REGEN

Technical report

Industrial Energy Modelling - Cluster Report

A technical report into commercial and industrial energy use in the Midlands and how businesses can decarbonise – focusing on four industrial clusters.

February 2026

About Midlands Net Zero Hub

The Midlands Net Zero Hub is funded by the government's Department for Energy Security and Net Zero to help local authorities, public sector organisations and the communities they serve reach their ambitious net zero goals.

About Regen

Regen provides independent, evidence-led insight and advice in support of our mission to transform the UK's energy system for a net zero future. We focus on analysing the systemic challenges of decarbonising power, heat and transport. We know that a transformation of this scale will require engaging the whole of society in a just transition.

Acknowledgements

We would like to express our sincere appreciation to all those who contributed to the successful completion of this report. This work benefited greatly from the support and assistance of many individuals and organisations. Thanks to all those on the project steering group for their curiosity, support and challenge. Thanks also to staff at all of our cluster organisations: Markham Vale, the National Space Centre, Space Park, Dock, Mira Tech Park and SmartParc.

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Glossary and abbreviations

Term	Definition
BEES (Building Energy Efficiency Survey)	Survey of energy use in non-domestic buildings.
BREEAM (Building Research Establishment Environmental Assessment Method)	Building sustainability assessment method used to rate environmental performance.
Cadent	Gas network operator for the Midlands.
CCC (Climate Change Committee)	UK body advising on climate targets and pathways.
Cluster	Group of businesses or facilities forming an industrial site.
Curtailment	Reduction of on-site generation output when export is constrained.
DFES (Distribution Future Energy Scenarios)	Localised future energy scenarios published by National Grid Electricity Distribution.
DNO (Distribution Network Operator)	Organisation managing the regional electricity distribution network.
eFreight 2030	Programme piloting early deployment of electric HGVs and charging hubs.
EMCCA (East Midlands Combined County Authority)	LAEP study area, used for regional analysis in the report.
EPC (Energy Performance Certificate)	Certificate showing a building's energy efficiency and main heating fuel.
ESA (Electricity Supply Area)	Area served by an 11 kV network around a primary substation.
Headroom	Spare network capacity for additional demand or generation.
HGV (Heavy Goods Vehicle)	Vehicle over 3.5 tonnes used for freight.
L&L (Leicester & Leicestershire)	LAEP study area, used for regional analysis in the report.
LAEP (Local Area Energy Plan)	Local authority plan for energy system transition.
LSOA (Lower Super Output Area)	Small statistical area used for public data.
MPAN (Meter Point Administration Number)	Unique identifier for an electricity supply point.
MSOA (Middle Super Output Area)	Medium-scale statistical area used for public data.
ND-NEED (Non-Domestic National Energy Efficiency Data-Framework)	Dataset of metered energy use in non-domestic buildings.
Primary substation	Higher-voltage electricity substation supplying secondary substations.
Secondary substation	Local substation supplying individual buildings.
SIC (Standard Industrial Classification)	Classification used to group business activities.
ZEHID (Zero Emission Heavy Goods Vehicles and Infrastructure)	UK programme supporting zero-emission HGVs and charging.

Section 1:

Introduction

1.1. Project scope and purpose

This technical report is part of a wider project studying approaches to decarbonising medium-scale industrial clusters across the Midlands. The project focuses on sites that host mixtures of light industry, research and development and logistics. These types of sites are very common across the Midlands and nationally, yet are often underrepresented in energy modelling and planning.

This study aims to address this problem through an area-wide study of industrial energy use combined with a deeper study of four specific industrial clusters. The cluster-level studies are designed to support each cluster in decarbonising, but also to produce replicable approaches to inform other sites. Phase 2 of this project will develop a model, which lowers the barrier to entry for similar clusters to replicate the study for themselves, as well as demonstrating it for two new clusters.

1.2. Study region

Phase 1 of this project studies two areas within the Midlands both of which have a local area energy plan being produced. These are Leicester and Leicestershire (L&L) and East Midlands Combined County Authority (EMCCA). Figure 1 shows the whole study region, marking local authority boundaries and major settlements.

The choice of these regions was linked to the ongoing local area energy plan (LAEP) projects and a desire to ensure that industrial clusters were well represented in this process. The four clusters are chosen from across the region, with two clusters within each LAEP area. Phase 2 of this project will examine other parts of the Midlands.

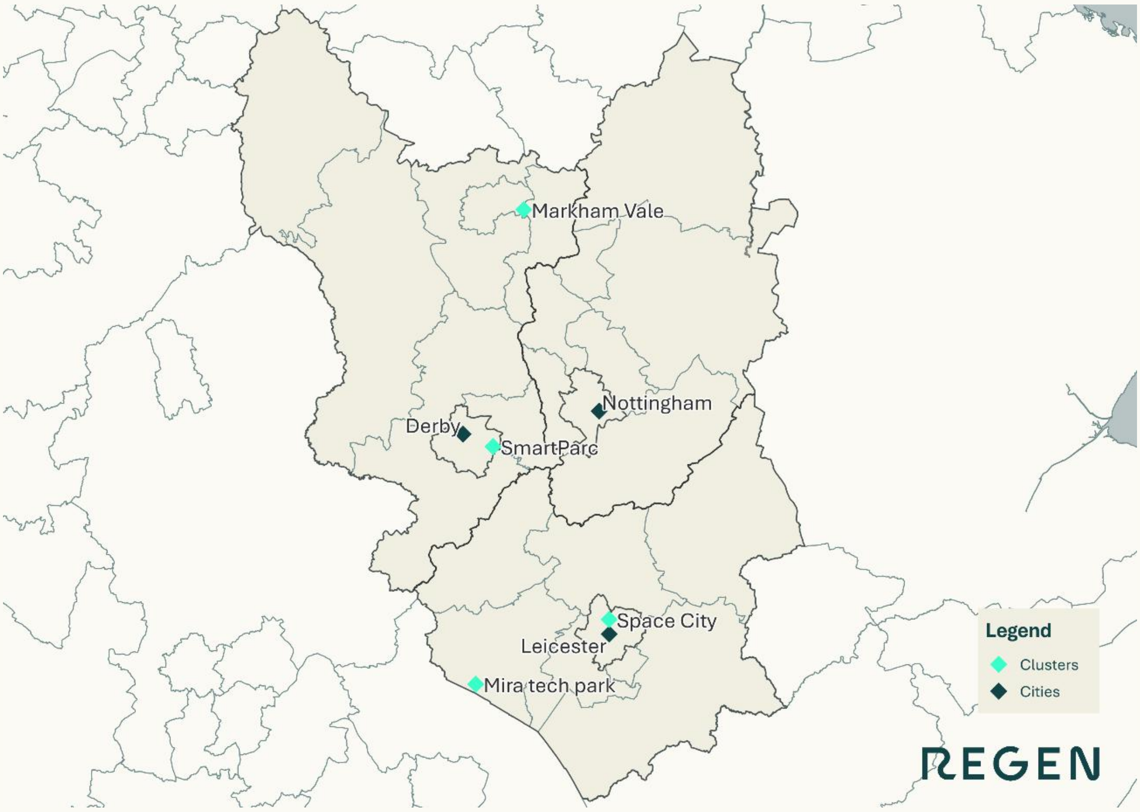

Figure 1: Map of the region study area, showing the three cities and counties studied in Phase 1, as well as the four clusters. Local Authority Districts (May 2024) Boundaries UK BFE, Counties and Unitary Authorities (December 2024) Boundaries UK BGC, ONS, 2025

1.3. Summary of the four clusters

The four clusters chosen for Phase 1 aim to illustrate common industrial themes, showcase best practice and support those specific sites with their energy needs. The project also required high levels of engagement from the clusters to make meaningful findings. The clusters were therefore chosen from sites that had established links to the Midlands Net Zero Hub (MNZH). Figure 1 shows where the clusters are located, with one cluster in each of Derby, Derbyshire, Leicester and Leicestershire.

Markham Vale offers an example of a mixed-use industrial park. There are many similar sites across the region and the country. The cluster has a wide range of sectors and businesses, but with an emphasis on logistics, which is a major sector in the Midlands. It highlights that space heating is the major energy demand for buildings in sectors without high-energy industrial processes. It also provides a worked example for electrifying HGVs for a major distribution site. This shows that significant electricity capacity will be required across supply chains.

SmartParc is a state-of-the-art site tailored specifically for the food manufacturing sector. The site's focus on food enables it to develop shared services that improve efficiency and operating costs. Energy is a significant part of this, with a shared heating and cooling system to support efficient cooking and refrigeration across the site. This site is still under development, with around half of the final floor area occupied. It provides an excellent example of how embedding shared energy infrastructure design into a project early on can significantly reduce energy use, bills and carbon emissions. Although this is a new development, shared energy infrastructure can potentially be replicated across a wide range of existing clusters with similar benefits.

Space City is an innovation cluster with a focus on space. It hosts academic research, as well as government agencies, start-ups and large established companies, as well as the National Space Centre, a visitor attraction. Most of the buildings have been built with excellent energy performance, being fully electrified, well insulated and with embedded PV. It provides a blueprint for how new developments should ensure that energy use is minimised.

Mira Tech Park is an innovation hub built around the advanced automotive sector. It is predominantly focused on research and development (R&D), with significant test facilities, such as wind tunnels and test tracks. There is a wide mixture of fuels used for heating across the site, with significant potential to electrify fossil fuel heating. The Park is currently engaged in a development plan, which will see it grow significantly and expand its remit into advanced manufacturing facilities. These new developments should ensure that they embed fully electric design and energy efficiency to align with the cluster's energy targets.

1.4. **Data, methodology and stakeholder engagement overview**

The project has used a diverse set of datasets and analysis approaches combined with direct stakeholder engagement. The findings for each cluster are a result of combining these approaches. The methodology has been adapted to the nature of the cluster, the available data and the information available through our engagement activity. Here we give an overview of each aspect of our analysis.

1.4.1. Engagement

For each cluster, we approached a key contact who had an overview of the site, requesting data on the businesses and activities, the site location and layout and any available details on energy. The approach was tailored to the cluster. For Space City, we were able to engage directly with staff at each of the organisations. For Markham Vale, this would not be possible, so instead we produced a short survey to be sent to all businesses on site. The data gathered from engagement varied considerably between clusters and was interleaved throughout the interpretation of the other approaches, where appropriate.

1.4.2. Energy Performance Certificate analysis

Energy Performance Certificates (EPCs) are produced for commercial buildings when they are built, sold, rented or at other points in a building's lifecycle.[1] They are based on a standard assessment of the energy use of the building and benchmarked based on the building's use. We used EPCs as an estimate of fuel usage and overall energy standards of buildings.

1.4.3. Sectoral analysis

Energy use varies significantly by industry type. To understand this, we undertook a sectoral analysis using Standard Industrial Classification (SIC) data to link the activity within each cluster to expected patterns of energy demand. Sectoral analysis for each of the clusters is based on a combination of business counts by size band from the Office for National Statistics (ONS) and energy consumption by industry as recorded by Ricardo Energy and the ONS.[2] The employment size band in the business count data is used to estimate the number of employees in each SIC sector. This is then combined with the energy use in each sector to estimate the energy use per employee in that sector. The same business count and employment size band data were used to estimate the average employment per sector in each MSOA.

We used AddressBase Plus (ABP), as well as engagement with clusters and analysis of public satellite imagery, to establish the number of businesses by sector in each cluster.[3] Where clusters overlapped multiple MSOAs, we used geospatial analysis to estimate how many of those businesses fell within each MSOA. This was combined with an estimate of the average number of employees per business in each MSOA and the average energy use per employee per sector to model the energy use in each cluster by SIC sector.

1.4.4. Metered energy analysis

We used UK subnational non-residential meter data for gas and electricity to estimate an energy use baseline in each cluster. For gas, we identified potential meter points using ABP, satellite imagery and cluster engagement and estimated how many of these sites were likely to have gas connections based on their SIC sector and the wider MSOA context. These meter counts were multiplied by the mean non-domestic gas consumption per meter. For electricity, we assumed all identified sites had an electricity meter. High-energy-use sectors and sites with greater potential for flexibility were assumed to have half-hourly meters. The half-hourly subnational electricity demand data is not published for MSOAs, but at local authority area. We

[1] Energy performance of buildings England & Wales, MHCLG, accessed February 2026.

[2] UK Business Counts - local units by industry and employment size band, ONS, 2025. Energy consumption by industry, ONS, 2025.

[3] AddressBase Plus, Ordnance Survey, accessed 2025.

therefore used the mean value across each local authority. The remainder were classed as non-half-hourly, which were assigned the mean non-domestic consumption for the MSOA.[4]

1.4.5. New developments

Several clusters were in the midst of significant development. We used planning records from relevant authorities, as well as details from the clusters themselves, to understand the scale, purpose and energy performance of these developments. The approach is bespoke to each cluster and sources are described in the relevant section.

1.4.6. Decarbonisation pathways

We developed decarbonisation pathways using the Climate Change Committee (CCC) Balanced Pathway from the Seventh Carbon Budget.[5] Baseline energy use for 2025 was taken directly from the metered energy analysis for each cluster. Baseline energy was then distributed among the businesses at that site based on either floor area or employment count, depending on data availability. We derived proportional annual growth or reduction factors from each relevant CCC sub-sector pathway, using 2025 as the baseline year. Each industry in each cluster was then matched to a relevant subsector decarbonisation pathway, where the proportional change to the baseline was applied.

For HGVs, we have used electric vehicle charging projections from NGED's Distribution Future Energy Scenarios (DFES).[6] We have reviewed this data in the context of our more detailed engagement with the two clusters with significant HGV activity (Markham Vale and SmartParc). Using a sensitivity analysis approach, we can estimate the degree of electricity capacity required for the sites. This was informed by a literature review to find evidence of the approximate scale of charging capacity required for a given level of HGV usage, which is outlined in Section 3.3.

1.4.7. Infrastructure

To establish the infrastructure available across the EMCCA and L&L area, geospatial analysis was undertaken using data available through the region's distribution network operator (DNO), alongside individual cluster boundaries. Electricity network infrastructure was taken from National Grid Electricity Distribution's (NGED) open data portal. Substation headroom was assessed using NGED's Network Opportunity Map and combined with Electricity Supply Area

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[4] Subnational consumption statistics methodology and guidance booklet, DESNZ, December 2025.

[5] The Seventh Carbon Budget, Climate Change Committee, 2025.

[6] Distribution Future Energy Scenarios, NGED, 2025.

(ESA) boundaries to identify which ESAs and substations served each cluster.[7] This allowed us to understand the existing network capacity and the points at which clusters interface with the wider electricity system. Nearby renewable project data was analysed using the renewable energy planning database (REPD).

[7] Network Opportunity Map Headroom, East Midlands Primary, National Grid Electricity Distribution, 2025.

Section 2:

Regional energy context

This section presents the results of our analysis across the study region of East Midlands Combined County Authority, Leicester and Leicestershire. Much of the data presented in this section is also available interactively in our project dashboard.

2.1. **Regional energy overview**

Reflecting UK-wide trends, total energy use in the region has decreased since 2005 by 15.5 TWh (17%). Over that period, industrial and commercial usage in the region has decreased by 7.5 TWh, with reductions across all energy sources except for bioenergy and waste. Bioenergy and waste energy usage has increased over that period, making up 10 % of industrial and commercial fuel usage in 2023.

Energy use has decreased in all sectors since 2005 in the study area

Electricity and bioenergy now make a larger share of energy usage

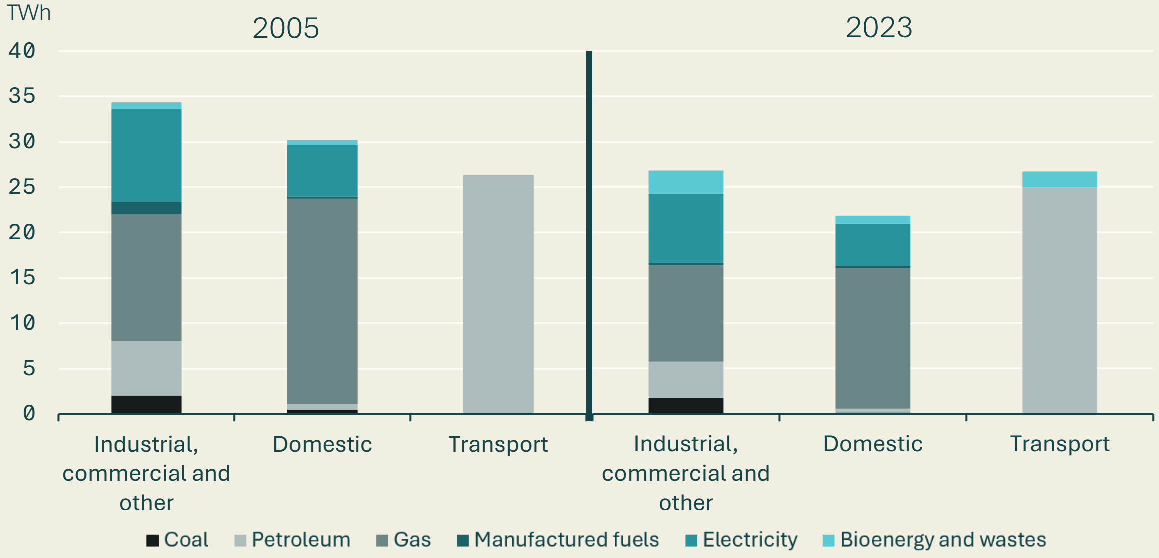

Figure 2: Total final energy consumption at regional and local authority level: 2005 to 2023, Department for Energy Security and Net Zero (DESNZ), 2025.
Note: Transport electricity demand is not included.

In 2023, industrial and commercial use made up 35% of total energy use in the region. Roughly 60% of this comes from fossil fuel sources. Coal remains part of the industrial and commercial energy mix, predominantly used for industrial processes.

Roughly 60% of industrial and commercial energy consumption comes from fossil fuel sources in the EMCCA and L&L area

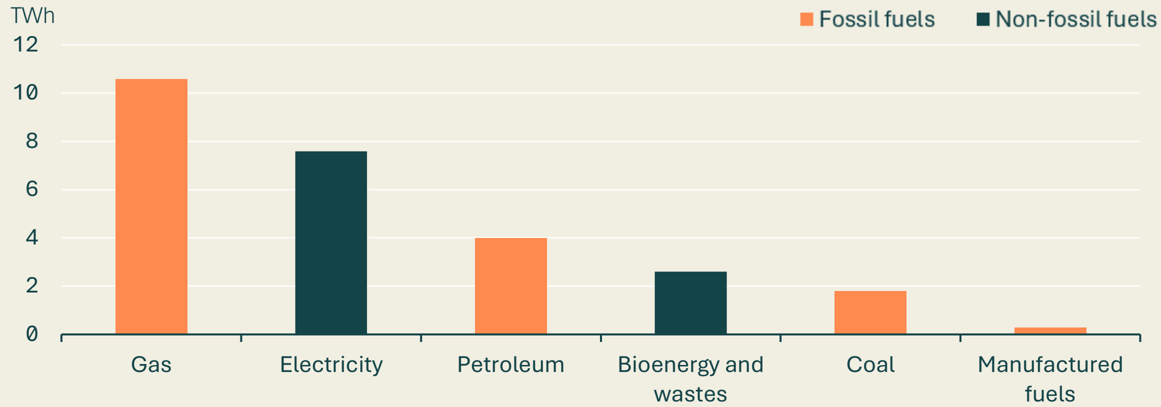

Figure 3: Total final energy consumption at regional and local authority level: 2005 to 2023, DESNZ, 2025. Note: Transport electricity demand is not included.

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2.2. **Metered gas and electricity consumption**

Cities have higher metered non-domestic energy use than rural areas

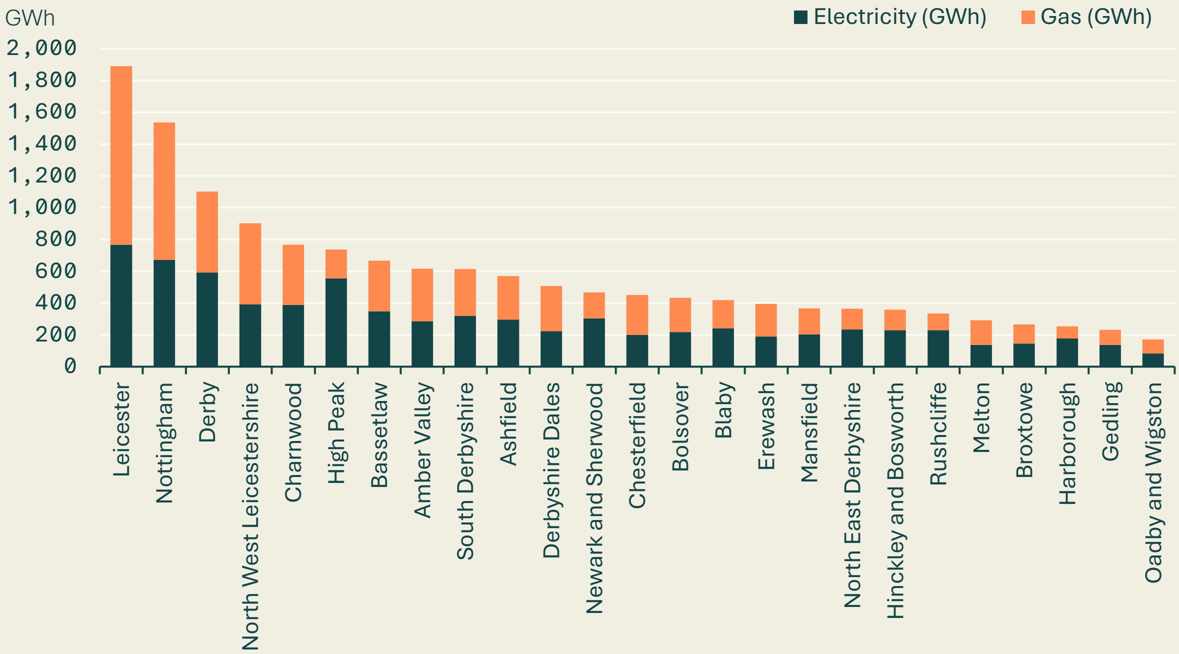

Figure 4: Metered energy use across local authority districts in the EMCCA and L&L area. MSOA non-domestic electricity 2010 to 2024, MSOA non-domestic gas 2010 to 2024, DESNZ, 2025

As might be expected, the region's cities have the highest metered non-domestic energy use, with more businesses concentrated in these areas. In general, rural areas have fewer businesses and lower total non-domestic energy use as a result. In addition, some rural areas will not have access to the gas network, meaning businesses in these areas will use greater amounts of off-grid fuels, such as oil and LPG, which are not measured in the same way.

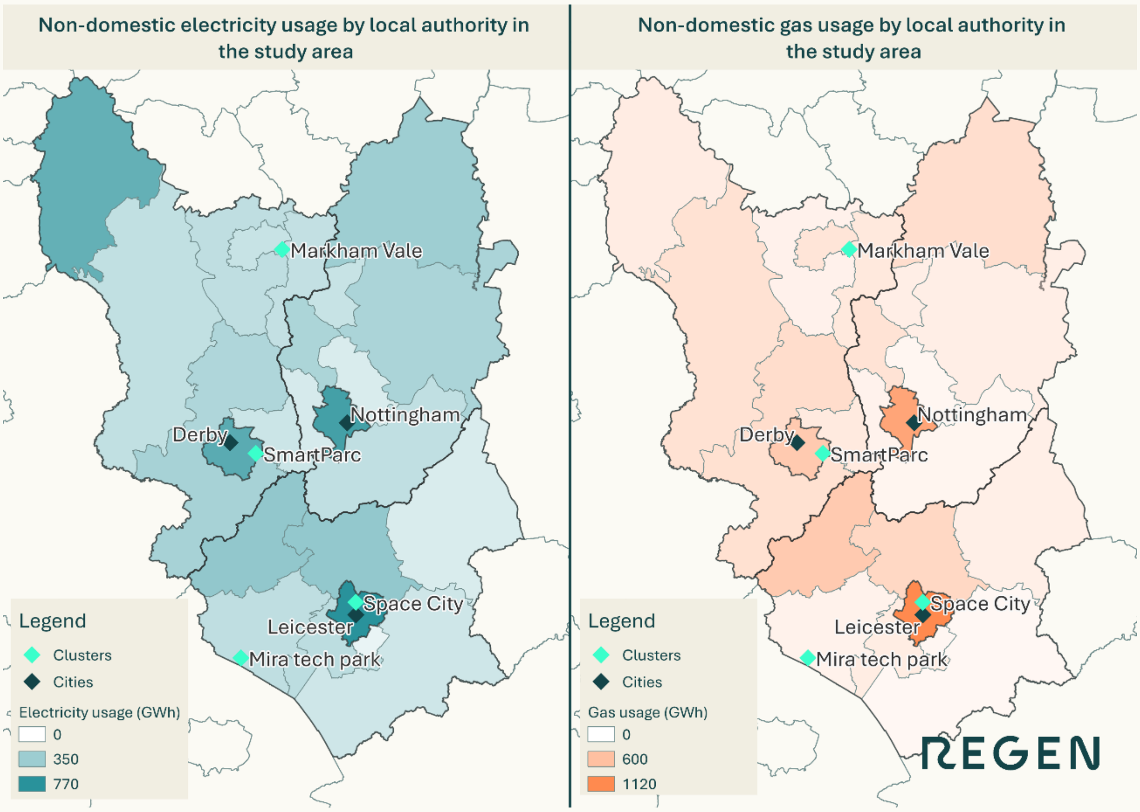

Figure 5: Maps showing metered energy use across the EMCCA and L&L area. Electricity usage includes both half-hourly and non-half-hourly meters. MSOA non-domestic electricity 2010 to 2024, MSOA non-domestic gas 2010 to 2024, DESNZ, 2025

The maps show metered non-domestic electricity and gas use by local authority district. SmartParc and Space City lie within the urban areas of Derby and Leicester, where non-domestic gas and electricity use is higher than the region's average. Markham Vale and Mira Tech Park are in more rural districts (Chesterfield and Hinckley and Bosworth respectively) with comparatively lower non-domestic gas usage.

