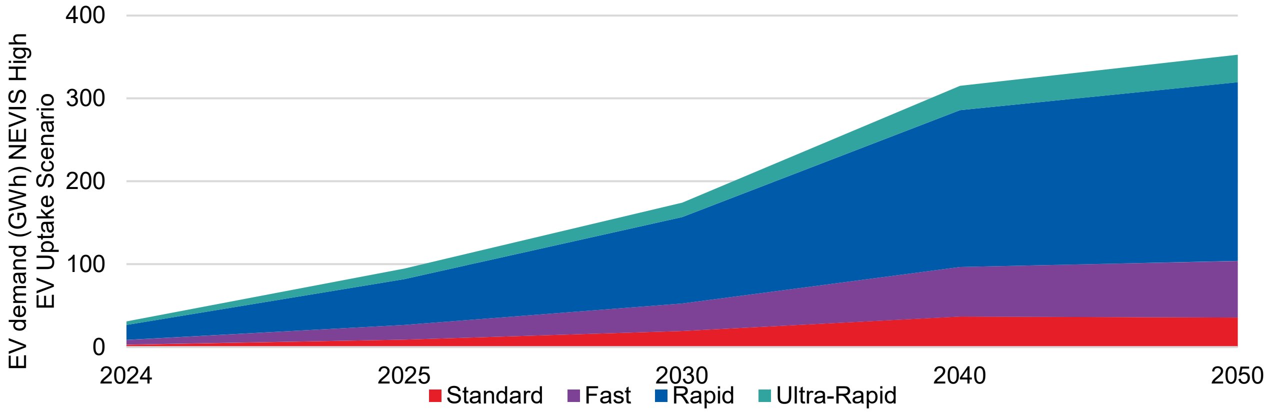

Figure 4.13: EV demand projections as GWh with NEVIS scenario

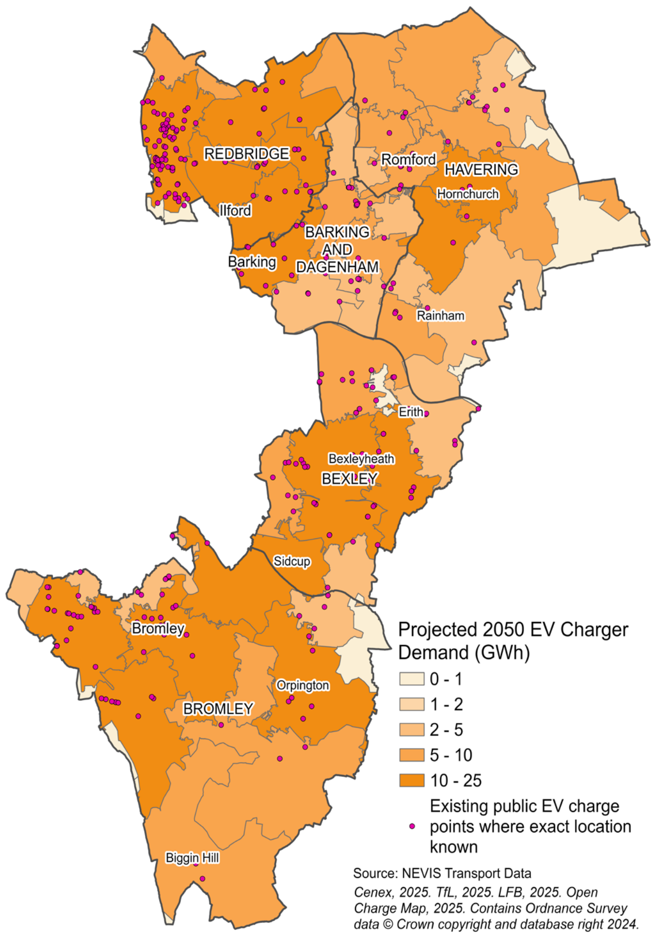

Figure 4.14: Projected 2050 EV charger demand with existing public EV charge points

4. Decarbonisation opportunities

Transport

4.4 Electrification of transport

4.4.3 Car parks and transport hubs

In East London, car parks and key transport hubs such as ambulance stations, bus garages, bus stations, fire stations, hospitals, police stations, rail stations, and zero-emission fleet depots are essential locations for deploying EV charging infrastructure. These sites would need larger bays and energy upgrades, making them critical for planning for larger EV charge points. Installing rapid and ultra-rapid chargers at these hubs reduces downtime for emergency and public transport services while also enabling high utilisation of charging assets.

The transport hubs and car parks were identified from open street maps and OS cartographic index and manually from GIS tools. All transport hubs and car parks are shown as points in Figure 4.15 with the primary substation headroom data. Off-street and on-street car parks can also be considered while deciding for the type and place of the charge points.

Aligning these priority locations with UK Power Networks' substation headroom data ensures grid capacity can meet future demand. Large car parks which have more than 50 bays and large garages are likely to need more grid capacity.

By targeting investment in these strategic hubs, boroughs can build a reliable and scalable charging network that supports both public and commercial fleet electrification.