2.3. **Commercial and industrial activities**

'Manufacturing' and 'transportation and storage' are the two highest energy use sectors in the EMCCA and L&L areas, despite having smaller numbers of businesses compared with other sectors

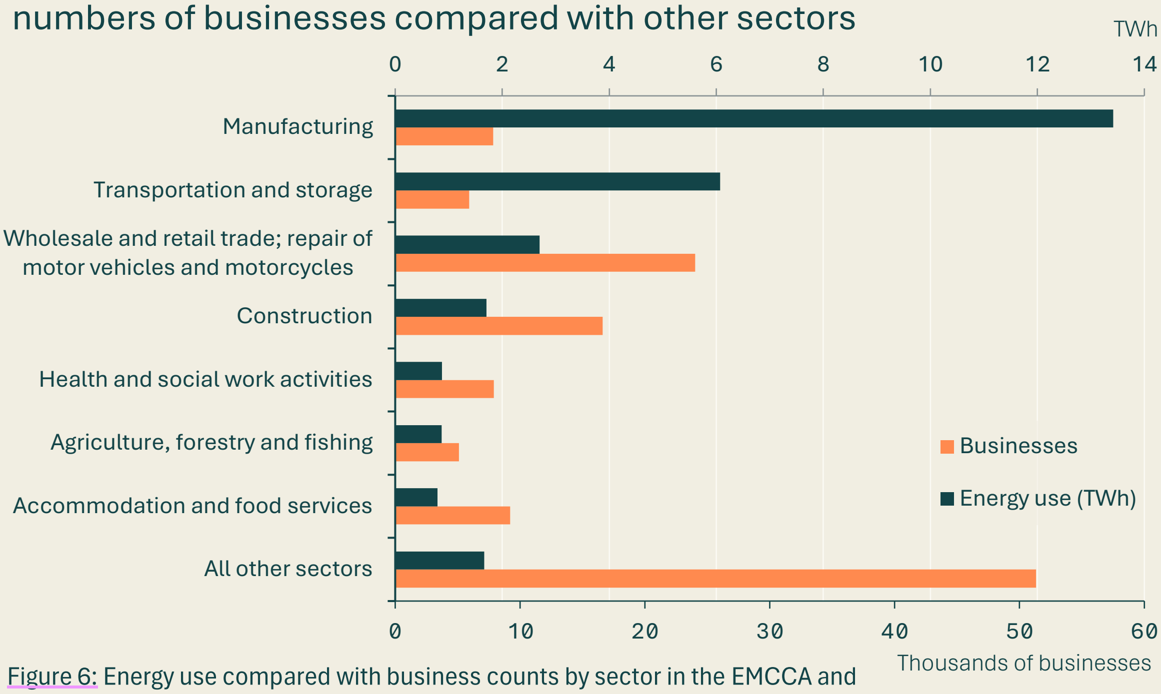

Figure 6: Energy use compared with business counts by sector in the EMCCA and L&L area. UK Business Counts - local units by industry and employment size band, ONS, 2025; Energy consumption by industry, ONS, 2025

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Understanding the range of commercial and industrial activities in the region forms a basis of understanding the scale, purpose and carbon intensity of their energy use. We make a distinction between industrial sectors, which focus on production and manufacturing of goods, and commercial sectors, which focus on distribution, sale and trade of goods or services. In energy terms this is a useful distinction, as industrial sites are likely to have large energy demands related to specific processes. Commercial buildings, on the other hand, are more homogenous in their energy use, with heating, cooling, lighting, refrigeration and other appliances being the dominant energy demands across sectors.

The majority of businesses in the region are operating in the commercial sector, rather than industrial. The largest share of these, 19%, are focused on retail and wholesale trade. This is higher than the national average, where 16% of businesses are in this sector. There are also high numbers of professional and service-related businesses.

In the region – and across the UK – industrial businesses make up a smaller proportion of all businesses.[8] Construction businesses are the second most numerous type of business in the region but use relatively low amounts of energy. Despite representing only 6% of businesses in the region, the manufacturing sector uses more than twice the amount of than any other individual sector. Transport and storage businesses also represent a relatively small proportion of the businesses in the region by number but are responsible for over a fifth of industrial/commercial energy use.

When considering how to decarbonise non-domestic energy use in the region, this data indicates potentially significant impact from tackling emissions at a smaller number of industrial sites involved in manufacturing, rather than smaller returns from engaging with a larger number of commercial or construction organisations. This trend is supported by data from the Non-Domestic National Energy Efficiency Data-Framework (ND-NEED), which shows that energy use is dominated by a small number of sites across all sectors. This is most pronounced in the industrial sector, where 80% of gas usage is concentrated in the top 1% of sites.[9]

Comparing industrial and commercial energy use across the three county areas in the region shows that Leicestershire has the highest demand, with particularly high consumption in the transportation and storage sector. EMCCA's industrial and commercial demand is lower, due to a smaller number of businesses in the manufacturing sector.

[8] UK Business Counts - local units by industry and employment size band, ONS, 2025.

[9] The Non-Domestic National Energy Efficiency Data-Framework 2025 (England and Wales), DESNZ, August 2025.

Leicestershire has the highest manufacturing and transport energy demand among all counties in the study area

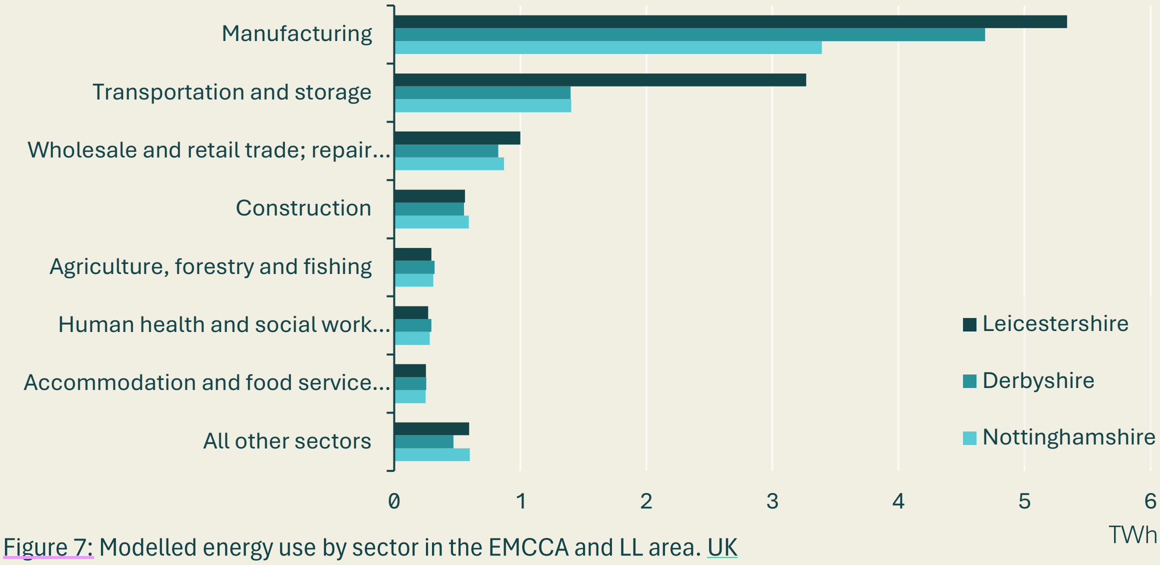

Figure 7: Modelled energy use by sector in the EMCCA and LL area. UK Business Counts - local units by industry and employment size band, ONS, 2025; Energy consumption by industry, ONS, 2025

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2.3.1. Manufacturing consumption by process

Low temperature processing is the most demanding manufacturing process in the EMCCA and L&L area

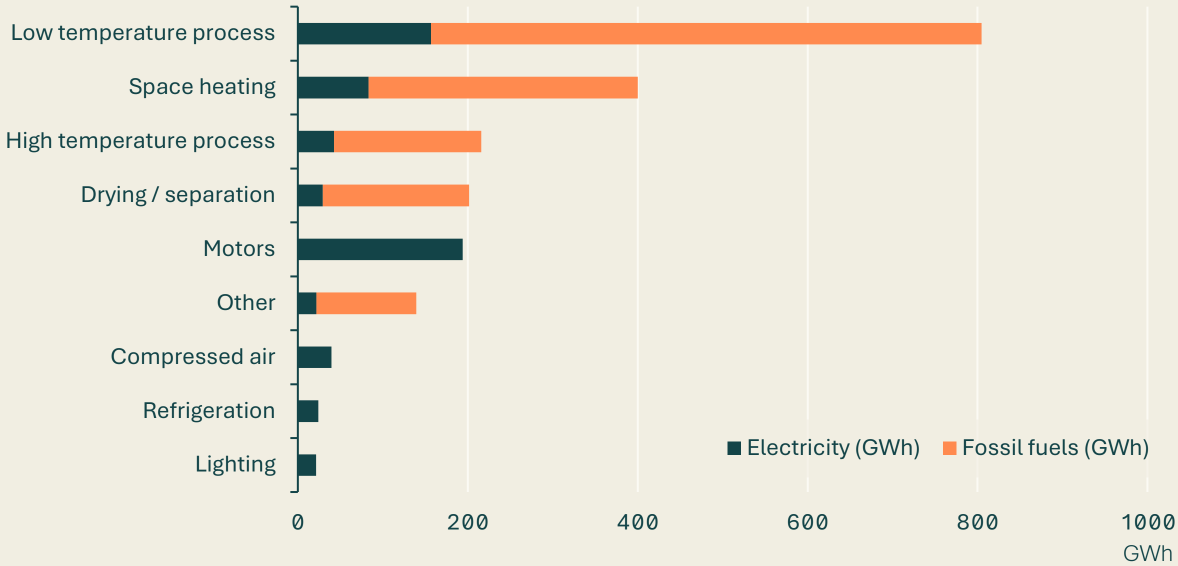

Figure 8: Electricity and fossil fuel use across manufacturing processes. UK Business Counts - local units by industry and employment size band, ONS, 2025; Energy consumption in the UK: End use data tables, DESNZ, 2025
Notes: Fossil fuels include oil, natural gas, and solid fuels

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Manufacturing energy use in the region can be examined by process type. Low temperature processes are the highest source of energy demand and use the greatest amount of fossil fuels to meet that demand; space heating is the second highest demand and also uses a significant amount of fossil fuels (usually gas). These types of energy use are relatively straightforward to electrify, especially compared to high-temperature processes.

How energy is used relates directly to how it can most effectively be decarbonised, as we discuss in Section 3.2.

2.4. Energy infrastructure

The energy transition is reliant on a shift away from fossil fuel infrastructure towards clean energy infrastructure. The maps in the following subsections set out the existing infrastructure in the region and proposed developments.

2.4.1. Electricity network

The electricity network delivers power to homes and businesses through the distribution network. The distribution network in the study region is operated by National Grid Electricity Distribution (NGED). The network is divided into a series of voltage levels, with each area served by a ‘primary’ substation, which serves a number of ‘secondary’ substations.

Substations are rated to provide a certain amount of power. To ensure they don’t become overloaded, permission is required to connect significant electricity demand or generation to any part of the grid. The space between the currently contracted power connections and the maximum rating of a substation is known as headroom. Each substation has separate demand and generation headroom ratings, based on its rating and what is already connected to it, or contracted to connect.

NGED publish headroom data for primary substations, but as most buildings will connect via a secondary substation, this does not necessarily give a definitive answer to whether a connection request will be permitted without reinforcement of the network. Figure 9 shows the location of electricity network infrastructure in the region, including contracted demand headroom at primary substations.

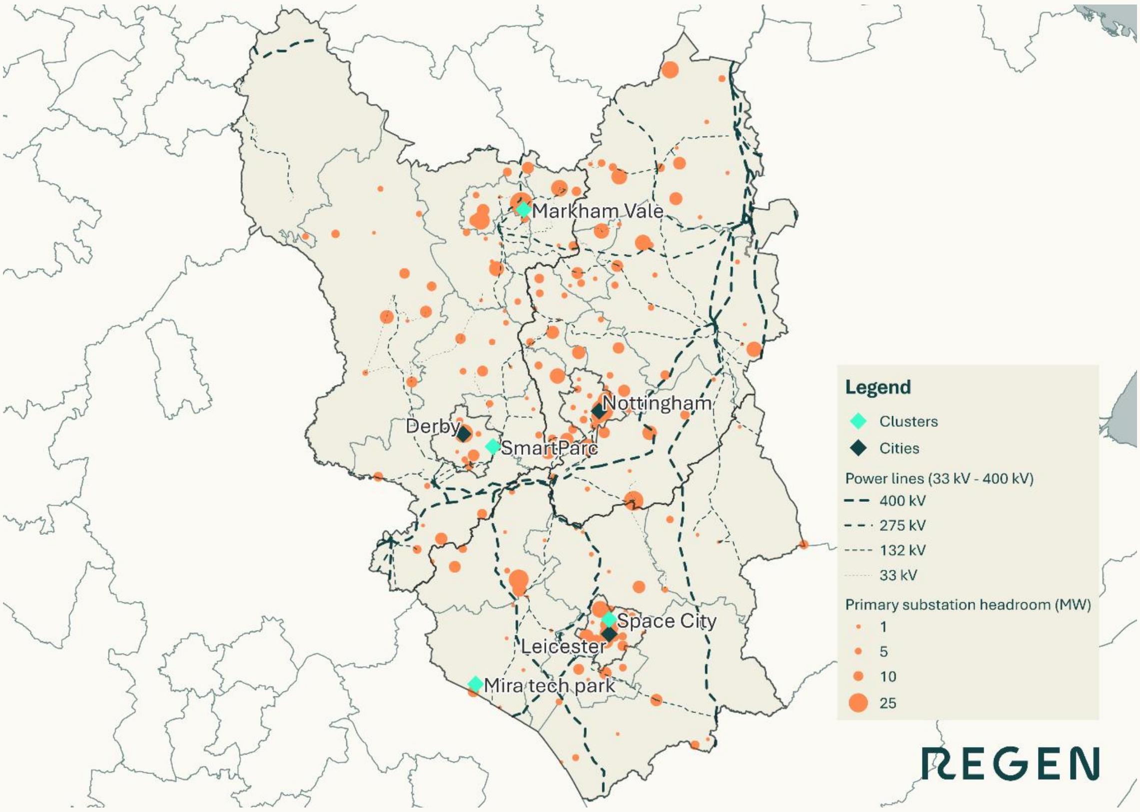

Figure 9: Map of electricity infrastructure across the EMCCA and L&L area. Power lines are shown at voltages of 33 kV and above. Network Opportunity Map Headroom, National Grid Electricity Distribution, 2025.

2.4.2. Renewable deployment

Installed renewables

Figure 10 shows installed renewable projects in the region. These are predominantly small and medium-scale solar sites in rural areas. There are a smaller number of wind, storage and waste-related energy generation sites located across the region in rural areas outside of National Landscapes.

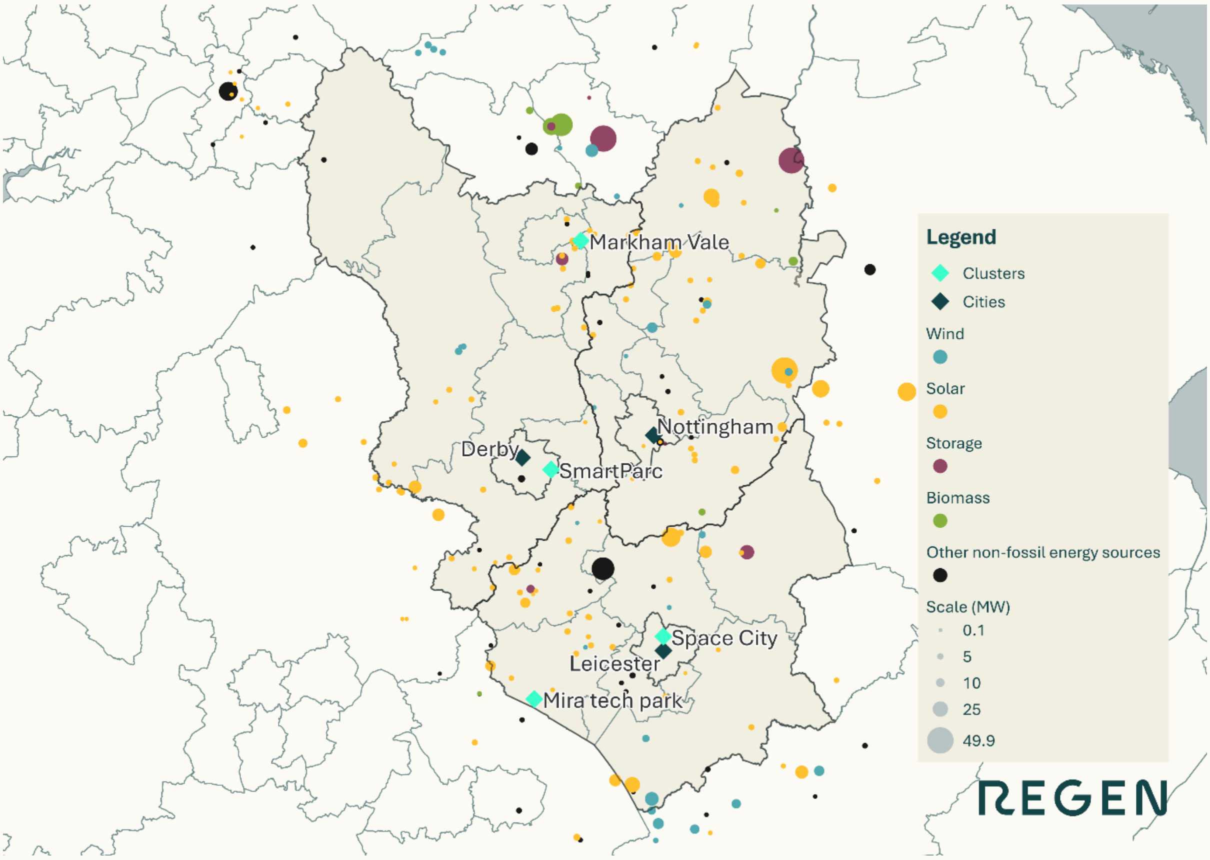

Figure 10: Deployed renewables within __ miles of the EMCCA and L&L area. Renewable Energy Planning Database, DESNZ, 2025. Note: Other non-fossil energy sources are small hydro, landfill gas, anaerobic digestion, energy from waste incineration and advanced conversion technologies. Proposals less than 1 MW in the planning system before 2021 or 150 kW thereafter are not represented in the REPD. A buffer was applied to ensure projects located just outside the study area were still captured in the mapping.

There is nearly 1 GW of solar PV deployed in the EMCCA and L&L area

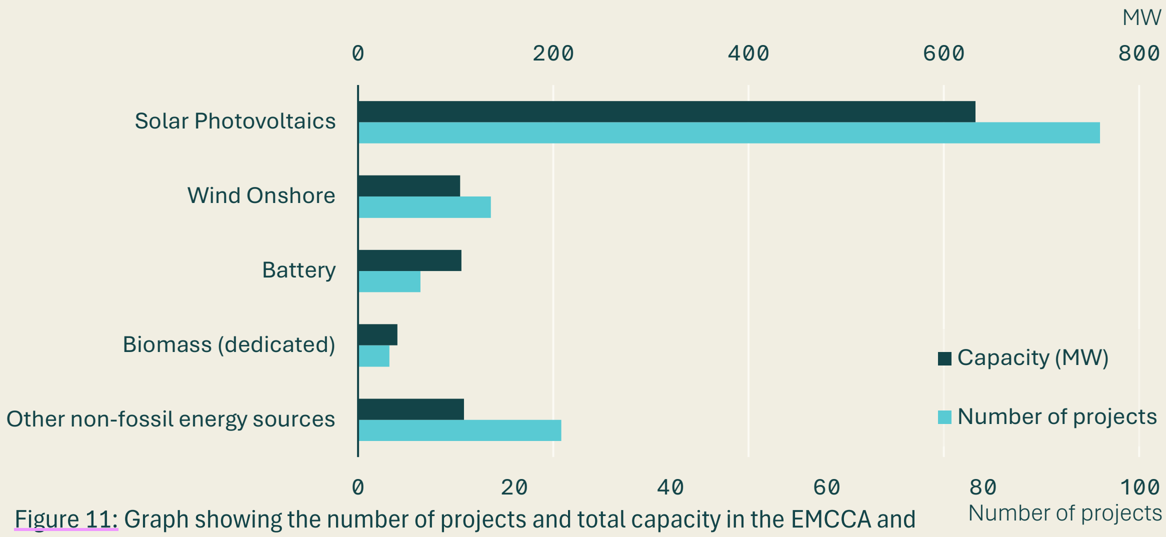

Figure 11: Graph showing the number of projects and total capacity in the EMCCA and L&L area by technology. Renewable Energy Planning Database, DESNZ, 2025
Note: Other non-fossil energy sources include: Small Hydro, landfill Gas, Anaerobic Digestion, EfW Incineration, Advanced Conversion Technologies. Technologies less than 1 MW in the planning system before 2021, and 150 kW after 2021 are excluded.

Renewable development pipeline

The pipeline of projects in the area is also dominated by solar, with an increased number of larger-scale sites and sites in both rural and more urban locations. There is also a marked increase in the number of storage sites in the pipeline in the north east, centre and south west of the area. This pipeline reflects trends across England.

There is currently a programme of grid connection reform which limits connection offers to projects considered 'needed' under the government's Clean Power Action plan and, in future, the Strategic Spatial Energy Plan. This is likely to mean that some sites in development will not be able to obtain a grid connection at this stage and will not be able to proceed.

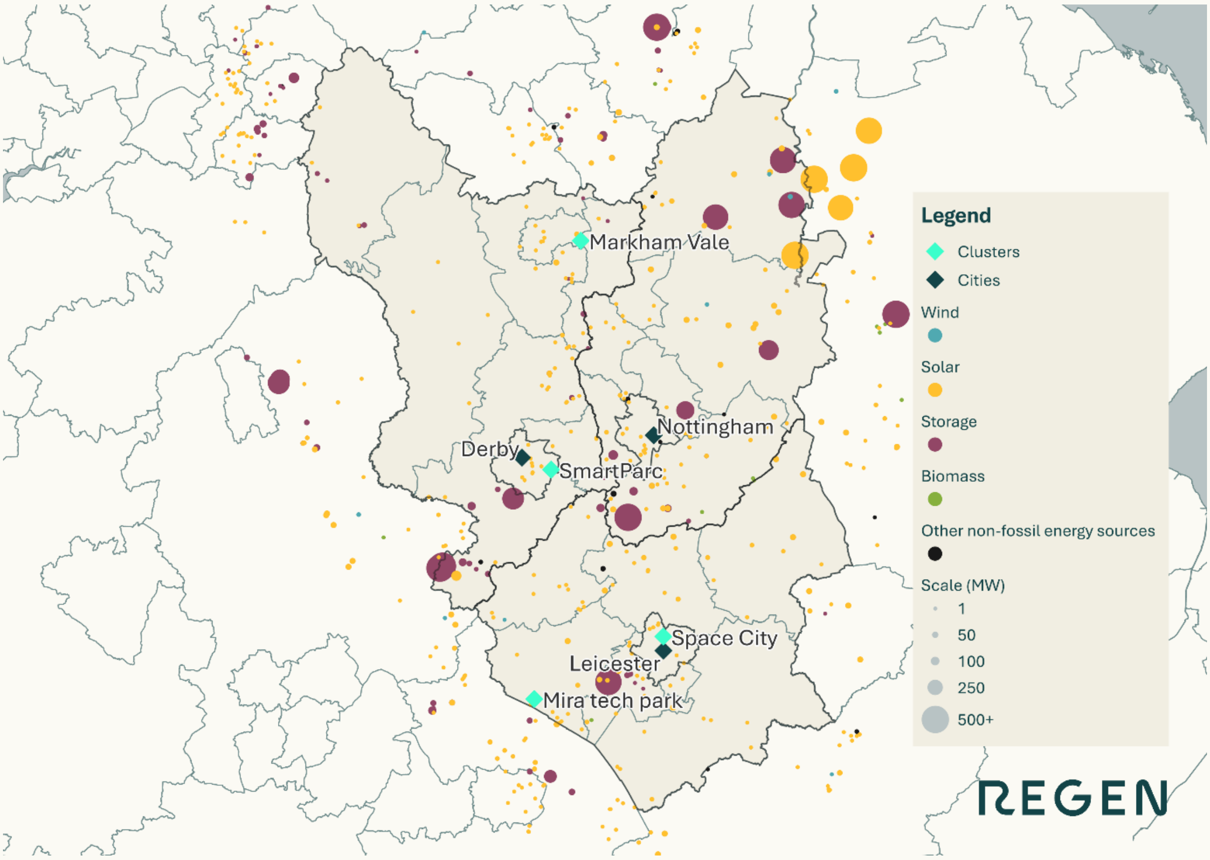

Figure 12: Pipeline of renewable sites within 12 miles EMCCA and L&L area. Renewable Energy Planning Database, DESNZ, 2025. Note: Other non-fossil energy sources include: Small Hydro, landfill Gas, Anaerobic Digestion, EfW Incineration and Advanced Conversion Technologies. Technologies less than 1 MW in the planning system before 2021, and 150 kW after 2021, are not represented in the REPD. A buffer was applied to ensure projects located just outside the study area were still captured in the mapping.

2.4.3. Natural gas network

The gas network supplies homes and businesses with natural gas through the gas distribution network. For the study region and the whole of the Midlands, this is managed by Cadent. Figure 13 shows domestic gas consumption at LSOA level across the study region. This data assumes domestic gas meters as those with a weather-corrected annual gas consumption of less than 73,200 kWh.[10] This means the data includes many small businesses or those with low gas use.

The LSOA data is a useful proxy measure of how widespread the gas network is. There are 28 LSOAs with no gas demand, which is 1.4% of the total. If we also include LSOAs with very low gas demand this rises to 36, or 1% of LSOAs. This shows that access to the gas network is

[10] Subnational consumption statistics methodology and guidance booklet, DESNZ, December 2025, Table 1.

widespread across the region.[11] As would be expected, off-grid areas are concentrated in the most rural areas of the region

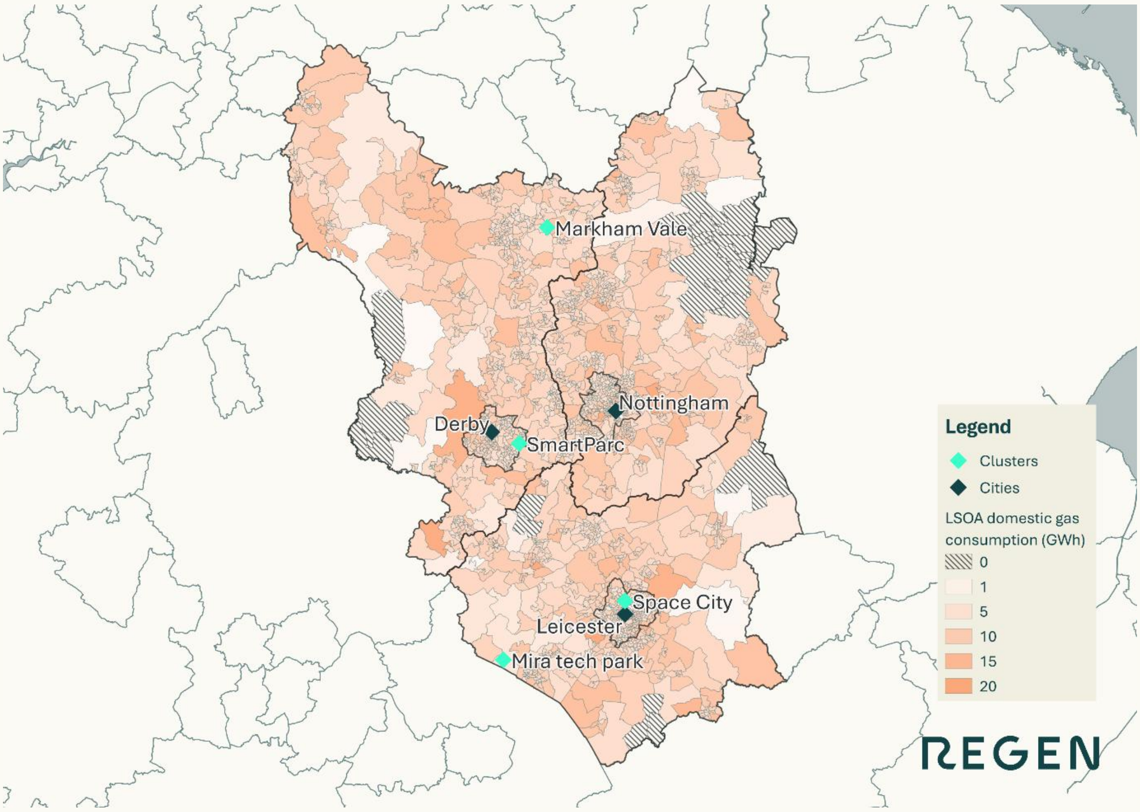

Figure 13: Map of LSOA-level gas usage across the EMCCA and L&L areas. LSOA domestic gas 2010 to 2024, DESNZ, 2025

To understand gas demand characteristics, we can look at the equivalent subnational dataset for non-domestic gas demand. This includes all gas meters with weather-corrected annual gas consumption of greater than 73,200 kWh.[12] This data is available at the MSOA level, which is less granular and is shown in Figure 14. This shows that industrial gas demand is concentrated in certain areas of high industrial activity. There are 12 MSOAs with annual demand of greater than 100 GWh, 3% of the total. These 12 MSOAs consumed 1,898 GWh of gas in 2024, which is 27% of the total non-domestic consumption. These areas do not align with our clusters; the clusters were chosen to represent small and medium commercial and industrial sites, rather than the region's largest industrial sites.