When planning for EV infrastructure, it is important to recognise that ar parks in public ownership, particularly those in sustainable, well-connected locations, may be repurposed in the future for housing or other land uses that support mode shift. This shows the need for a flexible and forward-looking approach tc charging infrastructure deployment, to balance the investment with wider borough priorities around housing delivery, active travel, and public transport improvements. Where possible, charging infrastructure in public car parks should be designed with adaptability in mind, so that assets can be relocated or integrated into new developments if land use priorities change.

Deployment of high-speed charging hubs

High-speed charging hubs should be deployed on public land such as car parks, depots and transport hubs to serve fleet vehicles, taxis, private drivers etc. Boroughs should assess their appetite for level of investment and risk to determine the most appropriate procurement model, from public delivery to partnerships with private operators.

Large car parks generally align with the prioritised EV locations as in the EV locations matrix study.

TfL-owned property company Places for London [1] has already started to work on new EV charging hubs to deliver ultra-rapid charging bays at Hatton Cross station.

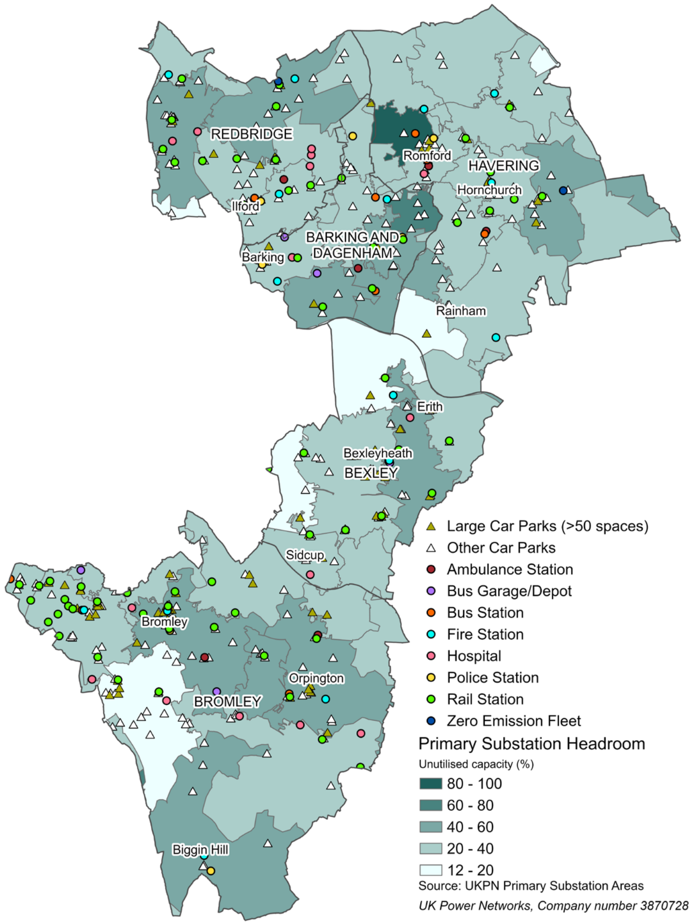

Figure 4.15: All transport hubs and car parks map with primary substation headroom

4. Decarbonisation opportunities
Transport

4.4 Electrification of transport

Integrating modal shift for mileage reduction

While the electrification of transport is the main driver for the reduction of emissions, mileage reduction through modal shift contribute to savings significantly with the AG scenario of 27% mileage reduction target.

Figure 4.16 and 4.17 shows the map with the high car ownership and poor public transport availability across the East London subregion. So, the prioritised locations for electrification of cars and development of the public transport can be identified by this method.

The measures that should be embedded to boroughs' strategies and action plans can be:

- Electrification of vehicles,
- Public transport improvements,
- Active travel infrastructure such as safe cycling routes.

Using UKPN chargepoint navigator

Using the UKPN's charge point tool for mapping headroom and prioritise charging sites based on network capacity and demand will help boroughs identify priority areas for deployment.

By using this tool, local authorities can align charging infrastructure with available grid capacity, can have information about such as fleet demand, energy demand, cable data from geospatial data set, charging capacities and pavement widths etc., and each local authority can have access.

Fleet decarbonisation

Electrifying the fleets such as borough owned ones and contracted services, such as waste collection and community transports can help to deliver emission reductions. Key actions can include:

- Develop a fleet transition plan
- Deploy charging hubs for fleet
- Support local businesses and operators through information, grants and land access for charging solutions – with signposting to available government grants as applicable