[11] We classed low gas usage as less than 10% of the median demand for an LSOA. These indicate LSOAs that are likely to be predominantly off the gas grid, but with some areas of gas network availability.

[12] Subnational consumption statistics methodology and guidance booklet, DESNZ, December 2025, Table 1.

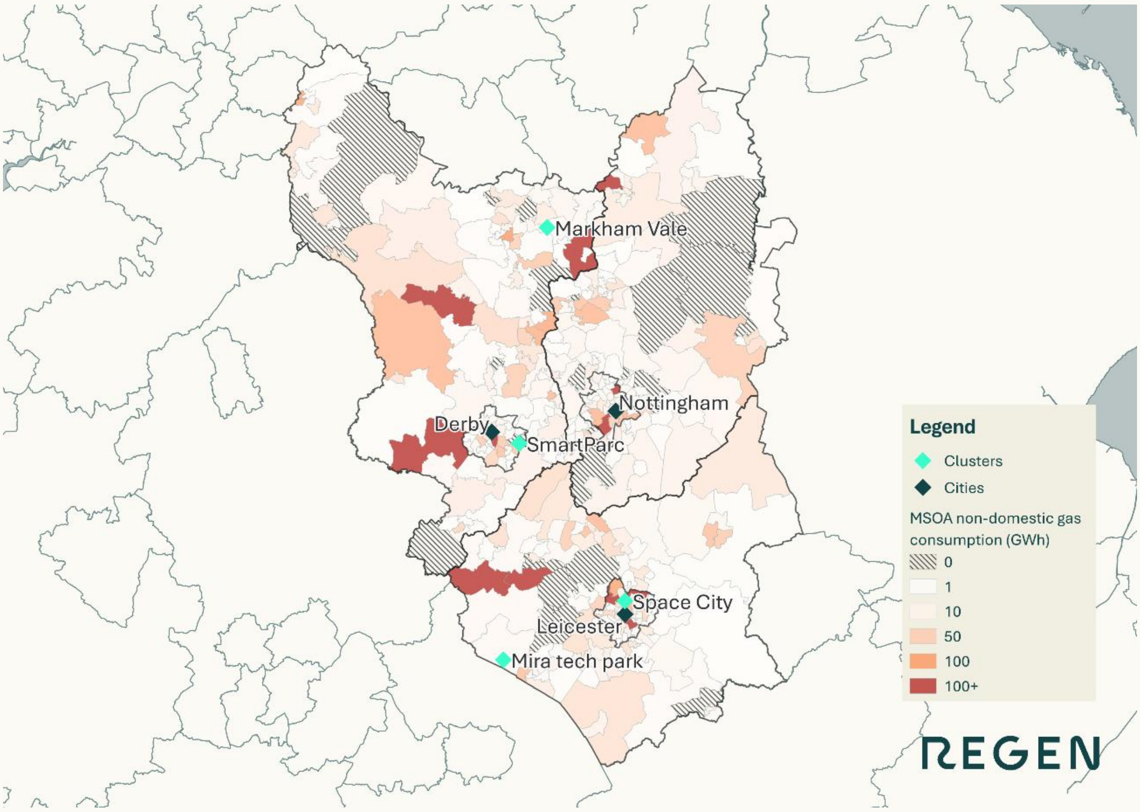

Figure 14: Map of MSOA-level gas usage across the EMCCA and L&L areas. MSOA non-domestic gas 2010 to 2024, DESNZ, 2025

2.4.4. Hydrogen network proposals

There are proposals to build a hydrogen network that would include this region – East Midlands Hydrogen. The project is a partnership between EMCCA Local Enterprise Partnership, Cadent, Uniper, Toyota, Midlands Engine, East Midlands Freeport, and Leicester and Leicestershire Enterprise Partnership.[13] The network aims to connect 70 industrial sites to a hydrogen network by 2050. Three of the clusters in this study – SmartParc, Space City and Markham Vale – are close to the proposed route of the hydrogen network.

The UK government published a hydrogen update to the market in July 2025, which defines hydrogen as having an important role in providing low-carbon dispatchable power and to "decarbonise hard-to-electrify sectors including industry, refineries and heavy transport".[14] In this update, the government also committed to establishing the UK's first regional hydrogen transport and storage network to become operational from 2031. The update does not indicate where this first network will be developed.

[13] East Coast Hydrogen delivery plan, East Coast Hydrogen, November 2023.

[14] Hydrogen update to the market: July 2025, DESNZ, July 2025.

Timelines in the East Coast Hydrogen report indicate that the section of hydrogen network relevant to this study (the Southern section) will follow on from the initial development of 'Project Union' around the Humber region. Taken together, this indicates that hydrogen transport infrastructure is unlikely to be developed in the study region before the mid-2030s.

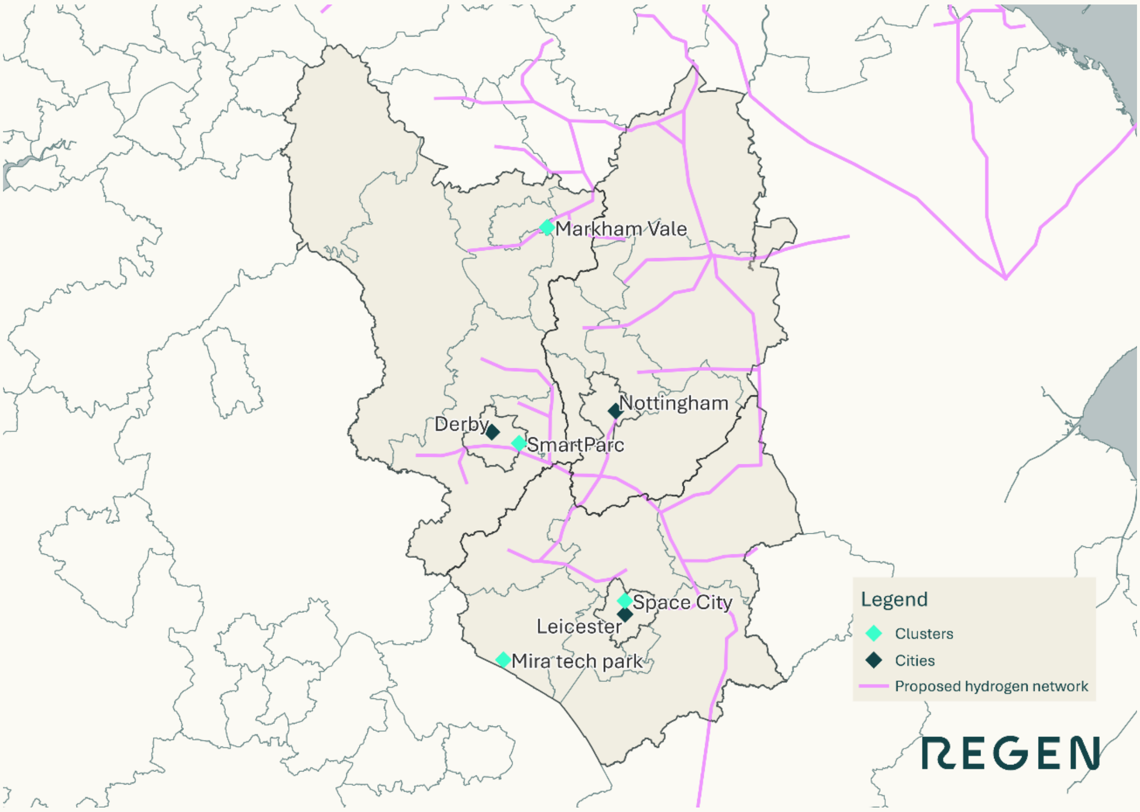

Figure 15: Proposed hydrogen network. East Coast Hydrogen – Pipeline North Phase 1 NZASP Re-opener, Cadent Gas, 2024

Section 3:

Regional decarbonisation

Achieving net zero requires rapid decarbonisation of all sectors, including industry. The Climate Change Committee's energy pathways examine decarbonisation approaches at the UK level for each sector, using assumptions on technology potential, costs and impacts to create potential decarbonisation pathways or scenarios.

Of these, the Balanced Pathway is the CCC's recommended approach to achieving the UK's net zero emissions target by 2050; the scenario is not overly reliant on any particular technology and focuses on technologies that are ready to deploy now, rather than those requiring development. This means, for example, it prioritises electrification over hydrogen use for heating, transport and industry. This aligns with the expectations for the development and use cases for hydrogen outlined in 2.4.4.

3.1. Decarbonising non-residential buildings

Gas makes up around 50% of non-domestic building energy demand in 2025 and is predominantly used for space and water heating, according to the CCC's Seventh Carbon Budget. Electricity is around 40% of demand, with use focused on lighting and appliances, as well as heating in some properties. The remaining 10% of non-domestic building energy use at present is supplied by oil and bioenergy, which are mainly used for space and water heating in some off-gas properties.[15]

The Balanced Pathway recommends that non-residential buildings can decarbonise through rapid electrification, with the "vast majority" of non-domestic buildings being suitable for a heat pump, either directly or through a heat network. This results in over 99% of non-domestic building demand to be met by electricity by 2050, which requires an immediate and sustained increase in the electrification of heating. To maximise efficiency, minimise energy costs and reduce the need for network investment, electrified heating should be supplied where possible by heat pumps, which are several times more efficient than any direct electric solutions. This efficiency boost, along with improvements to building fabric, is why the overall energy use in non-residential buildings is around 60 TWh lower by 2050 than the value for 2025 under this pathway.

[15] The Seventh Carbon Budget, the Climate Change Committee, 2025, Section 7.9.

Electricity provides 99% of non-residential building energy by 2050 in the 7th Carbon Budget Balanced Pathway

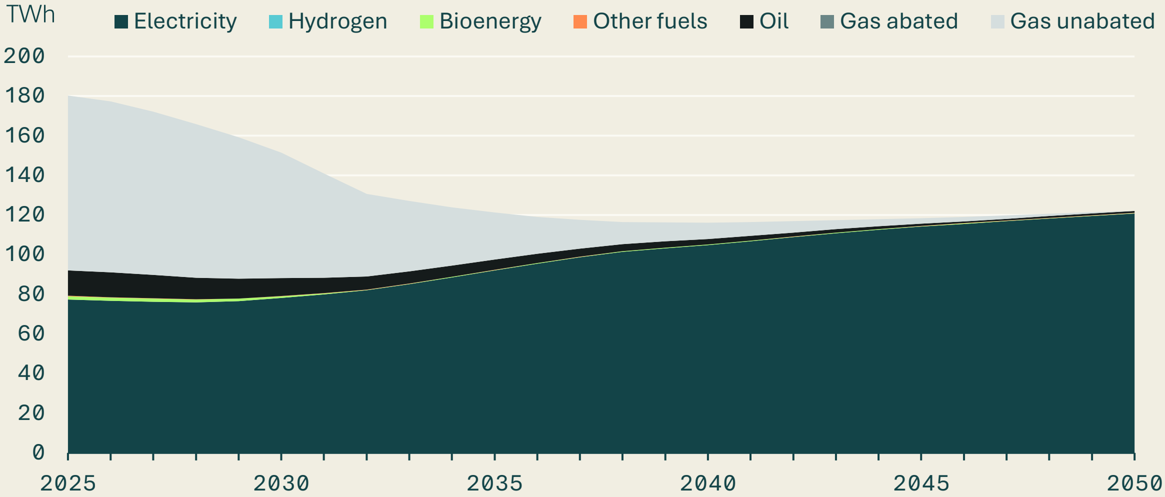

Figure 16: Regen analysis of the 'non-residential' sector balanced pathway. The Seventh Carbon Budget, Climate Change Committee, 2025
Note: 'Other fuels' contains non-bio waste and solid fuel

There is significant variation in energy use both between and within sectors. The government's ND-NEED dataset presents metered electricity and gas demand of non-domestic buildings in England and Wales.[16] This shows that the median energy intensity of non-domestic buildings varies significantly by sector, with median energy use from hospitality being almost six times greater per square meter than warehousing, as shown in Figure 17.

Across sectors and for both fuels, there is significant variation around the median with a significant positive skew in all cases, meaning that the mean is much larger than the median. This is most pronounced for factories, where 80% of total gas consumption comes from just the top 1% highest consuming buildings. Factories also have around 12 times more floor area than hospitality businesses in England and Wales. Overall, factories consume five times more energy than hospitality.[17]

The ND-NEED data shows that there is significant variation in energy demand from non-domestic buildings, but doesn't indicate what energy is used for. The Building Energy Efficiency Survey (BEES) collected this data but ended in 2016. The final BEES data indicates that around half of energy use from non-domestic buildings, excluding industrial processes, was for space

[16] The Non-Domestic National Energy Efficiency Data-Framework 2025 (England and Wales), DESNZ, August 2025, Tables 9a and 9c.

[17] The Non-Domestic National Energy Efficiency Data-Framework 2025 (England and Wales), DESNZ, August 2025, Figure 2.

heating.[18] Over the last decade, while there have been significant changes in technology and working practices, the dominance of space heating and hot water is likely still the case. Other energy demands, such as lighting and appliances, are likely to be met from electricity, which has a much lower carbon intensity and have seen significant efficiency improvements over that period. Decarbonising heating and improving the thermal efficiency of heating systems and buildings are therefore the key challenges in addressing building emissions.

Energy intensity varies significantly between sectors

Median gas and electricity intensity from commercial buildings by sector, 2023 data

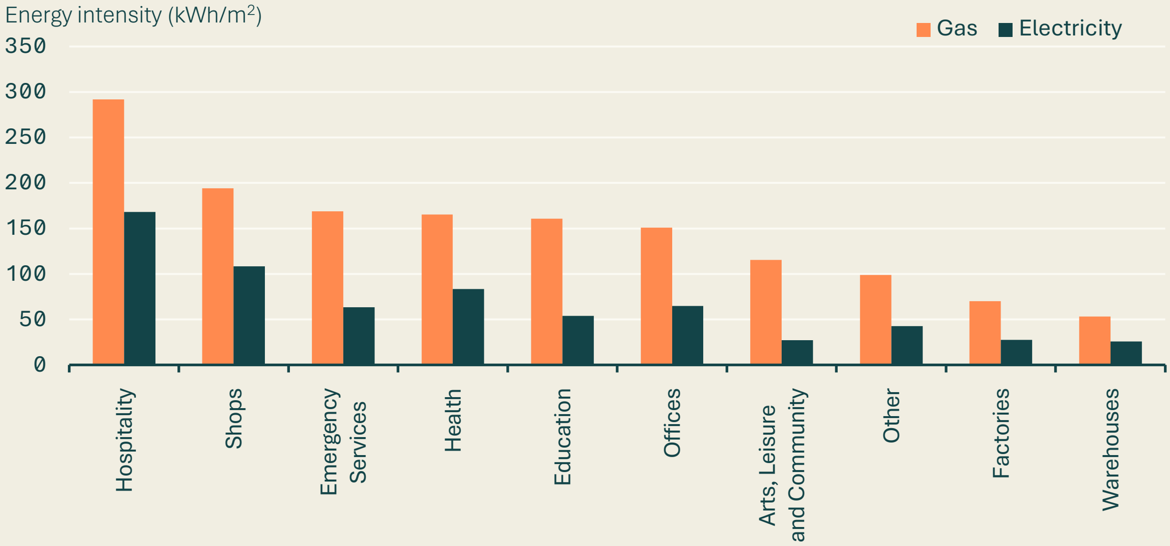

Figure 17: Median gas and electricity consumption by sector, tables 9c and 9a of ND-NEED data. ND-NEED England and Wales, DESNZ, August 2025

3.2. Decarbonising industrial processes

Industrial process demand includes low temperature processes, high temperature processes, drying/separation and a range of already predominantly electrified process uses such as motors, compressed air and refrigeration. The CCC Balanced Pathway sets out a scenario in which 73% of UK industrial demand is electrified. The remaining demand under this scenario is met by hydrogen, bioenergy, abated gas and other fuels. This pathway requires a significant reduction in the use of unabated gas, which currently makes up 35% of UK industrial energy use, and the near elimination of the use of oil, which currently makes up 13%.

Electrification forms the backbone of this strategy. This is informed by responses to the government's call for evidence on industrial electrification, which concluded that

[18] Business Energy Statistical Summary, BEIS, 2018, Chart 2.1.

“electrification offers significant technical potential for industry to replace fossil fuel use”, particularly if barriers of cost and grid connections can be overcome.[19]

Electricity provides 73% of industry energy by 2050

Industrial Sector 7th Carbon Budget balanced pathway scenario

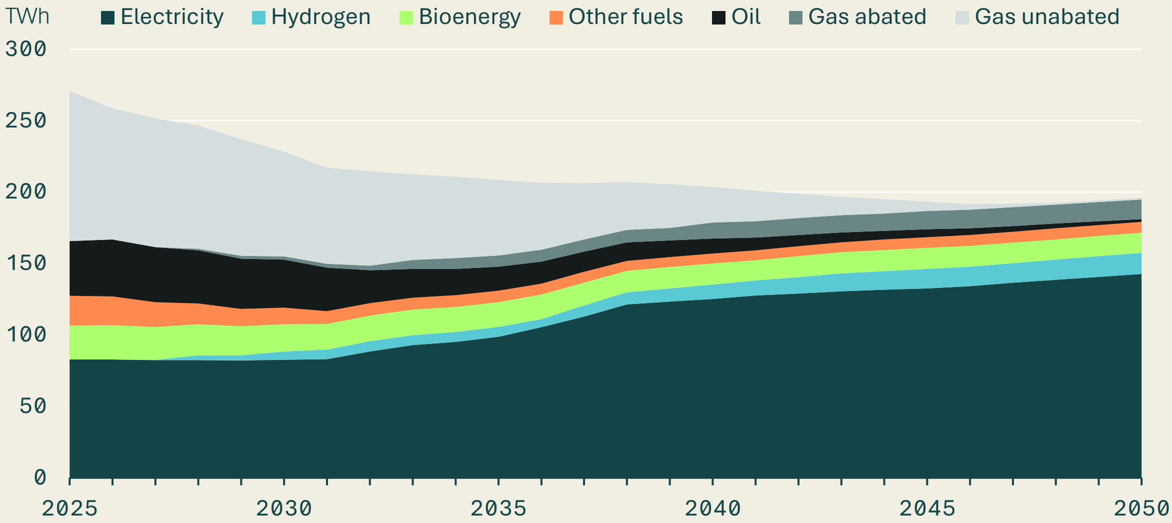

Figure 18: Regen analysis of the “industry” sector balanced pathway.
The Seventh Carbon Budget, Climate Change Committee, 2025.
Note: "Other fuels" contains non-bio waste and solid fuel

The ability to switch industrial processes from fossil fuels to electricity will vary considerably with the technical details of the process and each individual site. There are technology gaps, particularly for high-heat applications. Further innovation and technical demonstration is required to build capability and confidence in these technologies. There may also be some high-temperature and drying processes that cannot electrify, but require alternative, low-carbon fuels, such as biomethane or hydrogen. If the UK continues to decarbonise, both fuels will be in high demand and will be high cost, so will need to reserved for the hardest to electrify processes.[20]

The ability to obtain the required grid connection in a timely manner is a barrier to electrification for some businesses. Ofgem are reforming the connections process for demand in response to this issue[21] and has identified three interrelated challenges:

- The demand queue is large and growing, and contains a significant number of projects that are likely non-viable.

[19] Enabling Industrial Electrification, DESNZ, September 2024.

[20] Limited biomethane must be targeted at hard-to-decarbonise sectors, Regen, September 2025. Putting facts into perspective on hydrogen’s role in the energy transition, Hydrogen Science Coalition, accessed February 2026.

[21] Demand connections reform, Ofgem, February 2026.

- The demand queue contains a significant number of well-progressed projects that cannot progress to connection quickly enough, due to the time required for network or generation build, and the presence of non-viable projects.
- There are no mechanisms to prioritise strategically important demand projects.

Ofgem has issued a consultation on how to reform the queue of demand projects to address these barriers.[22]

3.3. Decarbonising HGVs

Logistics and distribution is a major sector for the region and a dominant sector for two of our clusters, which brings HGVs into the remit of this report. There were 1.59 billion tonnes moved by GB-registered HGVs operating in the UK in 2024.[23] The government is committed to phasing out the sale of new non-zero emission HGVs by 2035 for vehicles up to 26 tonnes and 2040 for larger HGVs.[24] The CCC expects electrification to be the main route for the decarbonisation of HGVs, stating there will be very little or potentially even no role for hydrogen in heavier vehicles. This is also echoed by the Automotive Council UK's roadmap, which categorises uptake of battery electric vehicle technology as having a high level of certainty, compared to fuel cell technology being categorised as having a lower level of certainty.[25]

This conclusion is supported by observed market trends, such as the falling cost of EV batteries and the release of several electric models, compared with the slow progress of fuel cell cost and commercial availability of hydrogen vehicles.[26] The decision to terminate the HyHaul project, which aimed to develop a network of hydrogen refuelling stations for HGVs, after fleets failed to commit to sufficient vehicle numbers also undermines the prospect of hydrogen-fuelled HGVs being competitive with battery electric 'eHGVs'.[27]

The CCC's Balanced Pathway targets roll-out of eHGVs scaling up in the late 2020s to meet the UK government's commitment to a 2040 phase-out date for the sale of new internal combustion engine HGVs. By 2035, the pathway has 31% of the HGV fleet being electric, rising to 93% by 2050, as shown in Figure 19. The chart also shows the significant increase in efficiency from electrification, as the overall energy demand shrinks by more than half.

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[22] Demand connections reform, Ofgem, February 2026.

[23] Domestic road freight statistics, United Kingdom: 2024, DfT, July 2025.

[24] Consultation on a New HGV CO_2 Emissions Regulatory Framework, DfT, January 2026.

[25] System-Level Roadmap, Automotive Council UK, 2024.

[26] The Seventh Carbon Budget, the Climate Change Committee, 2025.

[27] Innovate UK and DfT pull plug on hydrogen truck project, Fleet News, December 2025.

There are schemes in place to support this ambition. The eFreight 2030 consortium is leveraging both public and private funds to roll out the first electric fleets and better understand the most efficient approaches to electrification. The Electric Freightway public/private consortium is facilitating the rollout of eHGV charging hubs and ongoing learnings. Both of these fall under the UK government's Zero Emission Heavy Goods Vehicles and Infrastructure (ZEHID) programme, with a total of c. £200m in funding from the Department for Transport.[28]

Our research shows that freight companies are beginning to adopt electric HGVs across selected routes, marking the early stages of a wider transition within the freight and logistics sector. [29] So far, most deployments have relied heavily on public support, with grants and subsidies playing a crucial role in enabling initial investment and funding innovation.

Electricity makes up 97% of HGV energy use by 2050 in the 7th Carbon Budget balanced pathway scenario

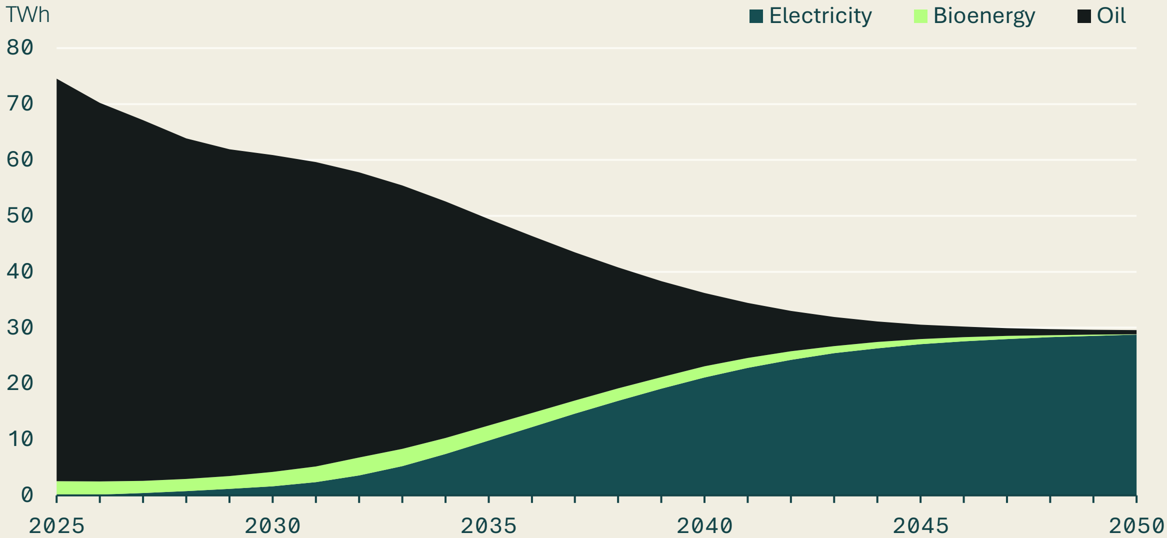

Figure 19: HGV pathway in the Seventh Carbon Budget Balanced Pathway. The Seventh Carbon Budget, Climate Change Committee, 2025

REGEN

Early fleet depot charger installations typically range from 240 to 400 kW,[30,31] although higher-powered chargers are expected to emerge as battery technology continues to develop. The first megawatt-scale charging hub was installed in January of this year at a logistics hub in the East Midlands. The site includes six DC charging bays powered by a single megawatt-scale Voltempo HyperCharger pod and is expected to be able to charge future e-HGVs in less than 30

[28] Zero emission heavy goods vehicles and infrastructure, Innovate UK, ND.