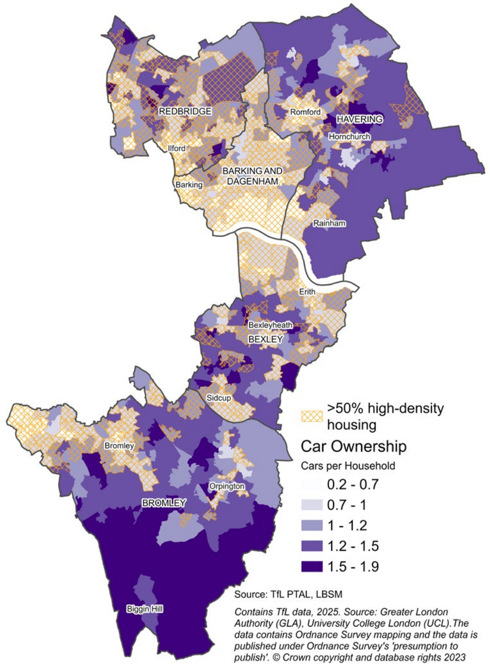

Figure 4.16: Prioritised areas for modal shift

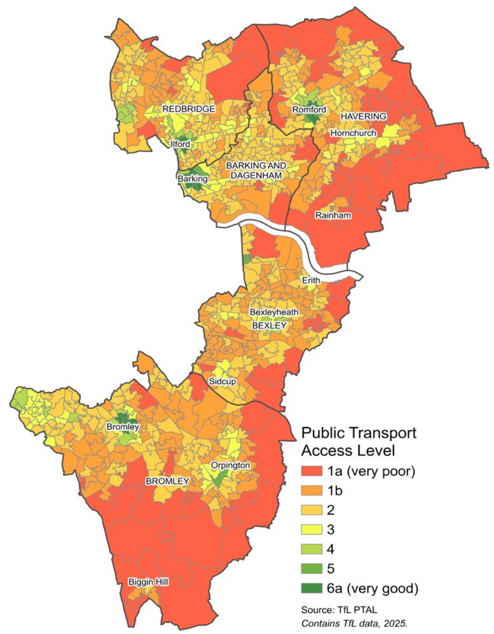

Figure 4.17: Public transport accessibility

4. Decarbonisation opportunities
Transport – action planning

Transport electrification

EV location prioritisation

The EV locations matrix was developed to identify the priority sites for future on-street slow charging infrastructure across East London boroughs, to support site location for sites funded through the LEVI fund.

A weighted scoring matrix is used to determine the optimal EV charging locations. Scores are calculated on layers at the LSOA level. Each layer is normalised to a 0-5 scale, and weighted. These weighting factors can be altered depending on Borough-specific priorities. The scores are then aggregated to final mappings, an example of which is shown to the right.

This mapping exercise enables prioritisation based on:

- High EV ownership but few charge points
- Adequate substation capacity
- High housing density with limited off-street parking
- Poor air quality or lower PTAL scores (indicating transport equity need)

The map to the right also shows the location of large car parks, as potential sites for rapid charging hubs. It shows that large car park locations generally align with the high priority areas.

The provision of charging infrastructure must of course also be balanced with encouraging most shift to active travel.

Table 4.7: EV location prioritisation and matrix scoring parameters, guidance and weight

Input Layer	Scoring guidance	Weight
Number of EV vehicles	Higher number = higher score	20%
Number of EV charge points	Fewer = higher score	20%
Substation headroom	More headroom = higher score	20%
Housing density	Higher density = higher demand for shared/public charge points	10%
Large car parks	Off-street car park availability	10%
Air quality (NO_2/PM_{10}) from LAEI 2022	Higher pollution area = higher score, prioritise areas with low air quality	10%
Index of Multiple Deprivation (IMD)	More deprived = higher score	5%
PTAL values	Lower PTAL= higher EV need	5%

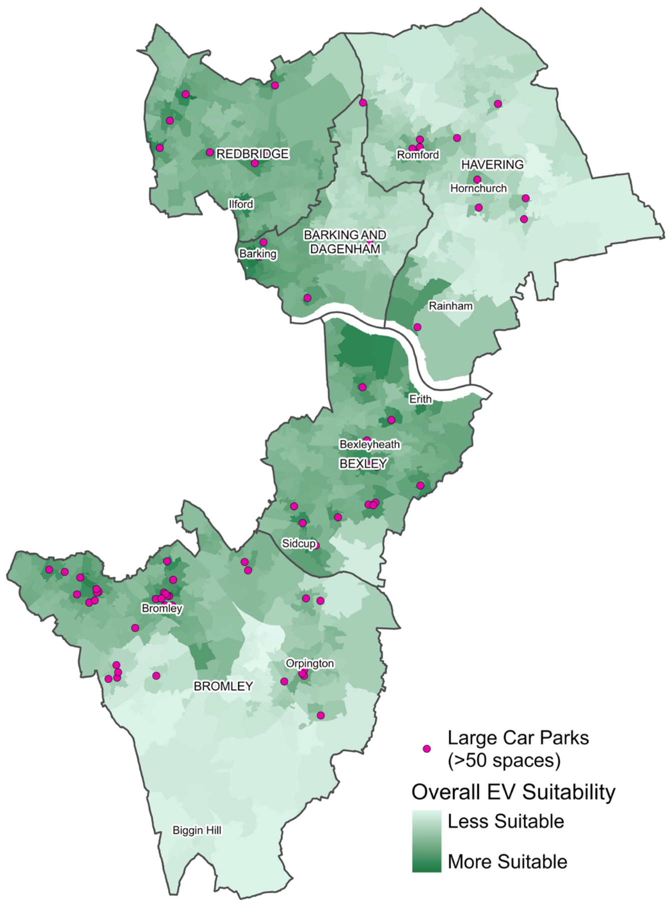

Figure 4.18: Overall EV location suitability map showing large car parks

Key

- Cross-cutting, sub-regional actions
- Borough specific LAEP actions

4. Decarbonisation opportunities
Transport – action planning

Transport electrification

The delivery of transport electrification requires a clear and coordinated plan that aligns with sub-regional and borough net zero ambitions and transport strategies, taking account funding options.

Deployment of on-street charging

Local authorities should prioritise the rollout of slow on-street charging to meet the needs of residents without access to off-street parking, taking advantage of the LEVI fund, for which all boroughs already have ongoing applications. The LEVI fund supports low-powered, on-street chargers and accelerates commercialisations and investments in local charging.

Boroughs should also coordinate with Charge Point Operators (CPOs) and neighbouring authorities to accelerate infrastructure planning and to meet the demand across the region.

The methodology for prioritising site selection should be refined to make sure underserved locations aren't left behind, particularly those with high car ownership but low existing provision. Factors like vehicle ownership, housing density and network capacity should guide decisions for equitable access to charging infrastructure. Additionally, social equity should be considered by targeting areas with lower income households.

Table 4.8: East London subregion energy planning potential next steps

East London subregion energy planning potential next steps - transport		
Task	**Description**	**Potential action owners**
Progress applications for LEVI funding for on-street charging	Refine methodology for borough assessment of tender returns and negotiating EV charge point locations with CPOs, to ensure deployment balances the most profitable locations with the need for equitable access	Boroughs, London Councils
Deploy rapid charging hubs on public land	Assess what procurement and commercial models Boroughs have appetite for (e.g. land leasing only, revenue share, etc) Assess what might be attractive borough-owned sites and engage with potential partners such as Places for London or CPOs	Boroughs, TfL, Places for London, GLA
Utilise UKPN's Chargepoint Navigator tool	Utilise the tool to upload data on existing and planned charger locations to develop a pipeline of charging infrastructure projects, refine location selection, track progress and assessment of CPO proposed locations for LEVI funded chargers, and of future transport strategies.	Boroughs, UKPN
Promote modal shift to reduce transport demand	Embed mileage reduction and sustainable transport measures in local strategies	Boroughs
Private and public sector engagement to deliver destination charging	Engage with local private and public sector stakeholders to drive delivery of destination charge points.	Boroughs
Fleet decarbonisation	Evaluate borough fleet transition requirements and plans	Boroughs

4. Decarbonisation opportunities
Renewables

4.5 Future renewables

4.5.1 Planning and zoning considerations

Identifying suitable locations for solar PV deployment is essential to maximising its contribution to local decarbonisation. In London's dense and diverse urban landscape, priority zones include areas with high concentrations of flat-roofed commercial buildings, public sector estates, and large-scale car parks. These sites offer scale, visibility, and potential for integration with battery storage or EV charging infrastructure.

However, land use conflicts and environmental constraints must be carefully managed. Rooftop PV in conservation areas or on listed buildings may face planning restrictions, while ground-mounted PV on brownfield or peri-urban land must be balanced against biodiversity, flood risk, and future development potential. A coordinated zoning approach, aligned with borough Local Plans and the London Plan, can help identify viable sites while minimising unintended impacts.

Public buildings—such as schools, libraries, leisure centres, and council offices—are particularly well-suited for early-stage investment. These assets are typically large, centrally located, and under borough control, making them ideal for demonstration projects and delivering cost savings, revenue generation, and improved energy resilience.

4.5.2 Modelling methodology

To estimate future rooftop solar PV potential, we used spatial data from the London Solar Opportunity Map (LSOM), adjusted to reflect real-world constraints and aligned with the Mayor's Accelerated Green scenario. Each building was identified via its unique property ID and mapped to LSOAs using OS data for spatial aggregation.

LSOM assumes high utilisation and perfect panel efficiency, which overestimates generation potential—especially in London, where many roofs are unsuitable due to orientation, shading, architectural complexity, or heritage constraints. We applied a correction factor of 11% to account for:

- Only ~50% of roof space being practically usable.
- Average panel efficiency of 22%.
- Required spacing between panels.

We also considered behavioural factors. Even where PV is technically feasible, uptake is influenced by cost, aesthetics, awareness, and the perceived value of exporting surplus electricity. Most installations are sized to meet on-site demand rather than maximise roof coverage.

To align with long-term decarbonisation goals, adjusted LSOM outputs were scaled to reflect the projected increase in solar generation to 2050 under Accelerated Green. A capacity factor was derived using DESNZ's "Renewable Electricity by Local Authority" dataset, enabling conversion from annual generation (kWh) to installed capacity (kW) for consistent comparison.