[29] Record number of electric HGVs and plug-in vans join Amazon fleet, Fleet News, 2025.

[30] Welsh freight forwarding specialist FSEW appoints Zenobē to develop electric truck charging hub, Zenobe, 2025.

[31] Nissan opens new UK electric truck charging hub, Electrive, 2025.

minutes. Under the eFreight 2030 programme, 25 of these megawatt-scale charging hubs are planned.[32]

A 2023 report from Transport & Environment found that around half of HGVs could operate sustainably without significant reliance on future public charging infrastructure due to rising eHGV ranges that are likely to be able to fulfil daily operational route requirements on a single charge.[33] This is particularly true for rigid HGV fleets, where primarily depot charging is estimated to be suitable for up to 75% of fleets. The implication of this, however, is a significant need for grid capacity. Maritime Logistics have installed 5 MW of charging capacity across three depots to support an initial rollout of 36 electric eHGVs – this is 1.6 MW per depot.[34]

Current en-route charging has been deployed at similar capacities as fleet charger installations, with the Moto Exeter eHGV charging hub installing 175-350 kW chargers[35]. Milence have also opened a charging hub at Amble Humber Port in Immingham, with four 400 kW chargers serving eight bays, a total capacity of 1.6MW. This location was partly chosen due to its proximity to A roads and motorways, but also as part of Milence's plans to build out a European eHGV charging network and recognising the port's crucial role in road trade between the UK and Northern Europe, Scandinavia and the Baltic regions. There are also plans to install megawatt-scale chargers at the same site during phase two of the project.[36]

Several logistics businesses, including Expect Distribution, Nissan and FSEW, are exploring ways to open their charging infrastructure to third parties during off-peak periods. If this is deemed feasible and more widely rolled out, there is a real potential for an improved business case for fleet owners, but also an opportunity for system efficiencies and access to strengthened infrastructure for new entrants to the market. However, this will require coordination across the sector and strong smart charging infrastructure. [30,31,37]

The power and number of charge points that a facility requires are dependent on the time available for recharging and the number of vehicles to be charged simultaneously. Overnight charging over several hours can be achieved through a slower, smaller capacity charger, but if eHGV tractor units are only able to have short downtimes between trips then faster, higher-powered charge points will be required. A 360 kW eHGV charger can add around 60 miles of range in under 15 minutes, although that will vary based on vehicle efficiencies.[38]

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[32] UK's first megawatt eHGV charging hub opens in East Midlands, Fleet News, 2026.

[33] HGVs on the road to net zero, Transport & Environment, 2023.

[34] Electrifying Heavy Logistics with High-Power Truck Charging, VEV, 2025.

[35] High-power charging hub for eHGVs opens at Moto Exeter, GreenFleet, 2026.

[36] Powering the UK's electric transport transition: Milence opens its first UK charging hub in Immingham, Milence, 2025.

[37] Expect Distribution rolls out first electric HGVs under eFREIGHT 2030 project, Renault Trucks, 2025.

[38] First fleet of fully electric HGVs deployed by Royal Mail, Fleet News, 2025.

We have used this research to inform our approach to reviewing transport across each cluster, along with information about the industrial mix of the cluster.

3.4. Regional conclusions

Our analysis has brought together a wide range of datasets to describe the energy characteristics of commercial and industrial sites across EMCCA and L&L.

We have found that around 60% of current energy use in the study area is from fossil fuels, there are significant opportunities to decarbonise these sectors. Almost half of all energy use from industrial and commercial activity is from the manufacturing sector, despite this being a small proportion of the businesses in the area. 'Transportation and storage' represents the next largest sector by energy use. Within the manufacturing sector most energy is used for 'low temperature processes' and 'space heating'. This is promising for the energy transition as these uses are generally technologically ready to electrify.

Electrification is the dominant tool to decarbonise buildings, transport and the bulk of industrial processes. The barriers to doing so are limits on electrical connections, capital investment costs and the relatively high cost of electricity. The high efficiency of electrical processes means that for many applications (e.g. space heating and transport) the running cost can be comparable to, or cheaper than fossil fuel equivalents, but the savings are not necessarily large enough to incentivise the high initial investment. In other areas connection barriers are holding back investment, where there is a strong business case.

The availability of electricity network capacity varies by location. Electricity demand has been reducing as a result of improved efficiency, so there are areas where there is significant 'headroom' for electrification. In other areas constraints mean that businesses cannot access the increased connection they need until network reinforcement work has been completed, which may be far off. There are products and technologies that can be used to overcome these restrictions, such as behind-the-meter generation and/or storage and flexible grid connections. Understanding the constraint of a particular site and identifying an approach to manage it requires bespoke analysis of the local network the site demands and the business needs. More broadly, there is value in reinforcing communication between DNOs and consumers and ensuring that businesses can access the knowledge and advice they need to overcome barriers from electricity constraints wherever possible.

Our cluster studies provide more detail on how network constraints, electricity cost and investment barriers play out on the ground for real businesses.

Section 4:

Markham Vale

Markham Vale is a mixed-use business park adjacent to junction 29a of the M1 motorway in Derbyshire. The site has an emphasis on logistics and distribution but also includes some small-scale manufacturing and other sectors.

4.1. Cluster profile

The site is centred around the former Markham Colliery, which closed in 1993. Since 2006, Markham Vale has been under continuous regeneration and development through a partnership between Henry Boot Developments and Derbyshire County Council.

The regeneration aimed to create an accessible business park over a 200-acre site, offering both freehold and leasehold plots, including industrial, warehouse and office spaces. To date, the project has brought in around £270m of private sector investment and developed over 1.9 million sq. ft of commercial floor space. There are currently approximately 70 businesses across 39 units, representing a range of industries, with a headcount of 2,927 in 2025.

4.1.1. Cluster-specific data and engagement

We engaged directly with the centre manager, who was able to share site plans and summary details of the site. Due to the large number of businesses on site, we could not do one-to-one engagement. Instead, we produced a short email questionnaire to gather key information. The centre manager shared this and collated responses on our behalf, leveraging her position as a known and trusted person across the site. The response period was open for three weeks, with regular reminders throughout this period.

Despite these efforts, only eight organisations responded. These included some of the largest employers on the site and represented around 20% of the overall headcount. The questionnaire asked about the business itself (headcount, sector and activity of the site at Markham Vale) and then asked energy-related questions covering energy demand, constraints on growth and investment plans.

4.1.2. Major employers and sectors

The site spans a wide range of industries, covering automotive, food, housebuilding and precision industrial equipment. Publicly available information suggests that activity at the site is focused on logistics and distribution, along with offices.

Figure 20 shows the mix of industry at Markham Vale by both floor area and business count. Distribution is the most dominant sector by floor area, but this is made up of a small number of large warehouses. It should also be noted that a majority of the sites marked as industrial are predominantly focused on distribution at Markham Vale. Without more engagement across the site, it is not possible to identify the small amount of manufacturing activity accurately.

There are many businesses within the mixed-use category, which make up a relatively small proportion of the cluster's area. These are within the Markham Vale Environment Centre and Wilson Business Park that support over 30 businesses between them; most businesses in these centres are small office spaces.

A few large distribution businesses make up over half of the floor area

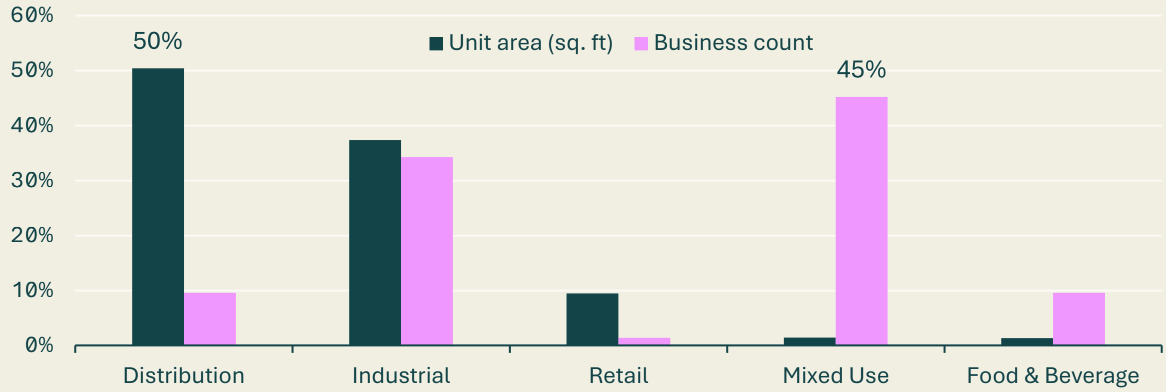

Figure 20: The mix of businesses across Markham Vale by floor space and business count. Floor area has been assessed from site plans. Business sector is assigned based on reported information where available and public information otherwise.

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The four largest units in Markham Vale represent 59% of the floor area of the whole site, the two largest being warehouses run by a single logistics provider with over 400 thousand square feet of floor space each. The other 35 units are all 100 thousand square feet or less and are a mix of warehouses, offices and retail spaces.

4.2. Current energy profile

Understanding the site's energy use requires analysing a range of data sources together. EPC data indicates that there is widespread use of both gas and electricity for space heating. A sectoral analysis of the businesses across Markham Vale indicates that distribution and manufacturing dominate energy consumption and estimated a total annual energy consumption of 142 GWh. This value makes high-level assumptions about industrial activity based on sector-wide averages. It is very likely an overestimate, predominantly as the manufacturing activity at Markham Vale is likely to be less energy intensive than the average based on our engagement with the cluster.

We can contrast this result with allocations of energy use from metered electricity and gas, which gives a total of 8.7 GWh, which is significantly lower. There is significant uncertainty around the allocations from this value too, as it requires allocating energy consumption between Markham Vale and neighbouring addresses, but it is likely to be a closer estimate than the sectoral analysis. This data shows gas usage that is much higher than electricity, which aligns with the EPC data that shows that gas heats a larger floor area, as well as gas heating being lower efficiency than electric heat pumps.

4.2.1. Energy performance certificates

Non-domestic EPC data across the site indicates that there is a mixture of gas boilers and electric heating, as shown in Figure 21. From the sample of available EPC data, more buildings are heated by electricity, but a larger floor area is heated by gas. There are two units with heating fuel marked as ‘other’; it is not clear what this fuel might be.

Most units use electricity for heating, but gas heats a larger floor area

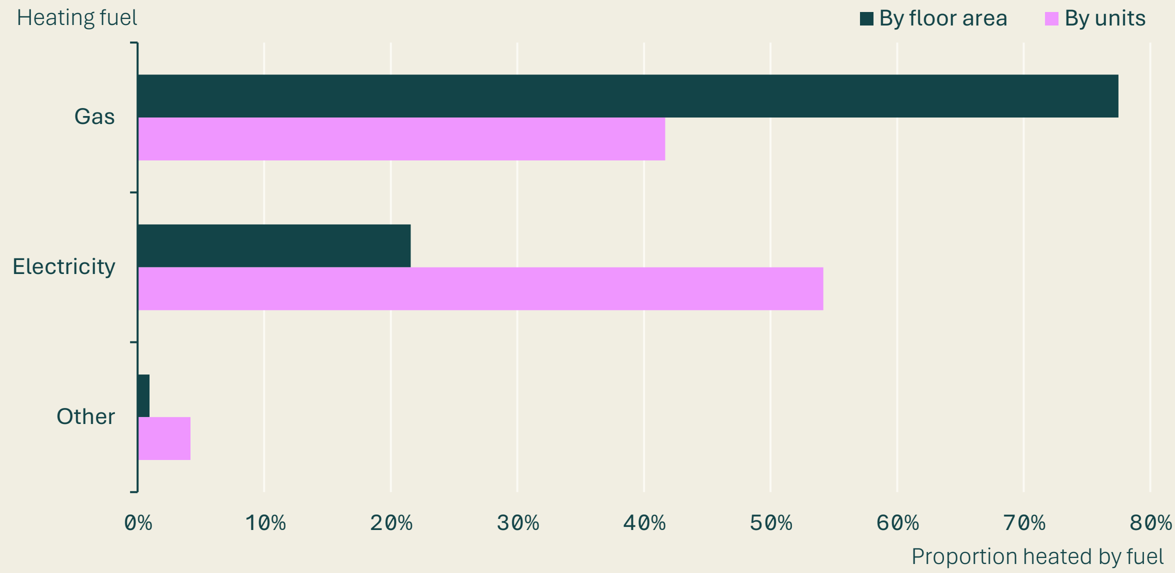

Figure 21: Analysis of non-domestic EPC data for Markham Vale. 48 certificates retrieved. Energy performance of buildings England & Wales, MHCLG, accessed February 2026

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Using the property type category from the EPC data indicates that this split between fuels is broadly consistent across building usage. Figure 22 shows this data split by building type category for both the proportion of units and the proportion of floor area. This shows that larger buildings are more likely to be heated by gas. As with buildings across the country, decarbonising space heating is a major challenge for many of Markham Vale's businesses.

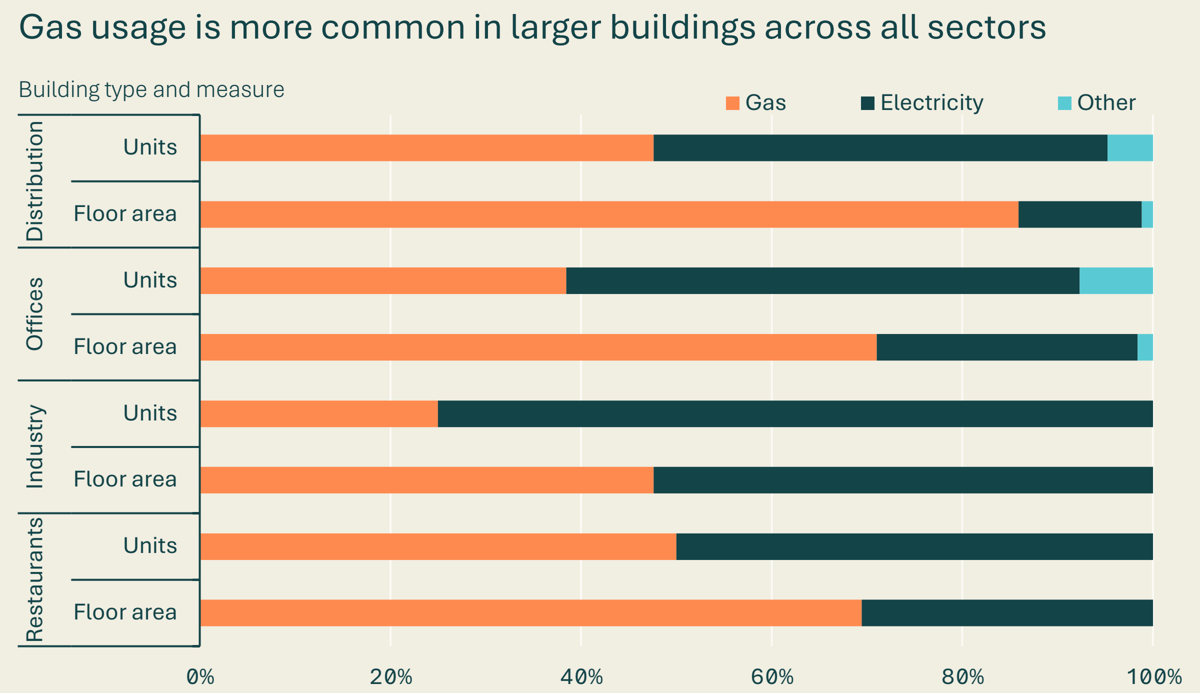

Figure 22: Analysis of non-domestic EPC data for Markham Vale. 48 certificates retrieved.
Energy performance of buildings England & Wales, MHCLG, accessed February 2026

4.2.2. Sectoral analysis

In light of limited energy data for the cluster, we can model energy use by linking information on sector and headcount to GB-wide energy usage data for different industries. These results are plotted in Figure 23 and estimate a total annual energy consumption of 142 GWh. Over 70% of energy use at Markham Vale is in the transportation, storage and manufacturing sectors. This aligns with these sectors being large employers across Markham Vale, as well as being more energy-intensive than some other industries.

Analysis estimates that the highest energy use comes from the 'transportation and storage' and 'manufacturing' sectors

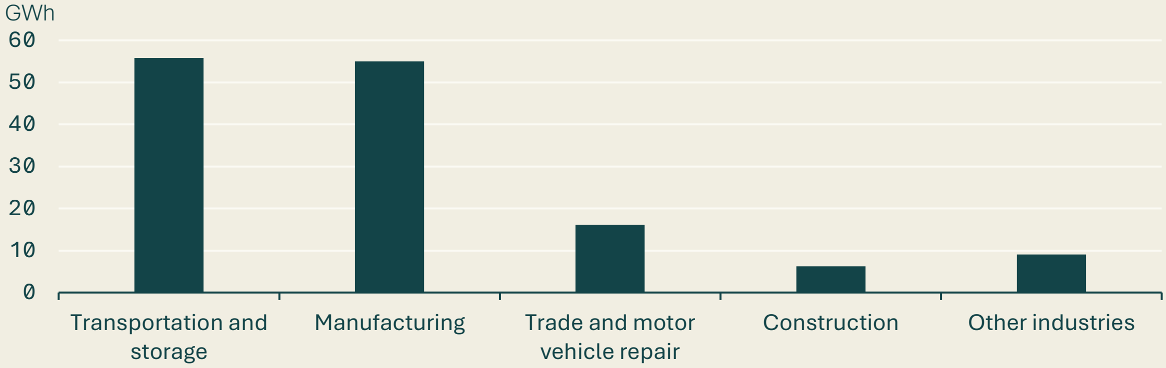

Figure 23: Modelled energy use by industrial sector for Markham Vale. UK Business Counts - local units by industry and employment size band, ONS, 2025; Energy consumption by industry, ONS, 2025

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The sectoral analysis assumes energy use is in line with the average energy use by employee for each industry. Analysis of the businesses listed within the site plan indicates that although some are in the manufacturing sector, the sites at Markham Vale are predominantly focused on distribution, with limited processing facilities.

Respondents to our survey listed the following as high-energy activities occurring onsite:

- Refrigeration
- Manual handling equipment
- Automated picking machines
- Cutting

With the possible exception of refrigeration, the energy use of these processes is unlikely to be larger than heating and cooling requirements. As far as we could identify, there are no heavy industrial processes with very large energy demands within Markham Vale. There are no sites that appear within the national atmospheric emissions inventory, which is a requirement for sites with large point source emissions.[39]

4.2.3. Metered energy use

In order to benchmark the energy modelling that we have presented above, we compared the analysis with subnational energy consumption data. This is available at the MSOA level for metered gas and non-half-hourly metered electricity, and at local authority level for half-hourly metered electricity.[40] Note that these data determine ‘domestic’ and ‘non-domestic’ gas

[39] The UK National Atmospheric Emissions Inventory (NAEI), accessed 2025.

[40] Sub-national final energy demand, DESNZ, July 2025.

consumption based on the overall demand, which may mean that gas consumption from some smaller gas users is categorised as 'domestic' and therefore excluded. This is not the case for electricity, where meters are classified as domestic or non-domestic.[41]

Our estimates of how these values might be allocated to the Markham Vale site are shown in Figure 24. This indicates that gas usage is much higher than electricity usage, which aligns with the EPC evidence that gas is used to heat a larger floor area in the cluster. The low efficiency of gas boilers compared to heat pumps also acts to increase gas usage, as for gas boilers more energy is required to provide the same amount of heat. This estimate also supports our qualitative assessment that current industrial activities at Markham Vale have modest energy consumption, compared to space heating demand.

These metered energy values are around ten times lower than the energy use modelled through sectoral analysis, shown in Figure 23. This is in large part because the metered energy excludes energy use from on-site renewables, as well as other unmetered fuels, such as oil. It also indicates that manufacturing businesses at Markham Vale have lower energy use than the sector-wide average nationally. This seems likely, due to an absence of particularly high-energy intensity processes.

Metered gas usage in Markham Vale is significantly higher than electricity usage

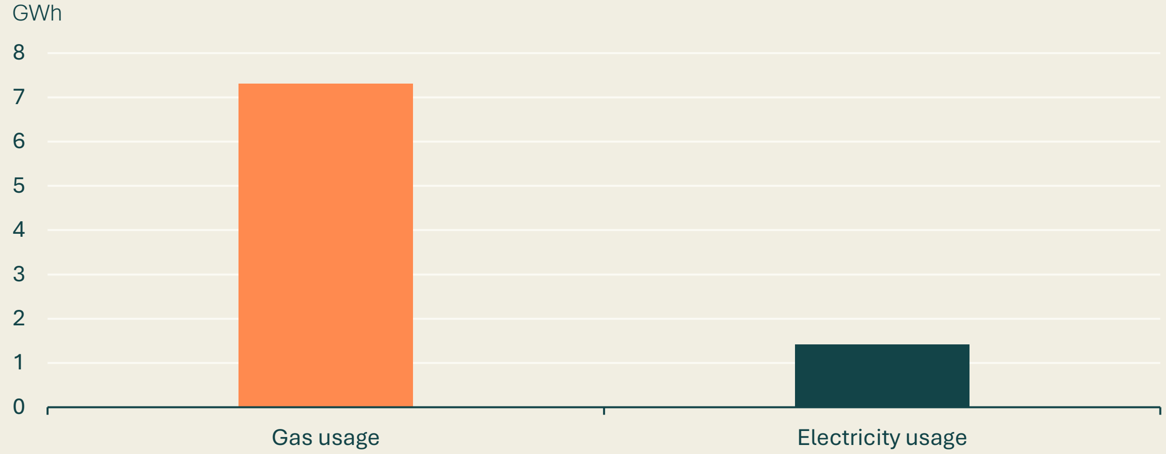

Figure 24: Allocation of metered gas and electricity usage to Markham Vale.
UK Business Counts - local units by industry and employment size band, ONS, 2025; MSOA non-domestic electricity 2010 to 2024, MSOA non-domestic gas 2010 to 2024, DESNZ, 2025. Note: Half hourly electricity meters within Markham Vale were assigned in proportion with the number of high energy use businesses (such as manufacturing).

[41] Subnational consumption statistics methodology and guidance booklet, DESNZ, December 2025, Table 1.

4.2.4. Freight

As distribution is the dominant activity across the cluster, transportation will be a large part of the site's energy usage. Currently, vehicles will principally be internal combustion engine vehicles. Although several businesses commented on having EV charging or having plans to install it, these were principally for staff use. Electrification of HGVs requires larger investments, a larger grid connection and a strategic approach across the logistics network.

Gridserve are opening an 'electric forecourt' at Markham Vale this year, which will include 22 400 kW-capable chargers, as well as three eHGV chargers, facilitated through a 6 MVA connection.[42] This highlights Markham Vale's broader role in supporting the electrification of transport.

The largest occupier at Markham Vale is Great Bear, a third-party logistics company serving multiple sectors. They operate two warehouses at Markham Vale, representing around 40% of the cluster's floor area between them. They are a major HGV fleet operator with 41 tractor units based at the two warehouses. These units will generally have at least three hours of downtime on site over the course of a 24-hour period. They also have around 50 third-party HGVs on site per day, which are on site for 1-2 hours at a time.[43] The downtime of HGVs is a key component in understanding the charging requirements to maintain operational impact from the same number of HGVs, as it determines the power at which they will need to charge.

4.2.5. On-site power generation

Analysis of satellite images shows that several units at Markham Vale have rooftop solar PV installed. Most of these sites only have a small portion of their roof covered in solar panels. This is likely due to restrictions from export connections.

From our engagement, three businesses reported having solar panels and one gave further details, stating that they have installed a 949 kWp solar PV system. This had been reduced from an initial feasibility study of a 1.8 MWp system, which was not approved due to capacity constraints. This business reported that "the DNO advised that if we wanted to install the system now we would need to fund the necessary upgrades, or alternatively, we would need to defer the project until 2032, when the planned upgrades are scheduled to be undertaken as part of their network improvement programme."

There is clearly significant rooftop capacity across Markham Vale, as most of the many large rooftops across the site have no solar PV, or a very small portion of coverage. Network

[42] 'GRIDSERVE previews new Markham Vale location', Gridserve, December 2025.

[43] Direct correspondence with Great Bear. February 2026.

connection is likely to be the limiting factor for any growth in PV. There is already a 4.2 MWp solar farm just across the M1 at Oxcroft, built in 2016.[44]

4.2.6. Summary of baseline energy usage

We have analysed building performance data, metered energy usage and engagement data for Markham Vale. While none of these datasets are sufficient to give a precise measure of energy usage across the site, taken together they give us a picture of how energy is used and how it could be decarbonised.

Space heating through gas boilers and transport of goods through internal combustion engine HGVs are the main fossil fuel demands of the site. Electrification has been identified as the most cost-effective route to decarbonising both demand sectors.

There are considerable opportunities for onsite generation, but these may be constrained by the electricity network's ability to accept additional exports.

4.3. Decarbonising Markham Vale

4.3.1. Decarbonisation plans of existing sites

Of the eight respondents to our survey, three indicated they were planning or hoping to increase EV charging on site. Another mentioned investment plans in electrifying their manual handling equipment to improve "operational performance". Two respondents indicated no investment plans for energy-related infrastructure. These were both smaller businesses within a shared unit, so are unlikely to be able to make material changes to their buildings.

The other respondents indicated that they had already invested in energy-efficient building fabric, PV and/or EV charging. Grid connections and energy cost were mentioned as constraints on development, as well as leaseholders being unable to develop certain measures, specifically more EV charging. No respondents mentioned decarbonising heating, despite this likely being the largest source of emissions in any buildings heated by gas.

4.3.2. Known development projects

Markham Vale is 21 years into its development. There are significant areas of land across four empty plots and half a dozen units in development, but these represent a small proportion of

[44] Anesco Completes Solar Farm in Derbyshire, Harworth, April 2016.

the overall site area.[45] We do not have firm data on how or when these sites will be developed. Our analysis has therefore modelled the details of the site as it currently stands.

4.3.3. Electrification of HGVs

The electrification of HGVs at Markham Vale could significantly increase electricity demand at the site. To understand the scale of potential demand, we compared projections from NGED's DFES against a high-level sensitivity analysis to assess available data from Great Bear, a distribution company and the largest occupier of Markham Vale by floor area.

NGED's DFES provides scenario-based projections of EV charger capacity, disaggregated to 11 kV substation level. Markham Vale sits at the boundary between two 11 kV Electricity Supply Areas (ESAs): Erin Road, which covers the northern site and part of the western southern site, and Bolsover, which supplies the majority of the southern site (see Figure 27).

The relevant charger categories within the DFES projections are:

- **eHGV chargers**: Dedicated chargers for HGVs at service stations and public sites
- **Workplace chargers:** Commuter parking at places of employment
- **Fleet/depot chargers**: Charging infrastructure for vehicles returning to base

These projections are shown in Figure 25 for the 'Electric Engagement' scenario – the scenario with the most ambitious electrification assumptions. Given Markham Vale's role as a distribution hub, the most relevant categories are eHGV chargers and fleet/depot charging.

[45] Analysis of site plan, as provided by Markham Vale.

The surrounding ESA's have nearly 7.6 MW of capacity forecast by 2050

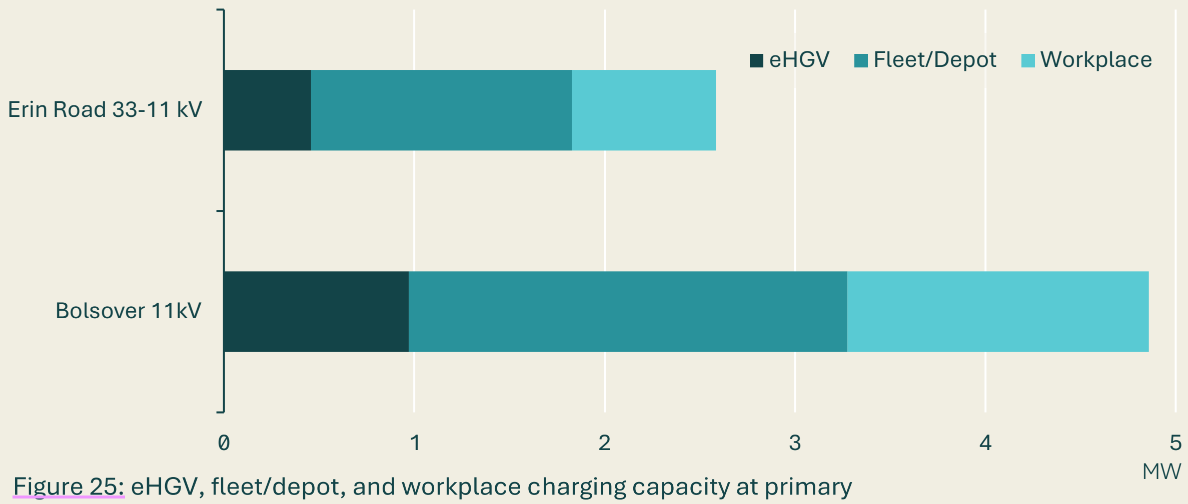

Figure 25: eHGV, fleet/depot, and workplace charging capacity at primary substations near Markham Vale. Distribution Future Energy Scenarios, NGED, 2025, Electric Engagement scenario.

The fleet vehicle usage patterns described for Great Bear in Section 4.2.4 indicate that Great Bear's 41 HGV tractor units are typically on site for up to three hours per day. As Great Bear occupies approximately two-thirds of the distribution floor area at Markham Vale, scaling this fleet proportionally suggests that approximately 55 HGV tractor units may be present on site across the wider Markham Vale distribution area.

Using these site insights, together with regional evidence and published assumptions, we have produced a high-level sensitivity analysis to benchmark potential HGV charging requirements against DFES projections. The analysis varies two key assumptions:

- Total annual energy delivered to HGVs on site
    - This is influenced by vehicle mileage and the proportion of charging undertaken on-site versus off-site
    - An average annual HGV mileage of 28,000 miles has been applied as a central estimate[46]
- Charger utilisation rate, defined as the average proportion of peak charging capacity.

Additional key assumptions applied in the underlying analysis are:

- HGV efficiency: 1.1 kWh/mile (NGED DFES, 2050)
- 55 HGVs charging for up to three hours per day
- 50% of total HGV energy delivered on site

[46] Regen analysis based on 'Table TRA89', Traffic data by local authority, DfT.

The resulting sensitivity range shows that the required peak capacity varies materially depending on annual energy demand and utilisation rates. Across the modelled, estimated charging capacity requirements span approximately 1 MW to over 5 MW.

Sensitivity analysis of Markham Vale's eHGV EV charging projections

Required charging power		Annual site eHGV energy (MWh)					
		800	1,100	1,400	1,700	2,000	2,300
Utilisation rate of chargers (%)	40%	1.8	2.5	3.2	3.9	4.6	5.3
	45%	1.6	2.2	2.8	3.5	4.1	4.7
	50%	1.5	2.0	2.6	3.1	3.7	4.2
	55%	1.3	1.8	2.3	2.8	3.3	3.8
	60%	1.2	1.7	2.1	2.6	3.0	3.5
	65%	1.1	1.5	2.0	2.4	2.8	3.2
	70%	1.0	1.4	1.8	2.2	2.6	3.0

Table 1: Regen sensitivity analysis of eHGV DFES charging projections. East Midlands licence area average HGV annual mileage = 28,000 (DfT Table TRA89, Regen analysis). HGV efficiency = 1.1 kWh/mile (National Grid Future Energy Scenarios). Three hours per day charging for 55 HGVs (Markham Vale insights). Assumes that 50% of the energy demand from Markham Vale's HGV fleet is delivered on site.

As demonstrated by this sensitivity analysis, site-specific eHGV use trends will significantly impact charging requirements. Uncertainty remains regarding:

- The proportion of fleet electrification occurring at depot versus public charging hubs
- The timing of electrification uptake
- Vehicle battery sizes and charging power ratings
- Operational charging patterns (opportunistic vs scheduled charging)

However, incorporating site-specific fleet data into the sensitivity analysis produces peak capacity estimates that are broadly comparable with the range of DFES projections for eHGV and fleet charging in the relevant ESAs. This indicates that DFES forecasts are of a similar order of magnitude to plausible site-specific demand, although both approaches remain high-level and subject to behavioural and technological uncertainties.

More detailed modelling and engagement with occupiers would be required to refine coincidence factors and charging profiles across the day, managed charging or flexibility potential and phasing of infrastructure investment. In particular, the timing of electrification deployment will be critical in determining reinforcement requirements.

Separate from depot fleet charging, Gridserve is progressing eHGV charging infrastructure at Markham Vale Services. Current plans include three dedicated electric HGV chargers. These could be up to 1 MW each, higher than the approximately 1.5 MW DFES eHGV projection.

4.3.4. Decarbonisation pathway

Using analysis of the baseline energy consumption, combined with subsector-specific energy decarbonisation pathways from the CCC, we have produced an energy pathway for Markham Vale to 2050.

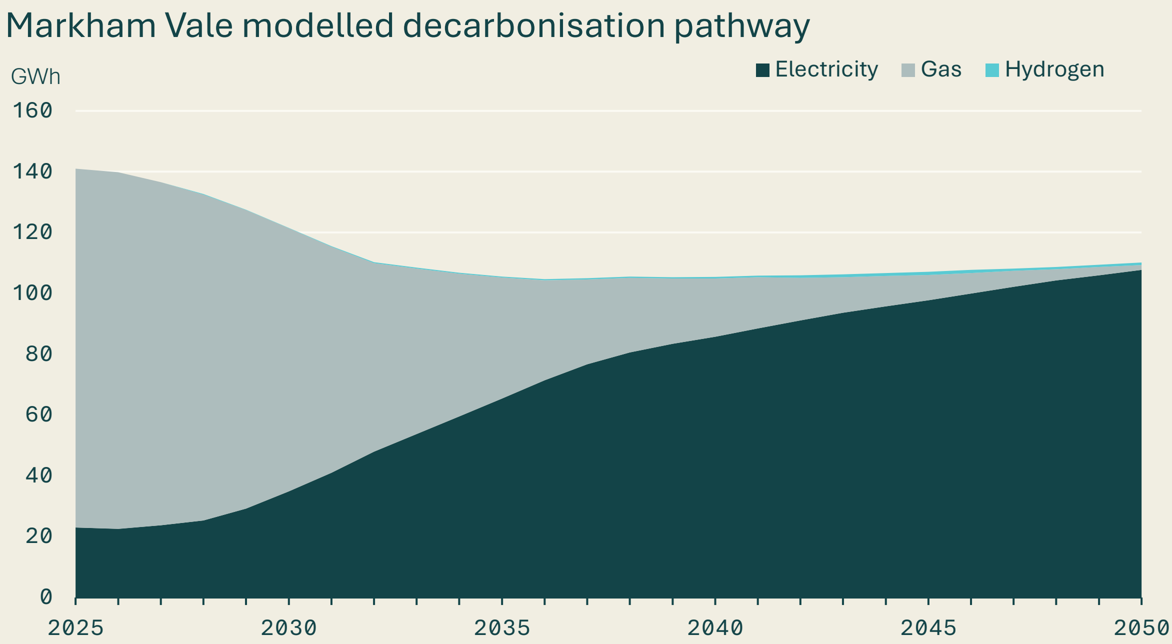

Figure 26: Decarbonisation pathway for Markham Vale based on the CCC Seventh Carbon Budget industry and non-residential pathway

4.4. Energy infrastructure

4.4.1. Electricity network

Markham Vale is likely to see a significant growth in electricity demand, as gas boilers are replaced with heat pumps and transport electrification continues. There are also significant opportunities for the development of on-site renewables, particularly rooftop solar PV. Both of these developments require electricity distribution infrastructure to connect to. There are opportunities to reduce connection costs or to overcome network constraints; these are outlined in Section 8.1.1.

Our analysis of network capacity indicates that there are two relevant electricity supply areas (ESAs), both of which have significant headroom for additional demand and generation. The abundance of generation capacity conflicts with engagement from one tenant within the Erin Road ESA who needed to scale back the size of a proposed solar PV installation to keep within grid constraints. This was likely due to a lack of headroom in the secondary substation supplying the area. This highlights the need for businesses and developers to engage directly with the DNO for a complete and accurate picture of network availability for their site.

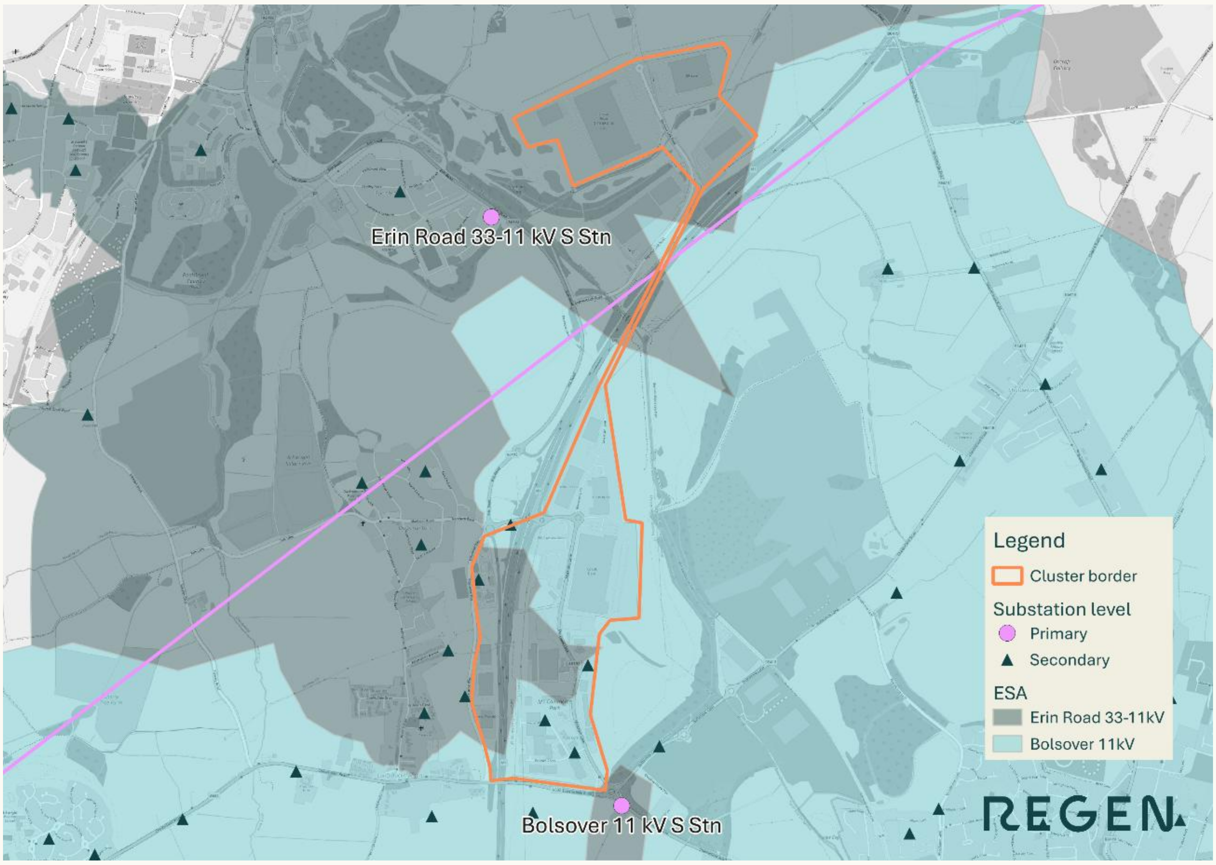

Figure 27: Markham Vale industrial cluster and surrounding primary and secondary substations. Network Opportunity Map Headroom, East Midlands Primary, National Grid Electricity Distribution 2025; Map data from OpenStreetMap

Substations near Markham Vale have substantial capacity for new generation and demand

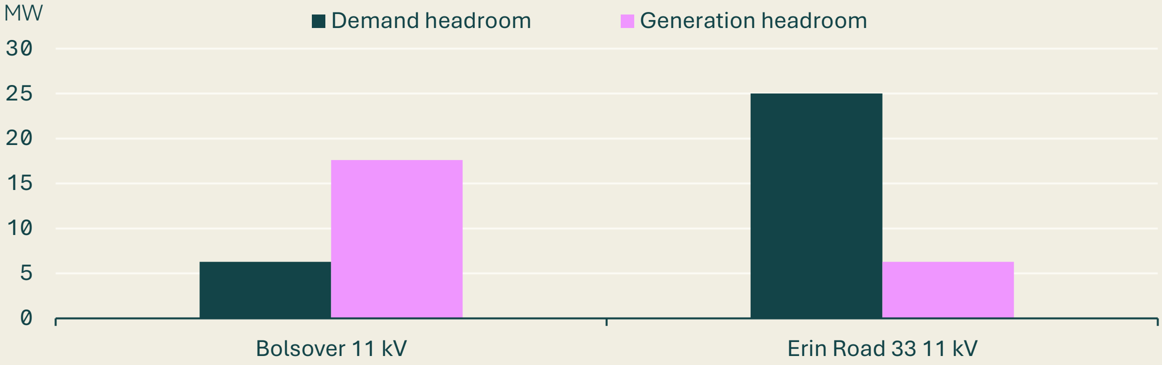

Figure 28: Headroom of primary substations near Markham Vale
Sources: Network Opportunity Map Headroom, National Grid Electricity Distribution 2025

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4.4.2. Hydrogen network

The East Coast Hydrogen project indicates that the Northern section of their proposed hydrogen transmission infrastructure could come very close to Markham Vale, as shown in Figure 29.[47] As discussed in Section 2.4.4, a hydrogen network anywhere in the study region is unlikely to be available before the mid-2030s.

Our analysis indicates that Markham Vale does not contain industrial energy demands that are likely to use hydrogen. The principal uses of energy are space heating and transport through HGVs. The CCC states that there will be no role for hydrogen in heating buildings, no hydrogen cars or vans, and "very little or potentially even no role for hydrogen in heavier vehicles".[48] We outlined the broader evidence case to support this view in Section 3.3. This suggests that there is unlikely to be sufficient demand for hydrogen at Markham Vale to justify investment in hydrogen distribution infrastructure.

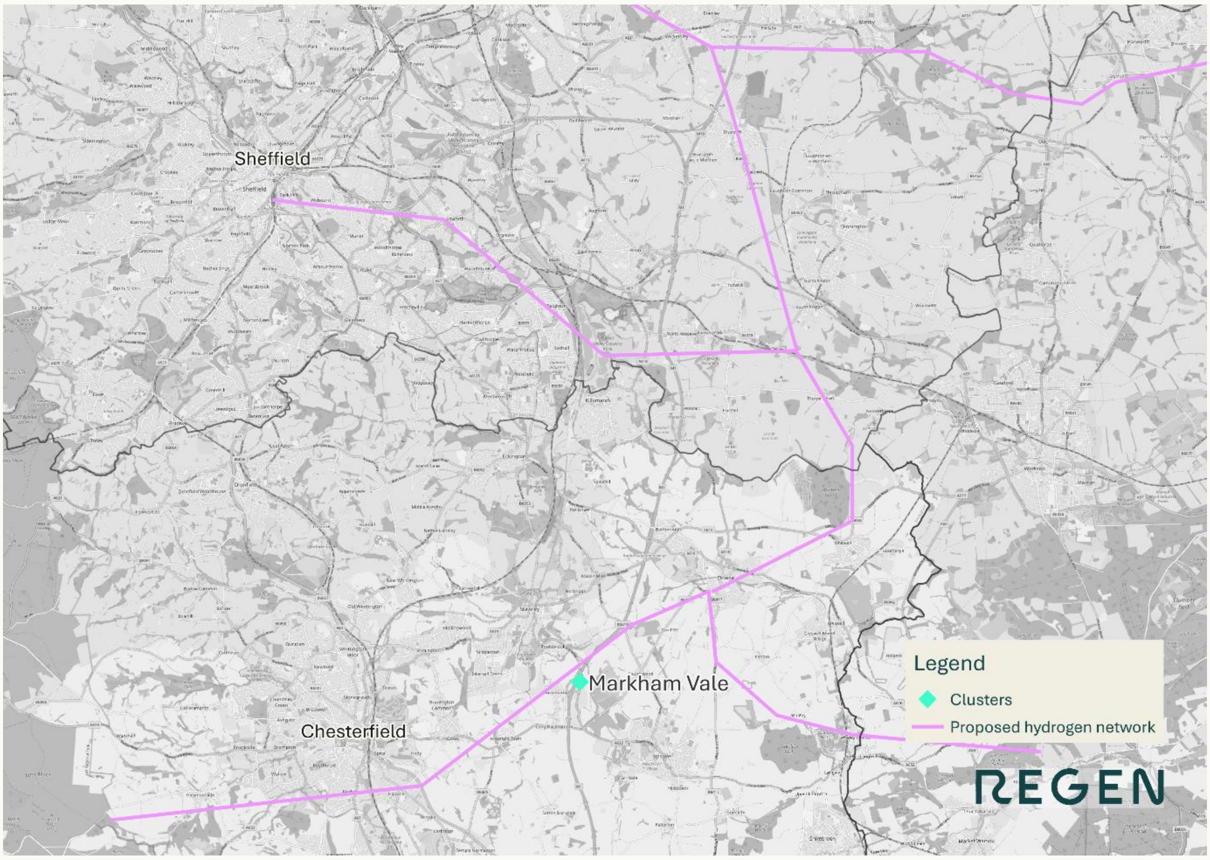

Figure 29: Map showing Markham Vale against the proposed hydrogen transmission network from the East Coast Hydrogen project. East Coast Hydrogen – Pipeline North Phase 1 NZASP Re-opener, Cadent Gas, 2024; Map data from OpenStreetMap.

[47] East Coast Hydrogen Delivery Plan Report, Cadent, Northern Gas Network and National Gas, 2023.

[48] The Seventh Carbon Budget, CCC, February 2025.

4.5. **Next steps for Markham Vale**

Markham Vale is a complex site with regards to the range of industries and the site structure. It has similarities to many industrial estates across the region and many of our findings will be replicable. Space heating and transport of goods are the largest sources of emissions and offer opportunities for electrification.

We have modelled the pathway for Markham Vale to decarbonise by 2050, as shown in Figure 30. This is based on the mix of businesses, current energy use estimates and the CCC balanced pathway for the relevant sectors. This shows how electrification can lead to much improved energy efficiency and can displace gas use almost entirely. Our analysis includes a small proportion of hydrogen, based on the national CCC sector pathway for manufacturing, but in reality we do not believe that Markham Vale is likely to have sufficient industrial demand to support a hydrogen supply.

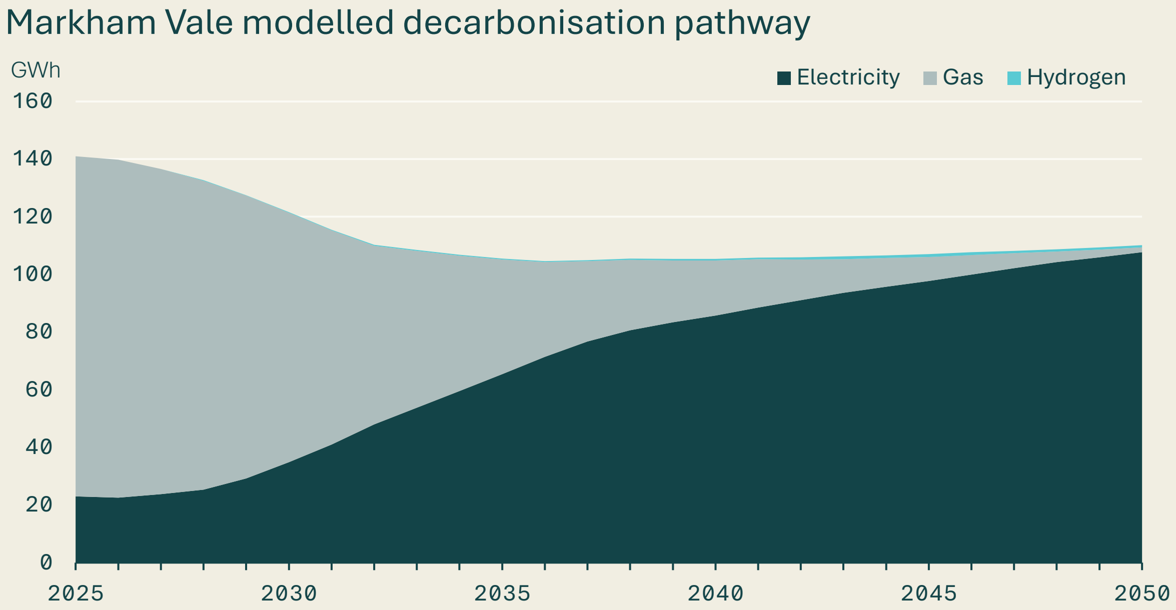

Figure 30: Decarbonisation pathway for Markham Vale based on the CCC Seventh Carbon Budget industry and non-residential pathway

Quantifying the needs of transport across the cluster requires more detailed engagement and modelling than has been possible for this project. This study should be undertaken to ensure that a strategic approach to investment can be implemented, as well as ensuring that the DNO can better understand future needs and work to minimise network constraints being a barrier to adoption. Where units are not owned by the occupant, the owner should work with and support leaseholders to invest in low-carbon technologies that will improve both the value of the site and operational efficiency for the leaseholder.

There is significant roof space available for further solar PV deployment. Grid constraints may delay the pace at which solar PV can be deployed, but engagement with the DNO may find ways around this through flexible grid connections and on-site energy storage.

Top 3 priorities for Markham Vale

1. Electrify existing gas heating across the site
2. Commission a detailed study of transport electrification to ensure adequate capacity
3. Expand the use of on-site renewables, considering using energy storage and/or flexible connection options to manage grid constraints.

Section 5:

SmartParc

SmartParc is an innovative new development focused on providing cutting-edge facilities to the food manufacturing industry. Efficient energy use is a central part of the site's design.

5.1. **Cluster profile**

SmartParc is a redevelopment project in Derby aiming to create a world-class food production cluster. The site is a former acetate production facility, located in Spondon on the eastern edge of Derby. It has a railway station, a direct link to the A6 and neighbours a Severn Trent water treatment works and the site of the former Derwent power station.

The site is currently in development with three units already built and occupied by Hello Fresh and Greggs, representing 48% of the total 2 million square feet of floorspace planned across 13 units. It aims to create purpose-built facilities for the food industry through designing the whole site to meet the specific needs of the sector and sharing key services. Food manufacture is the largest division of manufacturing in the UK by sales, with 21% of total manufacturers' sales in 2024.[49] It is also characterised by low margins, which can make investment challenging.

SmartParc aims to address this through investment that is focused on lowering operating costs and building sites that support a sustainable future for the food industry. A significant part of this strategy is efficient energy use. Food production has high energy needs for refrigeration, cooking and processing. The manufacture and processing of food and beverages in the UK consumed 31 TWh of energy in 2023, representing 14% of total UK manufacturing energy use.[50]

[49] UK manufacturers' sales by product: 2024, ONS, July 2025.

[50] Energy use: by industry, source and fuel, ONS, June 2025.

5.1.1. Major employers and sectors

SmartParc is different to the other clusters analysed, in that it is predominantly under development. Around half of the planned floor area is in operation, currently occupied by HelloFresh and Greggs, with a further nine units under development, including a 'Food Manufacturing Technology Centre of Excellence' offering education and development opportunities for food supply chains. The site is exclusively focused on the food sector and this focus allows the site to be designed for those specific requirements.

5.1.2. Cluster-specific data and engagement

We engaged directly with the chief operating officer of SmartParc, who was able to connect us to colleagues with specific energy and sustainability responsibilities. They had a detailed understanding of the energy use and challenges of the site, as energy is a cornerstone of the design. This enabled us to understand both the design approach to SmartParc, as well as the thinking and challenges behind that approach. They were also able to share site plans and other technical details related to the site.

We did not engage with the current occupiers, as energy is predominantly managed by the SmartParc team.

5.2. Current energy profile

As SmartParc is principally in development, our approach is less reliant on the EPC and meter datasets that are used to assess the other clusters. Instead, we have taken an approach of modelling the performance targets of the site, in reference to typical food manufacturing sites. This is informed principally by qualitative details shared by SmartParc directly.

What is clear from this analysis is that SmartParc has an extremely efficient approach to energy through shared infrastructure and electrification. This acts to lower, if not quite eliminate, the use of gas and other fossil fuels.

Transport remains an area where SmartParc is less advanced. The site has significant HGV usage and does not yet have any eHGV charging facilities. It is well placed to lead on a strategic approach for its supply chains.

5.2.1. SmartParc's approach to energy

SmartParc has an innovative approach to energy use that is specifically tailored to the food industry. This has been designed with a centralised energy model for the whole site, where energy is procured through SmartParc directly for all tenants and is intended to significantly lower energy costs. SmartParc estimates savings of 30% compared to conventional food manufacturing sites.

The core of the design is a dual loop heat network, providing both cold for refrigeration at -6 °C and heat for wash water, space heating and a source to make steam for cooking at 75-80 °C. These are provided to all units across the site through 11 km of pipes. This network is served by an energy centre fitted with ammonia heat pumps, avoiding the use of hydrofluorocarbons, which are potent greenhouse gases if leaked. A key operational challenge is balancing heat and cooling loads across tenants to maximise efficiency and avoid venting surplus heat.

Electricity is supplied across the site via a private wire network operating behind two electricity meters, allowing optimisation of energy flows between buildings. The site has a 41 MVA grid connection and around 4 MWp of rooftop solar, all feeding into a central, private substation and distributed across the network. There is currently no export capacity for the site and uncertainty over the availability of a future export connection. As a result, the system is designed to prioritise on-site consumption. Where generation exceeds demand, solar output can be curtailed.