4. Decarbonisation opportunities
Renewables

4.5 Future renewables

4.5.3 Modelling results

Figure 4.19 shows projected rooftop solar capacity across East London by 2050. Areas such as Rainham, Bexleyheath, and South Barking show high suitability (2-5.6 MW), likely due to large roof spaces, fewer shading obstructions, and supportive local policy. Conversely, central Bromley and parts of Redbridge and Barking & Dagenham show lower projected capacity (9–443 kW), reflecting constraints such as high urban density, limited roof space, tree cover, and conservation restrictions. Socioeconomic factors may also limit adoption, particularly in lower-income areas or where older housing stock requires upgrades.

Figure 4.19 also highlights LSOAs with a high concentration of public buildings, such as Ilford, Barking town centre, Orpington, and Erith. These zones should be prioritised for feasibility studies and installation programmes, given their potential for high-impact deployment.

4.5.4 Policy recommendations

Unlocking the full potential of solar PV requires a supportive policy environment. Key recommendations include:

- **Planning reforms** to streamline rooftop PV permissions, especially on public buildings and in conservation areas.
- **Incentive schemes** for households and SMEs, including grants, zero-interest loans, and enhanced export tariffs.
- **Community energy support**, with funding and technical assistance for cooperatives and local partnerships.
- **Integration into Local Plans**, ensuring new developments and refurbishments are designed with solar in mind.

Private sector deployment, particularly on residential rooftops, remains the largest untapped opportunity. Boroughs should target “able to pay” areas identified through socio-economic data such as homeownership rates, EPC ratings, and income levels. Such target areas include parts of Redbridge and Havering, where domestic PV schemes could be promoted through:

- Bulk purchasing programmes like **Solar Together London**.
- Awareness campaigns for the **Smart Export Guarantee**.
- Bundled offers combining PV with batteries and EV infrastructure.
- Planning guidance to simplify rooftop PV installation.

By combining spatial modelling, behavioural insights, and targeted policy interventions, boroughs can accelerate solar PV deployment and contribute meaningfully to London’s net zero ambitions.

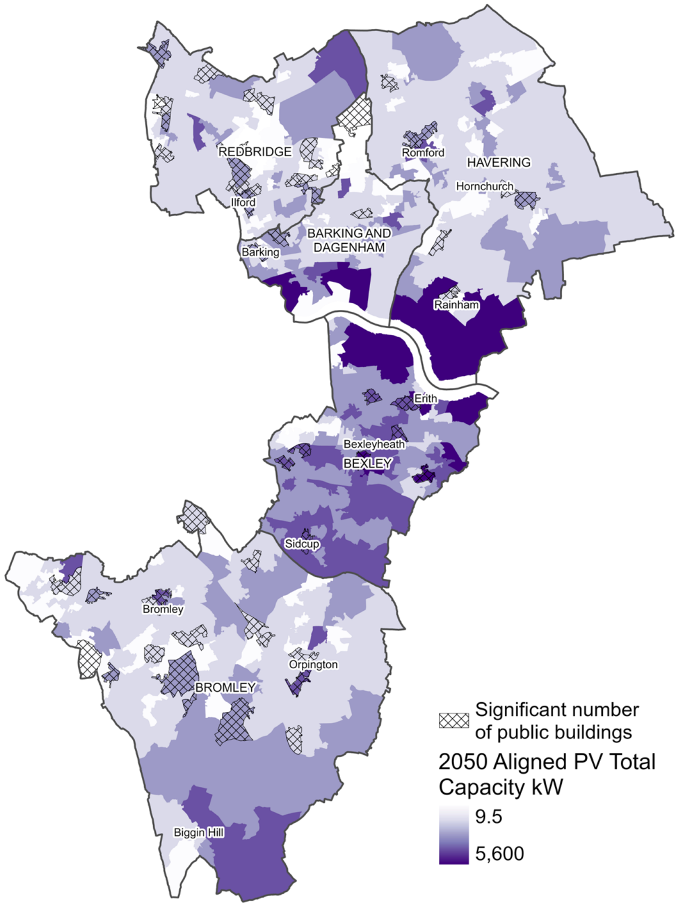

Figure 4.19: 2050 modelled solar capacity overlayed with high number of public buildings

Key	
(light pink)	Cross-cutting, sub-regional actions
(dark pink)	Borough specific LAEP actions

4. Decarbonisation opportunities
Renewables – action planning

Action planning

The East London subregion presents a significant opportunity for rooftop solar PV deployment due to its mix of residential, commercial, and industrial buildings, as well as large-scale regeneration areas. However, uptake remains low relative to potential, constrained by grid capacity, upfront costs, and limited awareness of incentive schemes.

To accelerate deployment, boroughs are encouraged to:

- Prioritise installations on council-owned assets such as schools, libraries, and leisure centres.
- Explore area-based schemes in industrial zones and retail parks, where large roof areas can support high-density PV arrays.
- Integrate solar PV with retrofit programmes to minimise disruption and maximise energy savings.
- Consider innovative applications such as solar canopies in car parks or floating PV on water bodies (e.g. Thames-side reservoirs in Bexley or Havering).