The buildings themselves are built bespoke for the food industry and with energy efficiency in mind. The developer SEGRO delivers an enhanced shell, including provision for single-skin refrigeration, drainage and heavier equipment loads. The units also embed higher environmental standards, reaching BREEAM Excellent ratings.

Gas use on site is minimal. A dedicated steam loop was assessed as unviable due to the high losses and the lower efficiency of heat pumps at this temperature. Creation of steam from the hot water supply is likely the primary gas demand. Cooking processes that would typically rely on gas, such as ovens or hot oil fryers, are either not present or are electrified.

All parking spaces are ‘EV ready’, with 20% currently fitted with electric vehicle chargers and the rest having the connections laid for easy installation of chargers as demand grows. While the site has significant electrical capacity, SmartParc recognises that HGV electrification presents challenges due to high power requirements and short dwell times.

5.2.2. Energy analysis

As a new development, much of the site has not yet been built and what is occupied does not yet feature in the published datasets on subnational energy usage or energy performance of buildings that were used to model the other clusters. SmartParc also has an innovative approach to energy, as detailed above, which makes estimating potential demand directly using typical or average energy performance from the food production sector less relevant.

We have therefore modelled an indicative baseline using the site plan and estimates of typical energy usage that have been adjusted to take into account the unique features of the SmartParc approach to energy, as shown in Figure 31.

Our modelling indicates SmartParc will be almost fully electrified

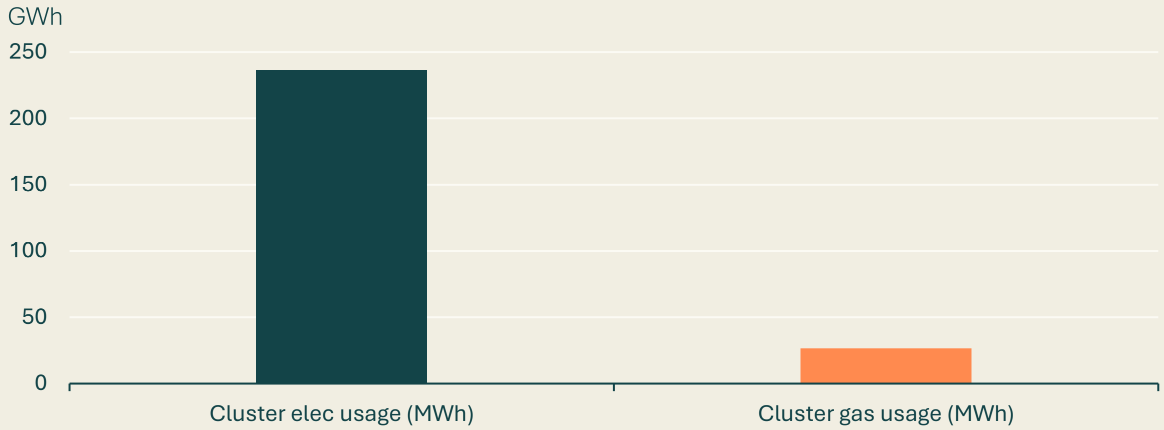

Figure 31: Modelled energy demand for SmartParc. UK Business Counts - local units by industry and employment size band, ONS, 2025; Energy consumption in the UK: End use data tables, DESNZ, 2025; Engagement with SmartParc Note: Energy consumption is based on the national average for food and drink manufacturing scaled to the number of units in SmartParc, then applying anticipated energy savings. It is assumed that 90% of energy demand will be met by electricity.

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The key design claim that has informed this indicative modelling is that energy usage will be 30% lower than typical food production sites. This is principally a result of the efficient dual heat loop system, which allows capturing of waste heat. We also assumed 10% gas usage, to correspond to the reported 'minimal' gas usage. They also indicate that the site will have 20% of its energy use from onsite renewables.

5.2.3. On-site power generation

The site has 4 MWp of solar PV generation on site. This will generate approximately 3.8 GWh per year.[51] This is less than 2% of our modelled electricity usage, which is far lower than their aim of generating 20% of their electricity usage on site. There will be opportunities to increase the installed solar PV, as the rest of the site is developed, though the size of installed PV was limited by the DNO's capacity. This is despite the connection not allowing export, meaning that power is automatically curtailed if generation exceeds on-site demand. There is an ambition to connect to the adjacent wind turbines at the Severn Trent Water site through a private wire to further boost the use of renewables at low cost.

[51] Approximate estimate based on ideal orientation and shading assumptions. Using the Photovoltaic Geographical Information System, European Commission Joint Research Centre, accessed February 2026.

5.2.4. Transport

SmartParc has a major distribution component to the site and the final site plan includes a shared distribution hub. We were not able to obtain data on the number of current HGV movements or projections for the completed site.

5.3. Decarbonising SmartParc

SmartParc is a new site that has been designed as an efficient user of low-carbon energy. There is little more to recommend that SmartParc can achieve, as it is leading the way on decarbonising the food sector. The remaining challenges are:

1. Allowing for greater usage of waste heat and renewables
2. Removing residual gas usage
3. Decarbonising transport

The first of these points is partially addressed by SmartParc's existing plans.

5.3.1. Cluster-specific data and engagement

We engaged SmartParc staff directly by email and through an unstructured interview. As the site is under development and has energy as a core component of the site design staff had considerable knowledge and expertise. They were able to provide site plans and modelling results for the final site, as well as having detailed understanding of the heat network system and the trade-offs and limitations around the approach SmartParc had taken.

5.3.2. Decarbonisation plans

The CCC pathway for the food and drink industry identifies electrification as the main route to decarbonising the sector, as shown in Figure 32. This approach has been embedded in the design of SmartParc, enabling efficiency through smart electrification tailored to the site's needs.

Electricity makes up 99% of energy use in the food and drink industry by 2050 in the 7th Carbon Budget balanced pathway scenario

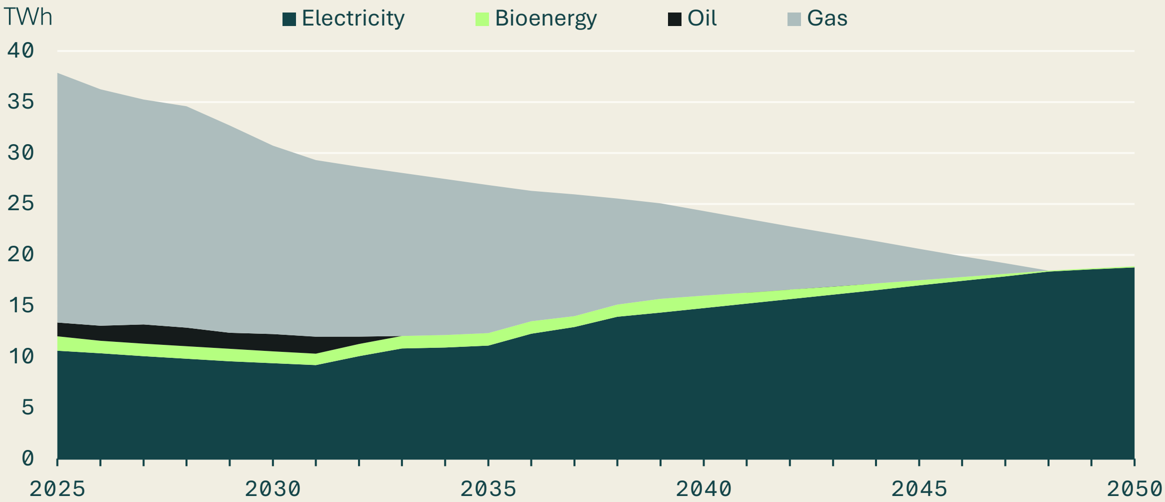

Figure 32: Food and drink pathway in the Seventh Carbon Budget Balanced Pathway
Source: The Seventh Carbon Budget, Climate Change Committee, 2025

Two options to improve the efficiency of the site further, which are still in development, are to enable greater usage of waste heat and on-site renewables. These are related issues; thermal storage, which will capture and use a greater proportion of waste heat, can also be used to store excess renewable generation. SmartParc are aiming to use thermal storage inherent in the heat network by reducing chilled water temperatures to absorb excess generation. This capability is in development, supported by software developed with Siemens and integrated into energy tariffs paid by tenants.

SmartParc is also in discussion with 1Energy on a future connection to a wider heat network, expected to go live in 2029. This could enable heat offtake by nearby users such as hospitals, schools and industrial sites. This allows the site to be a waste heat source, which will give it an additional source of revenue, while also mitigating the challenge of managing demand for heat and cold across the site.

The site is also exploring further renewable power options, including private wire arrangements with Severn Trent Water's neighbouring wind assets.

5.3.3. Removing residual gas usage

While the site has managed to electrify the vast majority of its energy use, there are some higher-temperature processes that still use gas. Part of this is an issue with current technology that may be resolved in the relatively near future; heat pump units are not currently capable of creating steam at scale at a cost effective efficiency . The SmartParc team were optimistic about this changing, as developments in heat pump technology for these types of usage is developing at pace.

There is also a possible running cost barrier if the unit price of electricity remains high, such that usage of electrified approaches is prohibitively expensive. By offering a lower unit rate for electricity on-site through a private wire network and use of on-site renewables, SmartParc's approach may be able to overcome this issue.

Another route could be to find alternative sources for fossil gas. There is particular potential for SmartParc to access biomethane, as there is already an anaerobic digestion facility on the neighbouring Sever Trent site. Regen's previous analysis of biomethane indicates that there will not be sufficient availability for widespread consumption and that it must be focussed on particularly valuable use cases, such as high-temperature industrial processes.[52] While it is unlikely that SmartParc's usage will come under this bracket in the long term, use of biomethane could mitigate the need for some electrification in the short term.

5.3.4. Electrification of HGVs

The electrification of HGVs at SmartParc is likely to increase electricity demand substantially. Without detailed knowledge of fleet numbers, average mileages and fleet profiles, it is difficult to quantify this growth. However, NGED's Distribution Future Energy Scenarios (DFES) have produced forecasts at 11 kV substation level. SmartParc sits across two Electricity Supply Areas (ESAs) – Spondon and Allenton.

The relevant forecasts from the DFES include changes in the capacity of: eHGV chargers (dedicated chargers for eHGVs at service stations), workplace chargers (parking for commuters at place of work) and fleet/depot chargers (charging for vehicles that return to a depot to park). We have reviewed the forecasts for these technologies under the Electric Engagement scenario, a scenario that focuses on electrification. It is unclear if the existing SmartParc buildings were included in these projections, and the sections that have not yet been built would not have been. We were unable to produce the same sensitivity analysis for the site as we did not have data on the volume or usage patterns on HGVs for the site.

[52] Making the most of biomethane, Regen September 2025.

Demand for chargers is forecast at 12.5 MW across the two ESAs

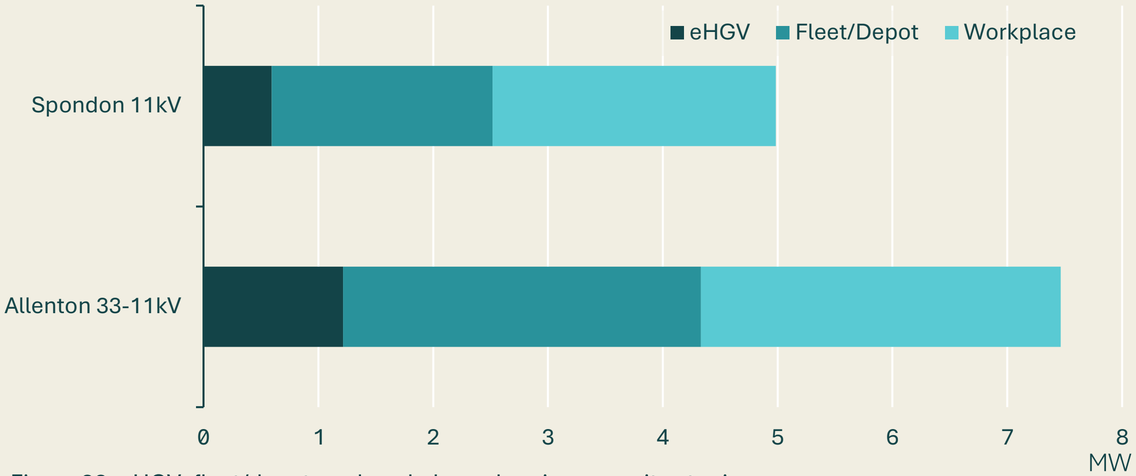

Figure 33: eHGV, fleet/depot, and workplace charging capacity at primary substations near Markham Vale. Distribution Future Energy Scenarios, NGED, 2025, electric engagement scenario.

5.4. Energy infrastructure

5.4.1. Electricity networks

According to direct engagement with SmartParc, the site has a single grid connection with a capacity of 41 MVA at 33 kV through Derby substation. This is bypassing the nearby 11 kV electricity supply areas that cover the SmartParc site. The demand headroom for these substations is less than half the rating of SmartParc's connection capacity. This connection prevents electricity demand from being a bottleneck to site development.

Unfortunately, SmartParc does not have a generation export connection to allow any export of excess solar PV generation. As well as the planned efforts to improve thermal storage, it may be worth exploring private wire connections to other electricity consumers, such as the Celanese factory in the centre of SmartParc, or the distribution hub to the south. On-site electrical storage could be considered, but against the potential for thermal storage through the existing heat network, this is unlikely to be the most economic choice.

SmartParc's connection is more than twice the generation headroom of nearby substations

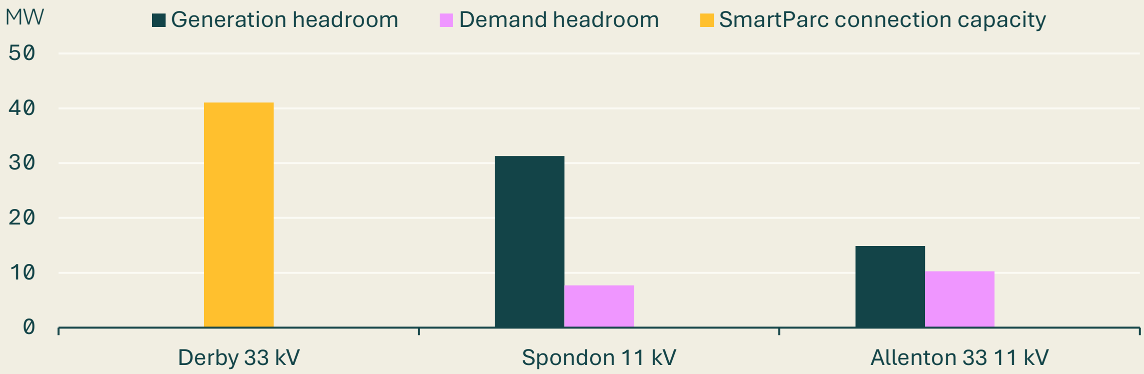

Figure 34: Headroom of primary substations near SmartParc and demand connection. Network Opportunity Map Headroom, National Grid Electricity Distribution 2025 and direct communication from SmartParc.

5.4.2. Hydrogen network

SmartParc has pursued electrification as the route to efficient, low-carbon energy design, in line with the CCC Balanced Pathway. The small volume of gas currently used onsite is viewed by operations staff as likely to be electrified as heat pump technology develops, as temperature and capacity limits increase. Additionally, the neighbouring anaerobic digestion plant offers an opportunity for replacing gas usage with biomethane in the near term, which is likely to be more cost-effective than hydrogen infrastructure.

Some staff at SmartParc expressed the personal view that hydrogen offered a more compelling proposition to decarbonise HGVs than electrification. This was due to the need for large grid connections to charge eHGV fleets. They commented that although SmartParc was likely to have a sufficiently large grid connection, many other sites are constrained. Unlike energy use associated with buildings, where a site is able to invest independently, decarbonising HGVs requires a strategic approach across sites.

Reviewing the evidence from the CCC and others in Section 3.3, our conclusion is that although these barriers to electrification are true, they are more easily surmountable than the barriers to the widespread use of hydrogen in HGVs. This requires a strategic approach to electrification of freight, regionally and nationally.

5.5. Next steps for SmartParc

SmartParc is a new and innovative site that is leading the way in low-carbon food manufacturing. It is a fantastic example for wider developments and show how energy costs and associated emissions can be reduced dramatically with investment in a bespoke, communal energy system focused on efficiency. Their first priority should be to share their story and any lessons learned as widely as possible, to encourage other developments to take similar steps.

The task of decarbonising SmartParc's buildings fully is dependent on removing the small amount of residual gas demand. Taking a cautious assumption that the high temperature heat pumps required to deliver this are only twice as efficient as current gas boilers results in a modest growth of overall electricity demand of just 6%, as shown in Figure 35. In reality heat pumps are likely to be able to achieve higher efficiency, even at high temperatures.[53] The key limitation to doing this is the availability of industrial heat pump technology at a low enough capital cost.

Eliminating gas from SmartParc would result in a modest increase to electricity consumption

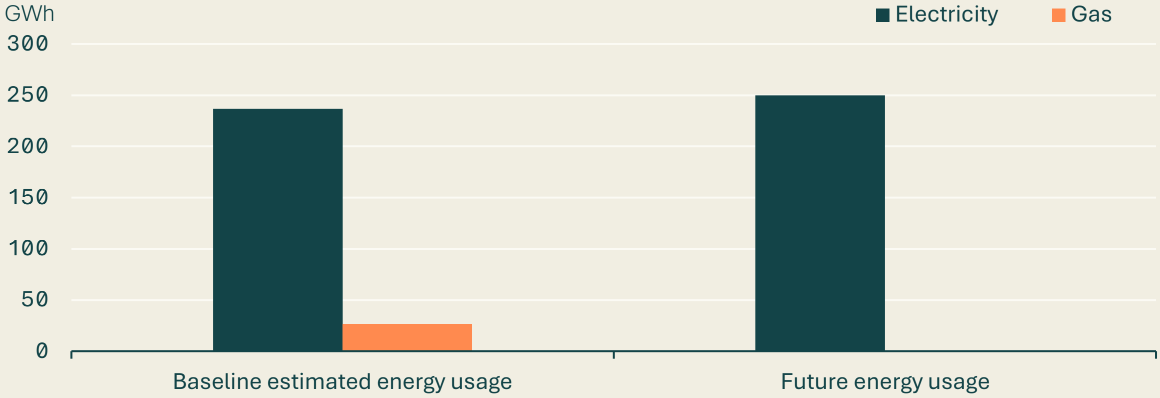

Figure 35: Note: we assume remaining gas usage is replaced with high temperature heat pumps with an average efficiency of double that of gas boilers.

HGVs using the site are the largest energy component that is not in line with the needs of the energy transition. SmartParc is well positioned to extend its leadership into the decarbonisation of freight. We encourage them to develop a strategy that reviews the options for decarbonising HGVs for their tenants and outlines a roadmap for doing so most cost-effectively.

The remaining challenges on site were highlighted by SmartParc staff themselves, with many solutions in development. We encourage SmartParc to continue to push the boundaries of

[53] HotGreen Solutions indicate their technology is 4 times as efficient as a gas boiler, but is not yet commercially available. Accessed March 2026.

efficient, low-carbon energy use on site, particularly the opportunities of maximising thermal storage within the dual loop heat network to minimise PV curtailment. There are also similar benefits to be gained through the partnerships SmartParc are developing with its neighbours, such as supplying a wider heat network with 1Energy, connecting to renewables on the Severn Trent Water site and investigating opportunities with the neighbouring logistics hub.

Top 3 priorities for SmartParc

1. Find ways to share the innovative energy approach more widely
2. Develop a roadmap to decarbonise HGVs
3. Continue to push the boundaries of efficient energy use, particularly through flexibility and collaboration.

Section 6:

Space City

Space City is a collection of technical, research and educational facilities with a focus on space. Located in the centre of Leicester, it includes the National Space Centre and facilities owned by both Leicester City Council and the University of Leicester.

6.1. Cluster profile

Space City is a major innovation and enterprise cluster on the northern edge of Leicester city centre and forms part of the Loughborough and Leicester Science and Innovation Enterprise Zone. The cluster is built around a partnership between Leicester City Council, the University of Leicester, and regional economic bodies.[54]

Space City brings together complementary facilities with a focus on space science, high-tech R&D, manufacturing and business incubation. Space Park Leicester is an innovation campus led by the University of Leicester. It hosts advanced laboratories, cleanrooms, data infrastructure and office space for space research, satellite engineering, Earth observation and related technologies. Key tenants include government agencies, major aerospace firms and university researchers.

The Dock, made up of five buildings, provides flexible workspace and light industrial units tailored to high-tech, low-carbon and knowledge economy businesses. These spaces serve both downstream parts of the space sector (such as tech developers, data companies, and specialist manufacturers) and other innovative firms working in sustainability and advanced engineering. Buildings 3 to 5 are the latest part of Dock and were opened in 2024; previous phases were developed in the early 2010s and 2021.

The National Space Centre is an iconic visitor attraction, education and outreach venue that anchors the cluster culturally and publicly. While its primary role is as a science museum and educational resource, its placement within Space City lends broader visibility to Leicester's specialised technology ecosystem and helps support talent development and public engagement with science and engineering.

[54] Space City, accessed February 2026.

6.1.1. Major employers and sectors

Space City hosts a mix of research, innovation, production and commercialisation activities. Space Park Leicester draws on decades of academic research and international collaboration, including space missions and satellite programmes. The Dock units nurture start-ups, small high-growth firms and scale-ups, providing them with affordable, flexible space and opportunities to integrate with the wider space and tech ecosystem.

The reported employee data supports this qualitative description. The largest sector by headcount is 'information and communication', followed by 'professional, scientific and technical'. Together these represent 57% of staff. 'Arts, entertainment and recreation' is next, which exclusively consists of staff at the National Space Centre. 'Manufacturing' represents just 15% of staff, though it should be noted that precise classification for these innovation sites is difficult. These values are shown in Figure 36.

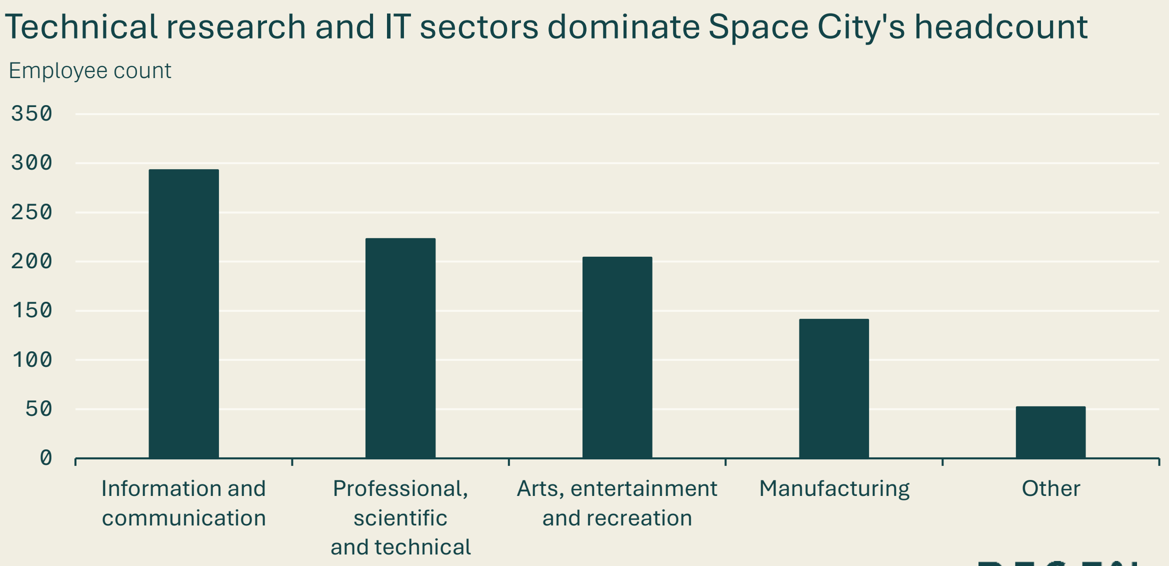

Figure 36: Employee counts by business from direct engagement with Space City staff. Reported sector mapped to SIC classifications.

6.2. Current energy profile

Space City is predominantly an electrified site with high energy efficiency and a high penetration of embedded renewables. The National Space Centre needs the most investment to match the high performance of the rest of the site and become ready for net zero. Energy details of this site are based on supplied consumption data, which greatly improves accuracy and reveals around 1 MWh of annual gas usage. Our analysis indicates that all other energy demands from the existing buildings are electrified.

6.2.1. EPC analysis

EPC analysis shows that the five parts of Dock and the Space Park are all entirely off-gas and achieve EPC band B or above. Our engagement shows that these buildings are all heated through heat pumps, have high fabric efficiency and solar PV arrays on the roof. The Dock 3-5 development has also achieved the UK Green Building Council Net Zero Carbon Buildings Framework. These buildings are net-zero ready.

The National Space Centre contrasts with this trend. It is a more typical development, has gas-fuelled heating, and is around 20 years older than the other sites. Retrofit measures to electrify this heating system represents the main remaining task for decarbonising energy use across these buildings.

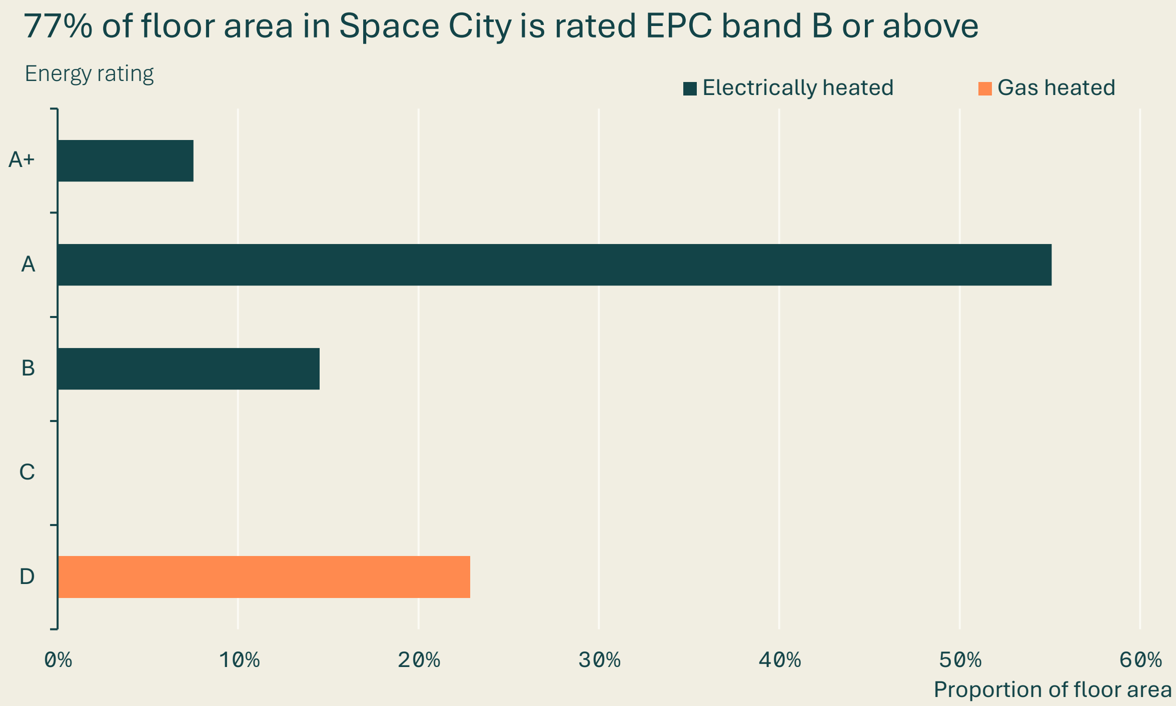

Figure 37: Energy performance certificate rating and main heating fuel by floor area. Energy performance of buildings England & Wales, MHCLG, accessed February 2026.

6.2.2. Sectoral analysis

Applying median energy usage values per employee by sector allows us to estimate energy usage by category. This would indicate that the 15% of employees engaged in on-site manufacturing are responsible for 80% of the energy use. This is unlikely to be the case, as the specialist, small-scale manufacturing at Space City is likely to be significantly less energy-intensive per employee than typical manufacturing processes. A better measure for the manufacturing is likely to be the median energy usage values per employee for the ‘professional, scientific and technical’ sector, as it has more in common with R&D than the manufacturing sector. Using this value gives the data shown in Figure 38.

This analysis results in a total annual energy consumption of 5.1 GWh across sectors. This is very likely to be an overestimate, due to the higher than typical energy performance of the Space City buildings and large amount of onsite solar PV.

'Arts, entertainment and recreation' has the highest energy use by sector, due to the National Space Centre.

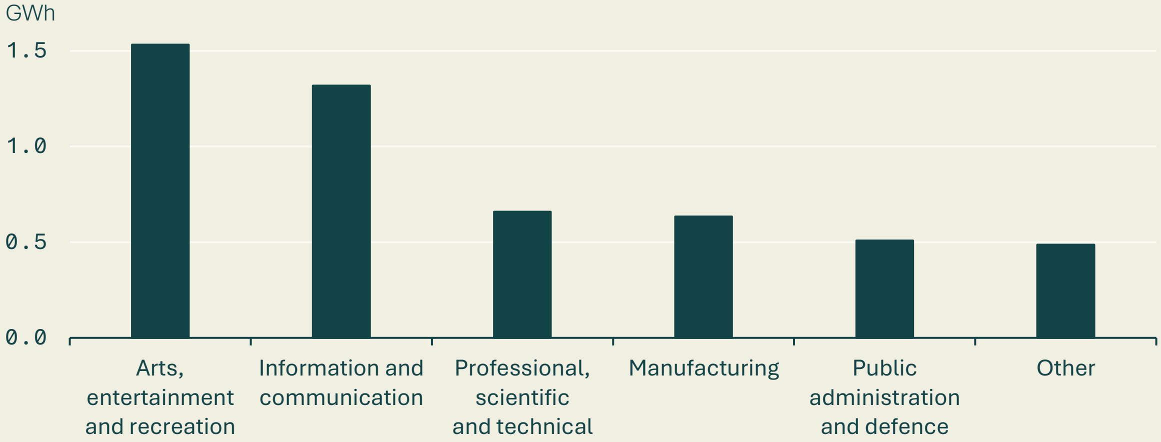

Figure 38: Modelled energy use by sector at Space City. UK Business Counts - local units by industry and employment size band, ONS, 2025; Energy consumption by industry, ONS, 2025

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6.2.3. Metered energy use

Combining the reported energy consumption with allocations from subnational metered energy usage for the area gives energy estimates for gas and electricity, as shown in Figure 39. This results in an overall metered energy usage of 2.6 GWh, which is around half of the value from the sectoral analysis. This aligns with expectations of the higher-than-average energy performance of most of Space City.

Space City uses significantly more electricity than gas

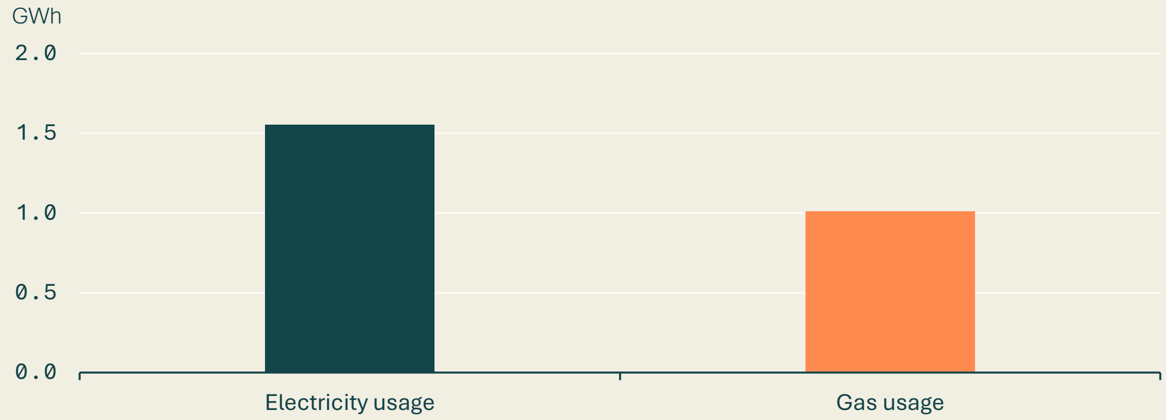

Figure 39: UK Business Counts - local units by industry and employment size band, ONS, 2025; MSOA non-domestic electricity 2010 to 2024, MSOA non-domestic gas 2010 to 2024, DESNZ, 2025. Directly reported consumption from the NSC.

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6.2.4. On-site power generation

Analysis of satellite images indicates that Space Park has around 85 kWp of installed solar PV and Dock 1-5 has approximately 205 kWp.[55] We estimate this could generate around 300 MWh of electricity, a significant portion of the estimated electricity demand for these buildings.[56] The seasonality of solar generation and heat demand may mean that there are times of high export. Electricity use of each site is independent, so there is an opportunity for a microgrid to allow self-consumption across the cluster, which could be advantageous to both the buyer and seller.

6.3. Decarbonising Space City

Space City is well on its way to being a low-carbon site. Most buildings are already off-gas, and the industrial processes identified in this research are principally electrical equipment related to clean rooms and other research equipment.

Electrifying the heating for the Space Centre is the most impactful action for decarbonising the site. Any further development of the cluster should follow the high standards of energy efficiency and electrification used in the existing premises.

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[55] Counted 286 panels on Space Park and assume 350W per panel, based on age. Counted 512 panels on Dock 1-5 at 400 W per panel, based on age of installation.

[56] Approximate estimate based on ideal orientation and shading assumptions. Using the Photovoltaic Geographical Information System, European Commission Joint Research Centre, accessed February 2026.

Transport is likely to be a big source of emissions for the site, especially for visitors to the Space Centre, as well as commuting to the site as a whole. Analysis of this aspect of energy use is out of scope of this project, but investments in active travel facilities and public transport should form the backbone of this strategy for a city centre location, with support for electrification of private vehicles also playing a role through workplace and visitor charging provision.

6.3.1. Decarbonisation plans

All Dock and Space Park sites have been built off-gas, with rooftop PV and to high thermal performance. These buildings are exemplars of net-zero energy performance for new buildings and can be considered to be sufficient for net-zero. These sites therefore have no further decarbonisation plans.

The National Space Centre uses gas for heating and hot water, no PV and an EPC rating of D. Engagement with the centre's operations staff indicated a net zero target of 2040 and informal plans to achieve this through replacement of gas boilers with an air source heat pump, as well as installing rooftop PV.

6.3.2. Known development projects

Space City is a progressive multi-stage development. Following the recent opening of the last stages of Dock, there are further development plans in progress, with two mentioned specifically by Space City.

The 'Exploration Drive Development' received outline planning permission in February 2024. Submitted plans proposed three new buildings on the former Abbey Court site, offering 6,000 m^2 of space for offices, R&D and industrial processes.[57] The planning proposal aims that an "exemplar construction approach will be adopted utilising low energy, low carbon and climate-adapted design principles". It also commits to electric-only energy use, in the absence of a district heat connection, with a preference towards heat pumps.[58] The Space City website indicates this is due to be completed in 2026.[59]

The 'Digital Space Futures development' is planned to the north of the current Space Park and was set out as phase three of the outline planning permission for the rest of the Space Park.[60] This would provide a state-of-the-art test and manufacturing facility, including 5,000 m^2 of space for small satellite production and testing focused on affordable, high-quality space technology development. The energy statement of this plan defines high energy performance

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[57] Planning application 20231046, Leicester City Council, February 2024.

[58] Outline Application, Abbey Court, Design & Access Statement, SGP, June 2023, Section 5.2.

[59] Space City, accessed February 2026.

[60] Planning application 20182094, Leicester City Council, July 2019.

with heat pumps and PV.[61] We do not have a target date for this development, but the outline planning permission requires certain approvals before phase three can commence, which we cannot find evidence of on Leicester City Council's planning register.

6.4. Energy infrastructure

6.4.1. Electricity networks

There is little further electrification need from the current buildings, as they are mostly fully electrified. Additional network demands will come from electrifying the National Space Centre's heating, new developments and potentially further EV charging for staff and visitors. The relevant ESAs for the site are mapped in Figure 40 and their headroom values for each one shown in Figure 41, with total demand headroom of 21.6 MW. This represents significant headroom that is unlikely to restrict these requirements.

An approximate analysis of gas usage for the National Space Centre for January 2025 indicates that the required electrical connection to provide the same heat would be less than 0.5 MW, well within the headroom of either substation.[62]

The new developments will require significant grid connections, but these will very likely be within the available headroom of the Lero 33 substation too. Moreover, it is possible that their connections have already been contracted and therefore accounted for within the headroom values.

There is also considerable generation headroom across the site, indicating that export constraints are unlikely to be a barrier for installations of PV.

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[61] Energy Statement, WYG, July 2018.

[62] Assumes boiler efficiency of 90%, heat pump COP of 3, gas usage in January spread equally over all days when open and 10 heating hours per day.

Figure 40: Space City industrial cluster and surrounding primary and secondary substations. Network Opportunity Map Headroom, East Midlands Primary, National Grid Electricity Distribution 2025; Map data from OpenStreetMap.

Substations near Space City have substantial capacity for new generation and demand

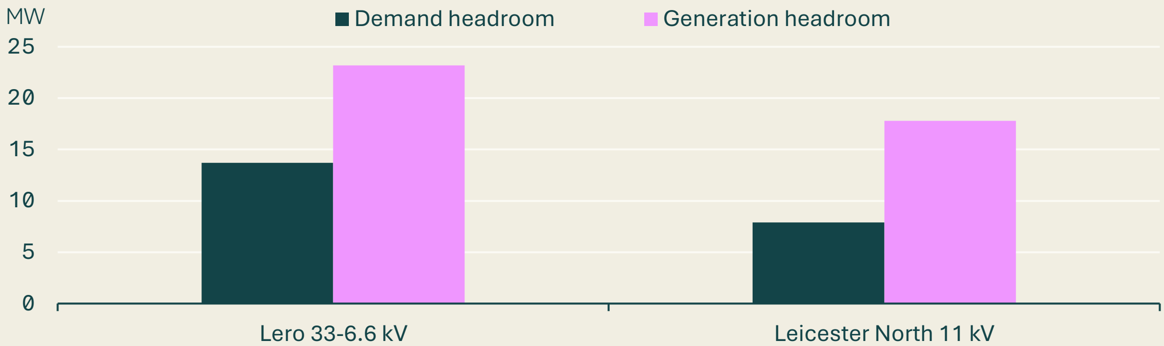

Figure 41: Headroom of primary substations near Space City. Network Opportunity Map Headroom, National Grid Electricity Distribution 2025
Note: The Space City cluster may still face constraints at the secondary substation level.

6.4.2. Hydrogen network

Space City is almost entirely electrified already, with plans for further developments to follow this pattern. The proposed hydrogen network illustrated in Figure 15 also indicates that it will not enter the City of Leicester. Hydrogen is therefore unlikely to be available or of value at Space City.

6.5. **Next steps for Space City**

Space City is a developing R&D hub in the centre of Leicester. The buildings have generally been built to extremely high standards of energy efficiency, along with electrified heating and large PV installations. These are exemplars for other similar developments. The exception to this is the National Space Centre, which is an older gas-heated building. The main priority for Space City in the transition to net zero is to electrify the heating of this building, along with any cost-effective fabric improvements and renewable installations to improve efficiency alongside this.

Making this change would fully electrify the buildings across Space City, as shown in Figure 42. Even taking fairly pessimistic assumptions about the relative efficiency of heat pumps to gas boilers this results in a significantly lower overall energy requirement. Our engagement with the National Space Centre highlighted that finding the investment to make this upgrade was the barrier to doing this. As a charity, their funds were limited and it would likely require some degree of external funding.

Electrifying the National Space Centre's heating is the key task to decarboniseSpace City

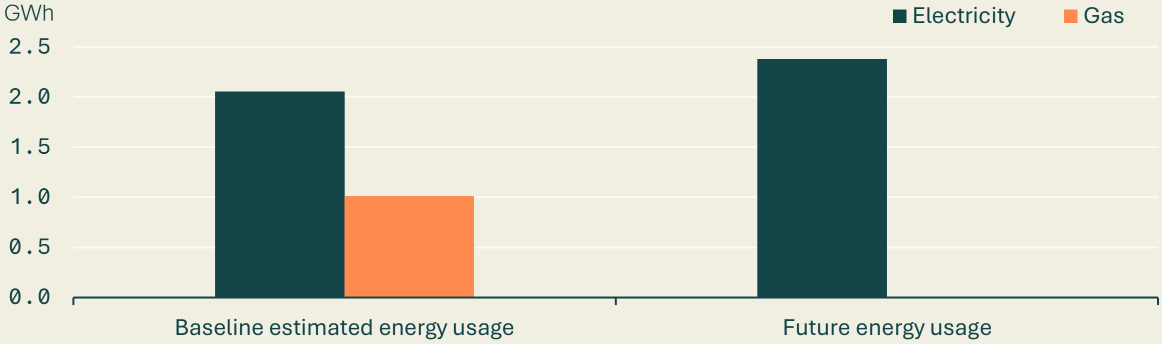

Figure 42: Current and future anticipated energy demand for Space City. Gas boilers are assumed to operate at 90% efficiency, and to be replaced with a heat pump operating at a COP of 2.8. These are pessimistic assumptions, leading to an upper estimate.

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Space City also has developments in planning and these follow the example of the existing buildings in terms of energy use, with no gas heating . This must be followed through on for these and any further developments. Reducing the embodied carbon and support of active and public transport through these developments would also offer opportunities to reduce the site's carbon emissions.

Top 3 priorities for Space City

1. Electrify gas heating at the National Space Centre
2. Ensure all new developments are fully electrified and efficient, as proposed
3. Commission a study to understand how to minimise transport emissions

Section 7:

Mira Tech Park

Mira Tech Park is a hub for innovation and research in south-west Leicestershire with a focus on transport and mobility. It is owned and managed by Horiba Mira, who have their own dedicated facilities alongside tenanted space.

7.1. Cluster profile

Mira Tech Park is a technology park focused on advanced automotive R&D. It hosts the UK headquarters of Horiba Mira, an automotive engineering company, which represents 32% of the current site by headcount. The site was made an Enterprise Zone in 2015, offering tax and development incentives, in order to encourage growth and development.[63]

The Mira site is under extensive development. The existing site is 650,000 sq ft of floor area within 750 acres, which also includes extensive test tracks and other automotive test facilities. There is a development project underway around the north site to create 1.2 million sq ft of floor area. This work is underway with the first buildings completed in February 2025 and the second buildings in February 2026, adding 72,000 and 34,000 sq ft respectively.[64]

Mira was also granted planning permission to build an advanced manufacturing campus to the south of the existing site in February 2024.[65] This proposal includes 2.3 million sq ft of floor area across seven new units and extends the site from a focus on R&D into advanced manufacturing.

7.1.1. Major employers and sectors

The site pitches itself as a global hub for disruptive technology, dedicated to innovation. Mobility innovation is the centrepiece of this, with wider sectors spanning clean energy, cybersecurity, and defence. Horiba Mira represent around a third of the site's current headcount, with 54 tenants making up the rest of the site. These include car manufacturers,

[63] Government drives forward development at MIRA Enterprise Zone, MHCLG, February 2015.

[64] Completion of plot 9, Mira Tech Park, February 2025.
Completion of plot 44, Mira Tech Park, February 2026.

[65] Planning application record: PAP/2022/0423, North Warwickshire Borough Council, December 2025.

such as Toyota, Jaguar Land Rover and Polestar, as well as automotive supply chain companies, such as Bosch and Warwick Acoustics Ltd.[66] The current focus of the site is R&D and testing of hardware, but the development programme is aiming to create an extension to host manufacturing facilities.[67]

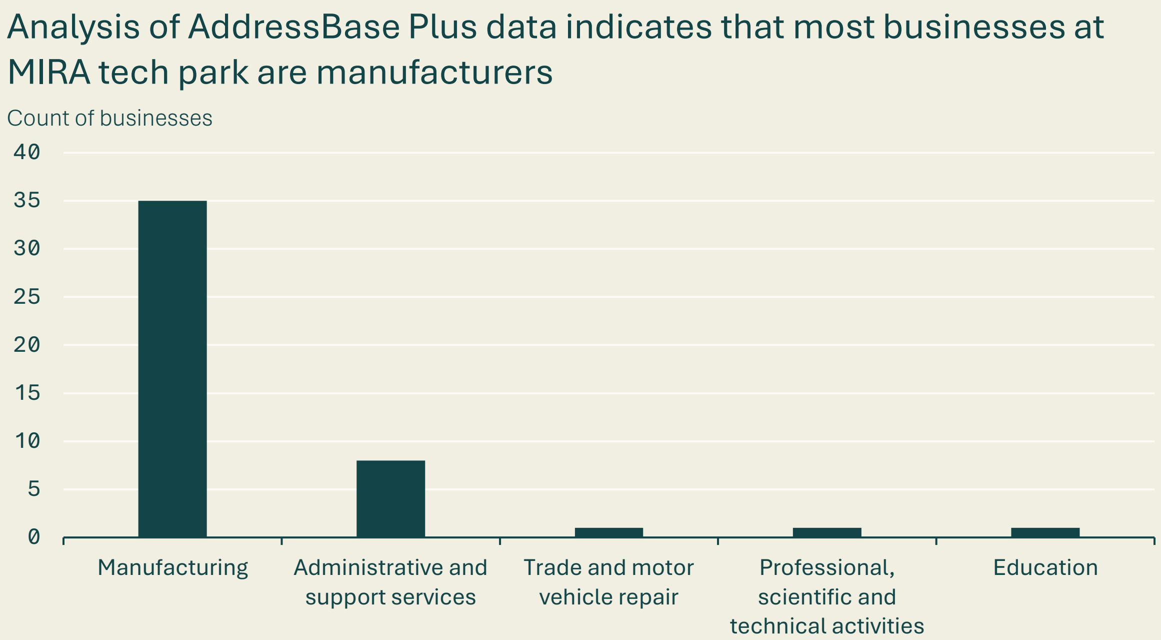

Figure 43: Analysis of businesses at MIRA tech park based on AddressBase classification. AddressBase Plus, Ordnance Survey, accessed 2025

The sector was identified by mapping to AddressBase Plus data for each site, using the classification field.[68] This indicated that 76% of buildings were engaged in manufacturing. This is much higher than the indication from our engagement, which was that the current sites are focused on R&D and testing, with limited capacity for prototype manufacturing.

7.1.2. Cluster-specific data and engagement

Engagement with the cluster was directly through the site management. They were able to provide some site plans and development detail, as well as some summary energy data such as details of the on-site solar PV array. We did not receive data on the activity of each business on site, which would have improved the accuracy of our analysis. Planning documents proved invaluable to assessing aspects of the new developments that are underway.

[66] Council gives go-ahead for £300m expansion of MIRA site, North Warwickshire Borough Council, February 2024.

[67] Council Resolve to Approve MIRA Tech Park's South Site Expansion, Mira Tech Park February 2024.

[68] AddressBase Plus, Ordnance Survey, accessed 2025.

7.2. **Current energy profile**

Understanding the site's energy use requires analysing a range of data sources together. EPC data indicates that Mira Tech Park has a high proportion of off-gas grid buildings, with many heated by LPG and Oil. Analysis of energy use by sector is challenging, as the SIC data indicates that almost all of the site is engaged in manufacturing, which is refuted by our engagement. This results in a very wide range of energy demand estimates, as manufacturing has a much higher average energy intensity than other applicable sectors.

Attribution of subnational demand data is likely to give a more accurate estimate for gas and electricity consumption. We can make a projection of LPG and oil usage from the gas consumption, based on the floor area heated by oil, LPG and gas from the EPC analysis. This leads to an overall energy use for the site of 18.5 GWh, predominantly from the direct combustion of fossil fuels.

7.2.1. EPC analysis

Analysis of EPC data for Mira shows that there is a diverse use of heating fuels, with 57% of buildings with a lodged EPC using fossil fuel heating. The off-gas postcode register shows that many of the neighbouring postcodes have no gas network connections.[69] This likely means that only some parts of the 750 acre site have access to the gas network, with almost a third of buildings with EPCs using oil and LPG as their main heating fuel. Converting these to electric heat pumps offers a significant opportunity to reduce emissions from the site, as well as avoiding the volatile costs of non-networked fossil fuels. Engagement with Mira indicated that they have a plan to do this over the coming years.

[69] Off Gas Postcode Register, Xoserve, March 2025.

Most units are off the gas grid with a wide array of fuels

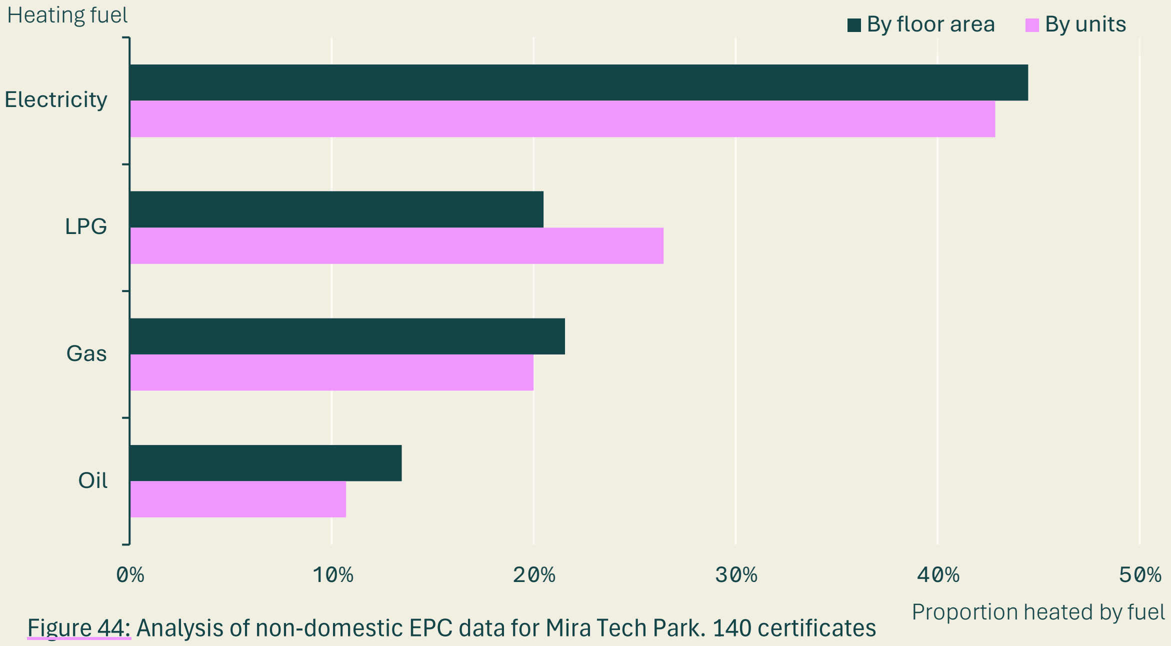

Figure 44: Analysis of non-domestic EPC data for Mira Tech Park. 140 certificates retrieved. Energy performance of buildings England & Wales, MHCLG, accessed February 2026

7.2.2. Sectoral analysis

As discussed in Section 7.1.1, our engagement conflicted with the SIC analysis, indicating that the bulk of the current site is engaged in R&D with a small degree of prototype manufacturing. In contrast, the SIC analysis classed 76% of units as engaged in manufacturing. The average energy intensity per employee for manufacturing is over 40 times higher than other relevant sectors, so the model is highly sensitive to the proportion of manufacturing jobs assumed.

We outlined a similar challenge for Space City in Section 6.2.2. In that case, it was clear that any manufacturing on-site was likely to be more similar to R&D than typical manufacturing in terms of energy intensity per employee. We therefore modelled the energy use associated with employees classed as within manufacturing as the same as those within the ‘professional, scientific and technical’ sector. Applying this assumption to Mira Tech Park gave a total annual energy usage of 7.9 GWh, which was still dominated by businesses classed by SIC as manufacturing.[70]

This is likely to be an under estimate, as Mira Tech Park is engaged in some prototype manufacturing and operates several high-energy-consuming test facilities. Following the SIC

[70] Regen analysis of UK Business Counts - local units by industry and employment size band, ONS, 2025; Energy consumption by industry, ONS, 2025.

classifications without this modification would result in an estimate of 175 GWh, which is clearly a significant overestimate.

7.2.3. Metered energy use

Gas and electricity consumption data shows that electricity usage is higher than gas, as shown in Figure 45. This chimes with the low proportion of gas heating across the site and higher degree of electric heating shown in the EPC data. Another cause for higher electricity usage are the site's four testing facilities with MW-scale power demands. These are: two climatic wind tunnels, a passive safety crash lab and a VI-grade motion simulator.[71]

Self-consumption of on-site generation is not shown in this electricity demand data. The data covers the period February 2024 to January 2025.[72] Seeing as the site's PV array was energised in September 2025, this should not affect these statistics.[73]

Oil and LPG data are not available at this resolution. This means that this dataset is missing a large proportion of energy consumption from buildings across the existing site, as shown from the EPC analysis. By using the relative proportion of floor area of gas, LPG and oil-heated buildings from the EPC analysis in Figure 44, we can estimate this missing energy demand. This assumes that LPG and oil-heated buildings onsite have similar usage and efficiency to gas-heated buildings. This results in an estimated 4.7 GWh of LPG demand and 2.6 GWh of oil, resulting in total annual energy demand of 18.5 GWh. Less than a third of this total is from electricity, the rest is from the direct combustion of fossil fuels.

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[71] Direct correspondence with Mira tech park.

[72] Subnational electricity consumption data 2010-2024, DESNZ, December 2025.

[73] MIRA Tech Park Powers Ahead with 7MW Solar Array Energisation, Mira tech Park, September 2025.