Delivering solar PV at scale will require coordinated action across a wide range of stakeholders. Local authorities have a central role to play, both as enablers and as asset owners. They can lead by example through installations on schools, libraries, and housing estates, while also shaping local policy and planning frameworks.

Distribution Network Operators (DNOs) are key partners in identifying grid constraints and enabling connections, particularly in areas where export capacity is limited. Early engagement with DNOs can help to align PV deployment with planned infrastructure upgrades or flexibility services.

Developers and commercial landlords are well-placed to deliver PV at scale, particularly on large commercial and industrial sites. Meanwhile, communities and residents must be engaged meaningfully to ensure that deployment is inclusive, equitable, and aligned with local priorities.

Strategies for inclusive engagement should include:

- Targeted outreach in areas with high fuel poverty or low uptake.
- Support for community-led schemes.
- Clear, accessible information on the benefits and practicalities of solar PV.

Table 4.9: East London energy planning next steps - PV

	East London energy planning next steps - PV	
Task	**Description**	**Potential action owners**
Investigation of novel solar models	Investigate funding and delivery mechanisms for rooftop PV, building on SLA Solar Uptake research to identify opportunities. Assess new models that could promote area-wide uptake of PV.	Boroughs, PV industry
Develop pipeline of PV on publicly owned buildings	Prioritise solar PV installations on public buildings, schools, and social housing.	Boroughs
Develop area-wide PV schemes in industrial areas	Explore shared PV and battery schemes in industrial estates (e.g., Thames Gateway, Beckton).	Boroughs, local industry
Prioritise where to engage private schemes	Identify areas to increase engagement and encourage private solar PV installation, particularly in 'able to pay' areas of boroughs.	Boroughs, homeowners

4. Decarbonisation opportunities
Electricity grid and flexibility

Overview

Grid investment and flexibility actions are enabling measures, as they allow connections for new developments, and local generation assets to connect to the electricity grid. Additionally, they will enable the mitigation of strain caused by the electrification of heat and transport, and could avoid, or delay the need for grid capacity upgrades.

Further analysis of network requirements, in collaboration with UKPN, is critical to support this transition. All planned future developments should be reflected in DNO planning tools such as the DFES to ensure accurate and coordinated planning.

Infrastructure needs vary by substation area, and identifying and prioritising critical substations is essential.

Flexibility solutions will play a vital role in bridging the gap between growing demand and the pace of network reinforcements. There are building level flexibility opportunities which can be implemented, alongside the electrification of heat such as thermal storage and smart meters. These allow buildings to feedback what is required of the network, but it is key to ensure the education is provided with it. Used effectively, they are a useful tool to reducing energy bills which can be used to engage local communities via borough-led initiatives. This could be the subject of further study and could be undertaken at local or subregional level.

In order to prioritise which areas should be targeted for flexibility measures, Figure 4.20 layers up key data layers from this Phase 1 analysis:

- Current substation capacity
- Projected electricity demand in 2050, derived from additional electrical demand from heat and transport electrification

The layering of these variables provides an indication of where need is greatest, and where early intervention should be prioritised. The map opposite suggests that most parts of Havering, majority of Barking and Dagenham and Bromley/Bexley border have the highest current level of potential grid constraint, and are expected to see the highest growth in demand, therefore will definitely require some level of grid flexibility or grid capacity upgrades.

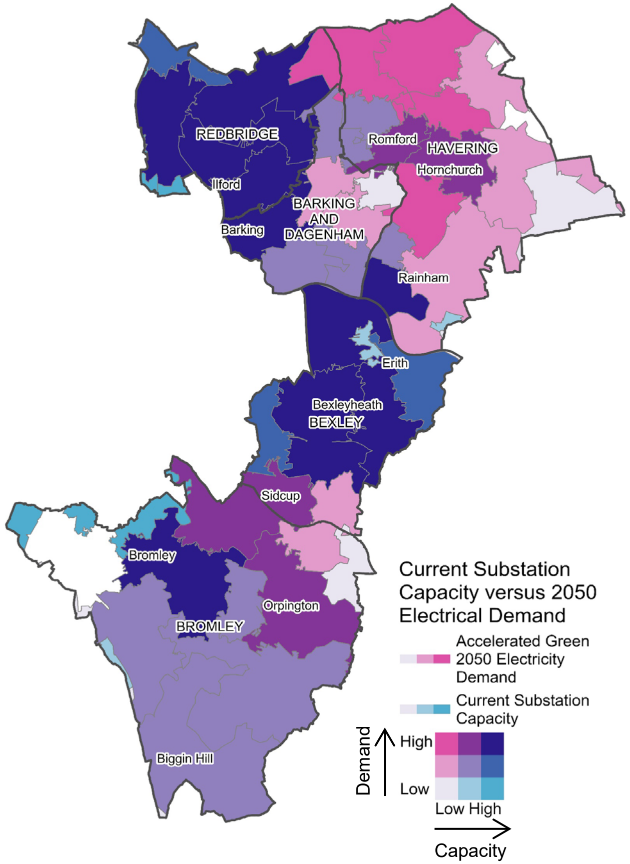

Figure 4.20: Current and projected (2050) electricity capacity at primary substation level