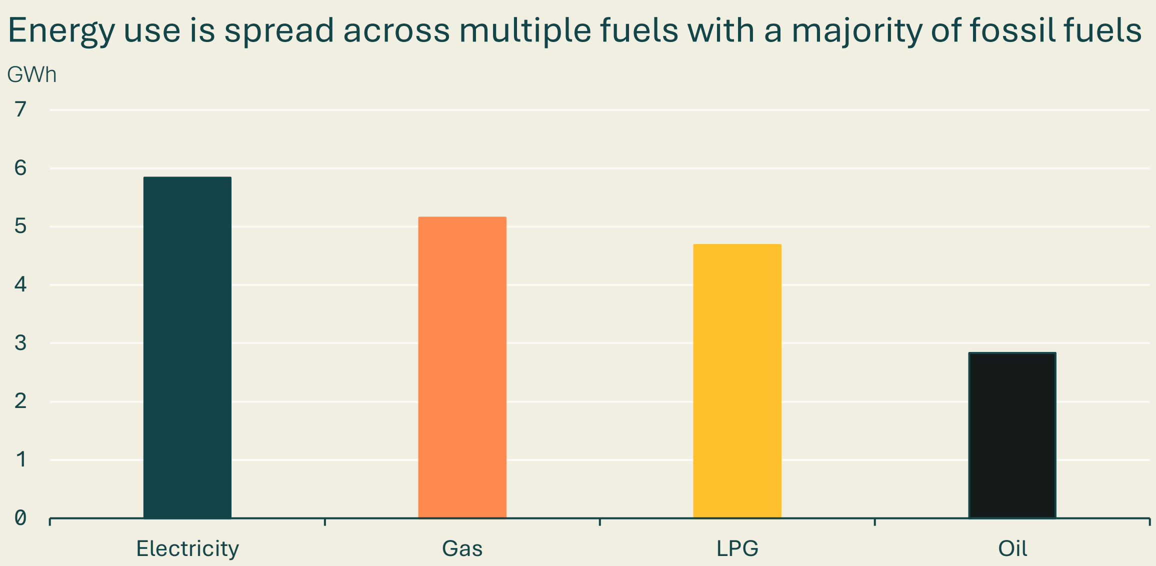

Figure 45: UK Business Counts - local units by industry and employment size band, ONS, 2025; MSOA non-domestic electricity 2010 to 2024, MSOA non-domestic gas 2010 to 2024, DESNZ, 2025. LPG and oil are projected from gas demand using the portion of floor area on site heated by each of those fuels, from EPC analysis.

7.2.4. On-site power generation

The site has a 7 MWp solar array on-site, which will generate approximately 5.2 GWh per year.[74] This is comparable to the site's current electricity demand, which would result in a high degree of export or curtailment during sunny periods. However, expansion plans will increase electricity demand significantly and likely result in a larger degree of self-consumption.

7.3. Decarbonising Mira Tech Park

7.3.1. Decarbonisation plans of existing sites

Mira Tech Park aims to reach net zero for Scope 1 and 2 emissions by 2030, and for Scope 3 by 2040.[75] Achieving this will require eliminating the use of oil, gas and LPG for heating across the site by 2030. This could be done through electrification, predominantly through heat pumps, with accompanying fabric efficiency measures where cost-effective.

[74] MIRA Tech Park Powers Ahead with 7 MW Solar Array Energisation, Mira Tech Park, September 2025.

[75] Sustainability, Mira Tech Park, accessed February 2026.

7.3.2. Known development projects

Mira Tech Park is in the middle of a major expansion, from a baseline of 650,000 sq ft of floor area at the beginning of 2025 to over four million sq ft when the south extension is completed. Figure 46 shows an aerial view of the site with each phase marked and the planned developments indicated. This means that the bulk of energy use at the site will be from buildings that have not yet been built. The design of these buildings is therefore critical to managing the energy demand and emissions of the site.

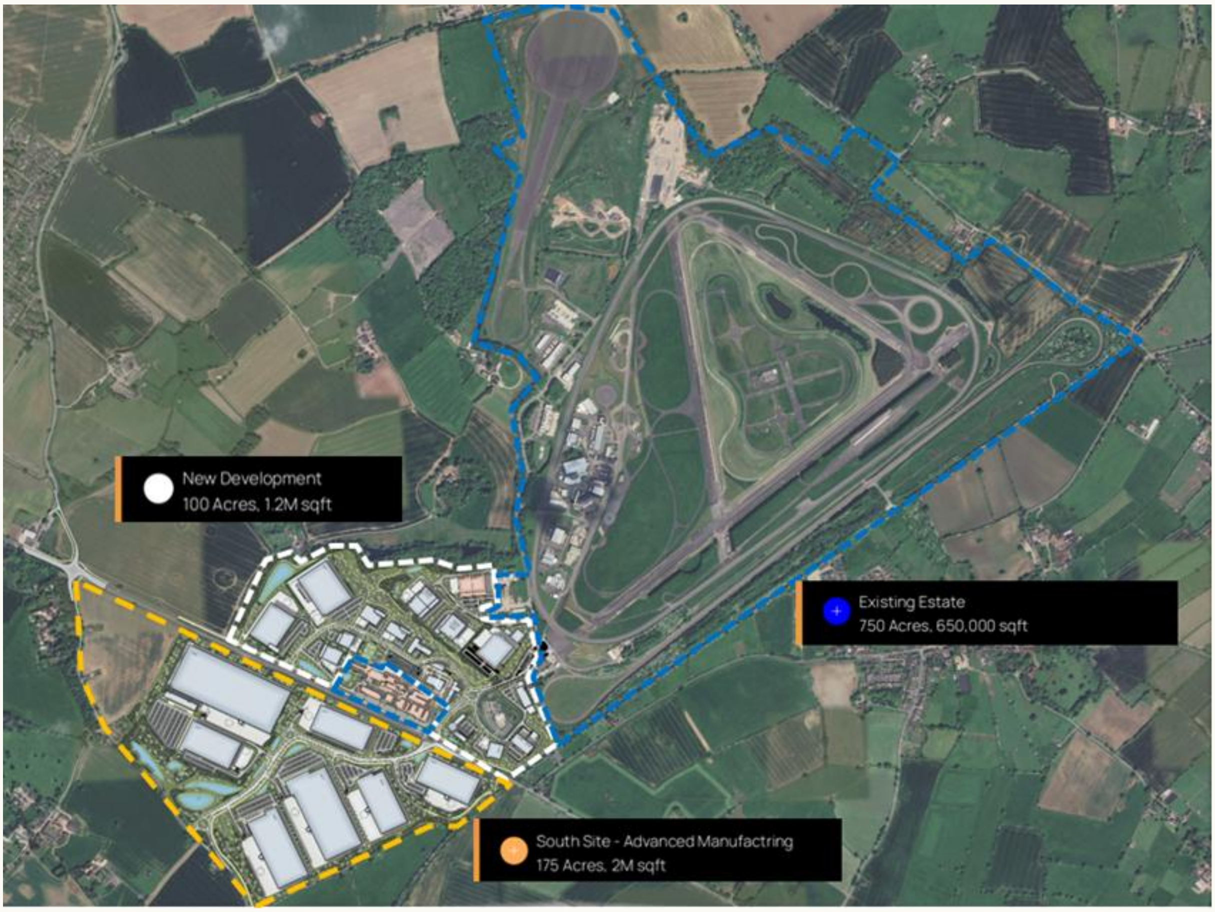

Figure 46: Aerial view of Mira Tech Park with development projects added and the three phases marked. Provided directly by Mira Tech Park staff.

The Design and Access Statement for the south site's planning permission outlines the sustainability strategy.[76] This outlines that all buildings should target EPC A and BREEAM 'very good ratings and indicates that PV should generate at least 10% of onsite energy use. For heating, it discusses a gas-fired combined heat and power plant feeding a heat network. It does not recommend this option, indicating that it is unlikely to reduce emissions intensity compared to gas.

[76] Mira Tech Park South Site Design and Access Statement, SGP, August 2022.

The approach of this strategy reflects that it is now over 3.5 years old; the context for heating has evolved significantly over that time. The average grid intensity of the GB electricity grid was 8% lower in 2025 than the lowest assumption in the strategy, and this value is expected to continue to fall.[77] There is also a clearer view that heating will be decarbonised through electricity, with the CCC's latest report being clear that electrification will be the way to decarbonise buildings.[78] Engagement with Mira indicated that all of these sites will be fully electrified.

7.4. Energy infrastructure

7.4.1. Electricity Network

Mira Tech Park is at the intersection of three electricity supply areas (ESAs), as shown in Figure 47. Headroom data for the Atherstone substation is missing from the NGED dataset. None of the primary substations associated with these areas are near to the cluster itself.

There is an additional substation, 'Wood Lane', which is near the site entrance and not linked to an ESA. It seems likely that this substation is for the principal use of the technology park. Wood Lane has almost 10 MW of headroom available, as shown in Figure 48. It is unclear as to whether the contracted demand headroom figures already include the proposed development plans.

There is no available generation headroom available to Mira, according to these data. This indicates that any additional solar capacity within the new developments must be for self-consumption.

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[77] Sustainability Energy Strategy, Hoare Lea, August 2022. Gives the SAP 10.1 carbon factor as 0.136 kgCO2/kWh for all electric buildings.
Analysis: UK renewables enjoy record year in 2025 – but gas power still rises, Carbon Brief, January 2026. Gives the 0.126 kgCO2/kWh as the carbon intensity of the GB electricity grid in 2025.

[78] The Seventh Carbon Budget, CCC, February 2025. Section 7.9.2.

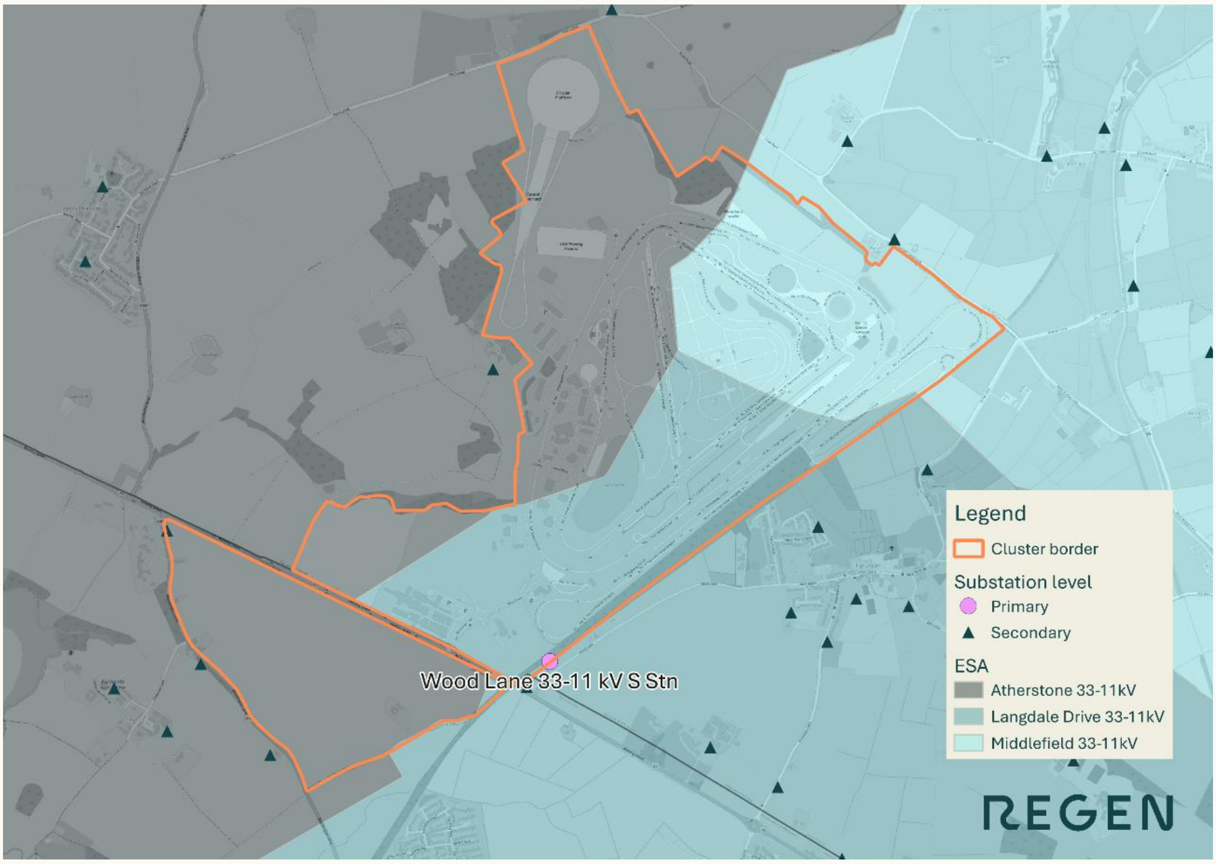

Figure 47: MIRA tech park industrial cluster and surrounding primary and secondary substations. Sources: Network Opportunity Map Headroom, East Midlands Primary, National Grid Electricity Distribution 2025; Map data from OpenStreetMap.

Substations near MIRA tech park have capacity for new demand, but not for new generation

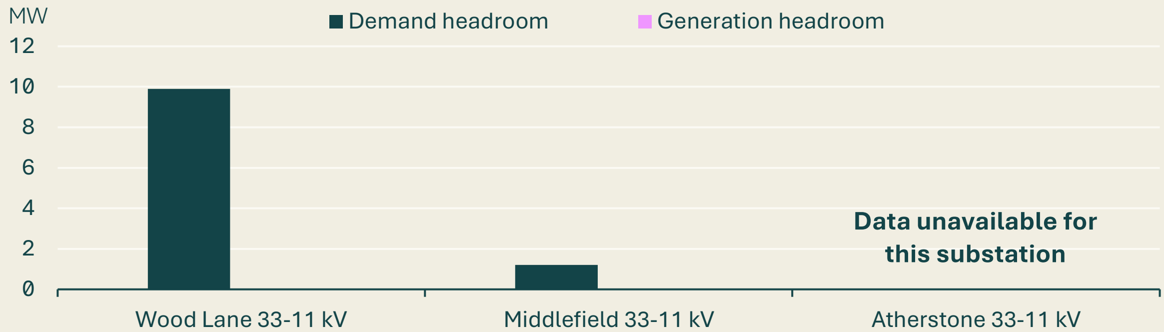

Figure 48: Headroom of primary substations near MIRA Tech Park. Network Opportunity Map Headroom, National Grid Electricity Distribution 2025.
Note: MIRA Tech Park may still face constraints at the secondary substation level.
Atherstone 33-11 kV substation data is missing from the NGED network opportunity map.

7.4.2. Hydrogen

Mira Tech Park is very far from the proposed routes of East Coast Hydrogen, as shown in the map in Figure 15. It is also partially off the existing gas grid, so is unlikely to get a hydrogen network connection in the future.

7.5. Next steps for Mira Tech Park

Mira Tech Park is near the beginning of a very significant development plan that will see the site grow substantially beyond its current building footprint. The emphasis must therefore be in ensuring that all new developments are all electric with high energy efficiency and PV where possible. Engagement with Mira Tech park indicates that they plan for all new buildings to be fossil free. Reducing the embodied carbon of these developments is also crucial for a site that supports the transition to net zero. This is out of scope of this report, but the BREEAM standard is recommended for assessing and minimising whole life carbon of buildings.

Unlike the other clusters we have studied, Mira's existing site has a wide range of fuels used for heating. According to EPC data, over half of buildings within the existing site use fossil fuel heating across mains gas, LPG and oil. These systems should be electrified, with particular focus on those using oil, which is the most carbon intensive, as well as having a more volatile cost basis.

Decarbonising MIRA tech park's existing estate will lead to a significant growth in electricity demand

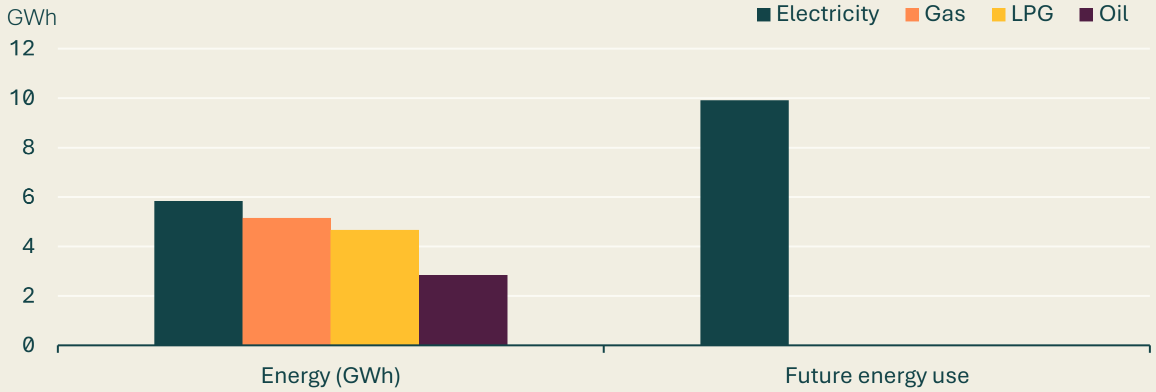

Figure 49: Current and future energy demand for the existing buildings within Mira Tech Park by fuel. Fossil fuel sources are assumed to operate at 90% efficiency, and to be replaced with a heat pump operating with a COP of 2.8. These are pessimistic assumptions leading to an upper bound estimate for electricity demand.

Applying approximate efficiency assumptions to the current energy demand estimates by fuel leads to a significant increase in electricity demand, reflecting the large number of buildings with fossil fuel heating, as shown in Figure 49. This highlights the importance of ensuring that heating systems are well designed and installed to ensure high efficiency is achieved. We have taken pessimistic assumptions on heat pump efficiency, which results in an upper estimate of overall electricity demand.

Top 3 priorities for Mira Tech Park

1. Ensure all new development are built with fully electrified energy systems.
2. Minimise the embodied carbon of new developments.
3. Electrify fossil fuel heating across the existing buildings, prioritising oil boilers.

Section 8:

Conclusions and next steps

This report has assessed and modelled the energy demands for four industrial clusters in the East Midlands, as well as the regional energy context and wider policy direction. The four clusters vary considerably in composition, but together they paint a picture of commercial activity across a range of sectors. This section brings together barriers and opportunities in the transition to net zero for these sites and other similar ones across the region.

Across the clusters studied, the predominant energy use identified is space heating and transport. Where evidence was available, industrial processes such as refrigeration, food processing and testing facilities are already largely electrified at the clusters. As a result, further decarbonisation is expected to occur primarily through further electrification of heat, electrification of transport, on-site renewable generation and storage, and enabling measures such as energy efficiency and flexibility.

The evidence suggests that none of the clusters studied are inherently unsuitable for electrification. Progress at scale will depend on sufficient electricity network capacity, competitive and well-functioning energy markets and coordinated infrastructure planning. This indicates that the transition is less constrained by technology and more by the challenges of aligning these systems.

8.1. Barriers and opportunities for clusters

Through our analysis, we have outlined several barriers to businesses and clusters decarbonising their operations.

8.1.1. Electricity connections

Electrification was found to form the backbone of decarbonising all of the clusters in this study, in alignment with the CCC Balanced Pathway for non-residential buildings and transport.[79] The electricity network is therefore a vital enabler to the transition. Connection constraints can limit the ability for businesses to grow, electrify demand and develop renewable generation. Ofgem have recognised this and is conducting reform of the demand connection process.[80]

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[79] The Seventh Carbon Budget, the Climate Change Committee, 2025.

[80] Demand connections reform, Ofgem, February 2026.

Organisations seeking to learn more about connections within the study area should start with National Grid Electricity Distribution's New to Connections page.

For businesses that are dealing with connection challenges now, there are a range of opportunities that can be explored to enable faster connections or to reduce costs. Finding the right solution for a specific site requires detailed modelling of the requirements and options, in the specific context of the network. Expert advice and engagement with the DNO will usually be required. Approaches to manage constraints may include:

- **Flexible connections**. When the network is constrained for demand connections, it may be possible to obtain a flexible connection. Flexible connections can offer a connection with the agreement that power may be turned off in periods of network stress. For most businesses the potential disruption from this sort of contract may not be economically acceptable, but a secondary option is a connection where interruptions will only occur if there is grid stress during pre-planned network maintenance.
- **Ramped connections** can also be offered, where the final connection capacity is ramped up over an agreed programme. This allows more localised infrastructure to be installed at high enough capacity in the immediate term, even while upstream capacity bottlenecks don't allow it to be used to its full potential immediately. While not releasing the demand immediately, it can offer greater certainty to both the business and the DNO, and ensure that investment plans are future-proofed.
- **Battery storage** can allow consumers to smooth their demand profile. If a site has a high peak demand relative to their typical demand, then this can be a particularly effective way to lower connection costs, as it can substantially reduce the size of import connection required. For sites with a flatter demand profile, there is less likely to be a benefit, other than increasing self-consumption of on-site solar generation.
- **On-site generation**. For new renewables, an export connection could be required, which, if constraints are present, can limit the potential generation capacity. A flexible connection can allow the business to install renewables as planned but limit the capacity of export from the site. This limit may be imposed at all times or vary at certain times. This may limit some of the potential economic gain from the renewable generation, but if self-consumption of power is the main benefit then it may still allow for development. This approach has been deployed by SmartParc to allow the installation of a significant volume of PV, but with a cut-out that prevents export if supply exceeds onsite demand.

8.1.2. Cost of electricity

The high relative cost of electricity compared to gas remains a structural barrier to electrification. For many use cases, the higher efficiency achieved through electrification does not necessarily lead to lower bills, due to the high unit cost of electricity as compared to gas.

This issue was cited by some of the businesses engaged with during the project as a barrier to business growth and electrification.

National policy reform is required to address this imbalance. However, at site level, opportunities to mitigate cost pressures include:

- Maximising onsite renewable generation for self-consumption
- Private wire arrangements within clusters and to external generators
- Shared energy infrastructure

Clusters that are able to reduce imported peak demand and increase self-consumption are likely to be more resilient to future price volatility.

8.1.3. Electrification of freight

For logistics-focused clusters, HGVs represent a significant proportion of total energy demand. Electrification of HGV fleets would materially increase electricity demand and peak load at these sites. This is challenging for a single cluster or organisation to tackle, as it requires a strategic approach across the logistics network. Clusters could develop a strategy based on the needs and constraints of their site. This should involve engagement with their wider supply chain to consider upstream and downstream logistics, as well as exploring potential collaboration with neighbouring sites.

8.1.4. Data availability

When encountered, we have highlighted in this report the shortcomings in the available data covering energy demand, EPCs, networks and business activity. Individual organisations will be able to use their energy bills or on-site metering to better understand their use, but our experience of asking for this information in the study is that this is impractical for wider studies of clusters or regions.

8.2. **Next steps**

The MNZH is well placed to coordinate, support and represent organisations across the region to reduce the barriers faced by clusters and accelerate the transition. We suggest six next steps for the hub to explore through Phase Two of this project and beyond, summarised below.

Supporting businesses with electricity connections

Waiting for connections delays investment. Organisations need support in navigating processes and products to access connections quickly. MNZH and partners could support communication between DNOs and organisations.

Building collaborative approaches to energy

There is significant potential to improve efficiency across and between clusters through collaboration. MNZH should develop clusters and build their knowledge of options for sharing infrastructure and resources.

Sharing and promoting examples of leadership

The region hosts several examples of industrial decarbonisation, innovation and leadership. These should be shared in ways that can support other organisations to learn from and follow good practice.

Developing a strategic approach to electrifying HGVs

The evidence indicates HGVs will most likely need to be electrified. This cannot be done by individual clusters independently. MNZH and partners could help to coordinate a strategic approach across the region that spans supply chains.

Addressing hard-to-electrify sectors

Our clusters did not represent hard to electrify industrial processes, yet these are often some of the most polluting and the hardest to decarbonise. Ensuring that partners engage with these sectors is vital to the transition.

Supporting wider engagement with the transition

Organisations need clarity on both expectations for them to decarbonise and the technical solutions available. The Hub is well placed to promote and communicate solutions, as well as continuing to learn from organisations across the region.

8.2.1. Supporting businesses with electricity connections

Electricity connections represent a major barrier to widespread electrification. MNZH could support NGED and other DNOs across the Midlands in ensuring that businesses are able to understand the connections process and to access products, which could accelerate connections and lower costs.

8.2.2. Building collaborative approaches to energy

Collaboration within and between clusters can offer significant benefits. One clear example of this is the approach taken by SmartParc to develop a site-wide electricity and heat network. This allows tenants to benefit from the waste heat and excess generation of their neighbours. This approach has offered lower-cost, lower-carbon energy across the site.

Aspects of this can be replicated for formal and informal clusters across the region. There are opportunities for developing heat networks, shared electrical networks and private wires that allow waste from one organisation to become a resource for their neighbours.

8.2.3. Sharing and promoting examples of leadership

The clusters we have engaged with show leadership in several aspects of the energy transition, such as the building standards of Space City and the dual loop heat network of SmartParc. Showcasing such examples of innovation and leadership could be a way to grow the impact and support other organisations.

It is worth noting that these examples of leadership are within new developments, rather than retrofitting to existing sites. This highlights the additional challenges of retrofitting existing buildings with new technology, as opposed to embedding them in the design of a new building.

8.2.4. Developing a strategic approach to electrifying HGVs

The electrification of HGVs represents a strategic challenge for the region and is highlighted by this report as an area where clusters are less able to lead the way without a wider strategic approach. SmartParc offers a compelling example of this challenge. Their innovative approach to energy use impacts every aspect of the site design, even including installing cabling to allow for easy electrification of car parking spaces. Our engagement revealed they had investigated options on low-carbon HGVs too, but these efforts have not resulted in the same level of delivery within the site design as other aspects of energy use. The hub is well-positioned to support a regional approach to developing eHGV infrastructure and deployment, in concert with eFreight 2030.

8.2.5. Addressing hard-to-electrify sectors

Of the clusters analysed, none were found to be unsuitable for electrification or to have a high need for hydrogen. There are unique challenges faced by industrial businesses that operate hard to electrify processes, including high-temperature processes, which we have been unable to study through this work, as they were not present in our clusters. These are also likely to be some of the largest sources of emissions. There could be value in commissioning follow-up work that is more focused on understanding how to support these.

8.2.6. Supporting wider engagement with the transition

The clusters were chosen in part because of the links they already had with MNZH. It therefore follows that they were reasonably engaged with the energy transition. Nevertheless, we found significant variation in knowledge and expectations from businesses. This indicates uncertainty in both the technological approaches to the energy transition and the role of businesses and other organisations in achieving it. There was not always a clear view of what the transition would require technically, nor what might be expected from them. An example of this would be expectations around the availability and affordability of hydrogen, which in some cases were much more optimistic than the evidence suggests.

A lack of clarity or engagement could undermine investment in the energy transition. Understanding attitudes of businesses more completely requires a detailed engagement exercise across a representative sample of the sector. The Net Zero Business Census is one resource that could inform this question.[81]

A related approach is to support access to data that supports the transition. Phase 2 of this work may go some way to addressing this point. More broadly, there is an opportunity for the hub to promote relevant resources and to engage national stakeholders in addressing the current shortcomings in the data landscape.

[81] 2025 UK Net Zero Business Census, UK business climate hub and Planet Mark, 2025.

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