Key

- Cross-cutting, sub-regional actions
- Borough specific LAEP actions

4. Decarbonisation opportunities
Electricity grid and flexibility – action planning

Electricity grid and flexibility

Table 4.10: East London energy planning potential next steps – grids and flexibility

East London energy planning potential next steps – grids and flexibility		
Task	**Description**	**Potential action owners**
Detailed capacity assessment	Priority zoning to target constraints and infrastructure	Boroughs
LV infrastructure consideration	Work with UKPN to better understand LV network constraints. This could be undertaken at borough or subregion level.	Boroughs, UKPN
Thermal and battery storage study	Assess how storage can used to maximise heat pump and PV deployment and enable flexibility, by assessing whether they increase the viability of such installations through bill savings	GLA, Boroughs, DNOs, homeowners
Whole systems modelling to assess value of flexibility	Assess the impact of PV generation and flexibility measures such as vehicle to grid smart charging and demand side management in order to identify opportunities for deployment and assess potential avoided grid upgrade costs	GLA, Boroughs, DNOs
Technology specific demand assessment	Refine the assessment of the required flexibility services at the subregional level, utilising the results of additional electricity demand generated by this subregional LAEP	GLA, Boroughs
Understand where building-level flexibility measures such as storage should be installed in council-assets	Focus on bundling battery or thermal storage with other measures like heat pumps and retrofit, which may provide greater energy bill savings	Boroughs
Ensure all planned developments are included in DFES	Engage with DNOs (in this case UKPN) to ensure that all known planned future developments have their energy demand reflected in energy planning scenarios such as the FES,	Boroughs, UKPN

Key
Cross-cutting, sub-regional actions
Borough specific LAEP actions

4. Decarbonisation opportunities
Electricity grid and flexibility – action planning

Cross-Cutting

Table 4.11: East London subregion energy planning potential next steps – other

East London subregion energy planning potential next steps – other		
Task	**Description**	**Potential action owners**
Data alignment and standardisation	Datasets used in this LAEP use differing definitions between building IDs and historical LSOAs. Create a standardised template and definitions to improve consistency of analysis.	GLA
Engagement and alignment	Successful implementation of LAEP recommendations depends on public and business engagement. Targeted awareness raising initiatives are essential to motivate and support the adoption of new technologies and behavioural changes. The outputs from the LAEP provide evidence and educational material for such engagement. Provide toolkits and guidance for landlords, SMEs, and homeowners to navigate retrofit and electrification options.	GLA, Boroughs
Collaboration with major energy users	Establish strategic partnerships with NHS Trusts, academy chains, and commercial operators to co-develop retrofit and energy management plans. Prioritise deep retrofit and heat network connections for these anchor loads, reducing the need for widespread interventions across smaller buildings. Explore flexibility services and demand-side response opportunities to alleviate grid constraints.	Boroughs, major energy users
Investment and funding coordination	Delivering the LAEP will require substantial capital investment. To maximise funding opportunities and cost efficiency: Align borough-level building stock priorities with existing grant schemes such as SHDF, LEVI, and ECO4 Facilitate cross-borough procurement frameworks to enable bulk purchasing of technologies and services.	GLA, Boroughs, London Councils
Local skills and workforce development	Support **training programmes** focused on priority technologies, with an emphasis on retrofit and heat demand reduction. Partner with **FE colleges, training providers, and industry bodies** to deliver accredited courses and apprenticeships. Promote **inclusive employment pathways** to ensure local residents benefit from green jobs, particularly in areas of high unemployment.	GLA, Boroughs, local educational facilities and supply chains
Undertake a Phase 2 LAEP	Assess funding streams, organisational buy-in and internal capacity to commission follow-on analysis and action planning. Consider partnering with neighbouring Boroughs as has been done in West London and in Southeast London.	Boroughs
Identify suitable delivery models	Explore potential delivery mechanisms for progressing energy projects, such as Direct Delivery, Public-Private Partnerships, ESCOs, Community Energy models	Boroughs

5. Next steps

5. Next steps
Summary of key actions

The East London subregional LAEP has identified a range of strategic interventions across buildings, transport, heat, and power systems that are critical to achieving net zero.

While each borough faces unique challenges, the modelling and stakeholder engagement have revealed common themes and shared opportunities for collaboration. From heat network viability in dense zones to retrofit pipelines targeting fuel-poor households, and from EV infrastructure planning to rooftop solar deployment, the subregion is well-positioned to take coordinated action.

The following section summarises these key subregional actions by technology area, providing a high-level overview to support boroughs in progressing toward implementation.

Heat Networks

- Initial viability indicated in 9 priority zones through refined modelling using the Arup's HeatNet tool.
- Strategic opportunities in Barking & Dagenham, Romford, and Rainham, with potential for multi-borough transmission networks.
- Waste heat sources (e.g. CORY EfW, data centres) identified across boroughs; further engagement needed to unlock supply.
- Next steps include technical design, business case development, and coordination with DESNZ and neighbouring boroughs under the Heat Network Zoning programme.

Retrofit and Heat Electrification

- Retrofit pipelines developed using EPC, IMD, and tenure data; prioritisation tools available via the LAEP DataHub.
- Owner-occupied homes in Bromley and Havering and social housing in Barking & Dagenham present early opportunities.
- Heat pump deployment modelled to scale significantly by 2040; boroughs should prepare for grid impacts and supply chain coordination.

Transport Electrification

- Utilise UKPN's Chargepoint Navigator tool.
- EV uptake projected to rise sharply; Bromley and Havering show highest future demand.
- Rapid charging hubs recommended on borough-owned land and transport nodes.
- Modal shift essential to meet net zero targets; boroughs should integrate active travel and public transport improvements into local plans.

Renewables (Solar PV)

- High-potential zones identified in Rainham, Bexleyheath, and South Barking.
- Public buildings (schools, libraries, leisure centres) offer scalable deployment opportunities.
- Planning and funding mechanisms (e.g. SEG, Solar Together London) should be leveraged to support uptake, especially in "able-to-pay" areas.

Electricity Infrastructure and Flexibility

- Grid constraints mapped at substation level; Redbridge, Bexley, and Bromley town centre show highest pressure.
- Flexibility measures (e.g. smart meters, thermal storage) should be integrated into retrofit and new development strategies.
- Coordination with UKPN and use of DFES data essential for aligning infrastructure upgrades with decarbonisation pathways.

5. Next steps
Conclusion

The East London Subregional LAEP provides a strategic foundation for boroughs to plan and deliver net zero energy systems in a coordinated, data-driven way. It highlights the scale of change required across buildings, transport, and infrastructure, and identifies clear opportunities for targeted interventions. While challenges such as grid constraints, fuel poverty, and rapid development persist, the subregion is well-positioned to move forwards with inclusive and place-based decarbonisation, particularly making use of the GLA's LAEP Datahub.

This analysis and the data produced by it is not intended only as a technical roadmap, but as practical tool for decision-making. The outputs from Phase 1 can be used to inform a wide range of local and regional activities, including:

- **Local Planning**: Integrating energy performance, retrofit potential, and heat network zoning into Local Plans and planning applications.
- **EV Strategy and Infrastructure Deployment**: Aligning EV charger rollout with grid capacity, transport demand, and equity considerations utilising funding streams such as LEVI and planning tools like UKPN's Chargepoint Navigator.
- **DNO Network Investment Planning**: Supporting UK Power Networks and National Grid with spatially resolved demand forecasts and technology deployment scenarios to guide reinforcement and flexibility investments.
- **Funding Applications and Business Cases**: Providing evidence for bids to programmes such as LEVI, SHDF, and HNIP, and developing Strategic Outline Business Cases for priority projects.
- **Borough-Level LAEPs (Phase 2)**: Enabling more detailed, locally tailored energy plans that build on the subregional evidence base and reflect borough-specific priorities and constraints.
- **Community Engagement and Policy Design**: Using mapped data and scenario outputs to communicate the energy transition, design equitable policies, and support behaviour change.

By progressing to Phase 2 LAEPs and embedding this analysis into planning, investment, and delivery frameworks, the East London subregion can unlock a resilient, low-carbon future that benefits all communities.

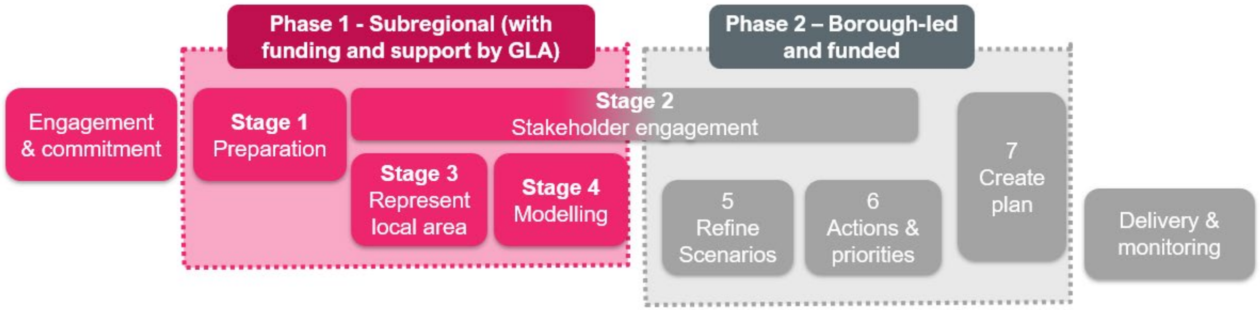

Figure 5.1: Phase 1 and 2 LAEP methodology

Appendices

- A1: Borough Profiles
- A2: Methodology diagrams and assumptions
- A3: Additional retrofit and heat network results