

REGEN



Centre for
Sustainable
Energy

Gloucestershire

Baseline Energy Representation

Version: Final

October 2025

Introduction

This report aims to summarise the current energy system in Gloucestershire, focusing on technology and infrastructure across the county.

When paired with the Local Area Characterisation (D4), the two documents together form the Energy Baseline for an area, demonstrating both the technical (technology and infrastructure) and non-technical (social, economic, regulatory) realities that must be navigated to move things forwards.

The report addresses energy demand by fuel and sector, energy infrastructure, renewable generation and storage, heat, transport and emissions. Where relevant, data has been graphed temporally to display trends over time, or geographically to illustrate energy baselines on a more local level.



Energy demand

Summary

Significantly reducing the amount of energy we use for transport, heat and power is a key step on the path to net zero. This will reduce the amount of renewable and low carbon generation needed to achieve net zero.

The trends in Gloucestershire’s energy consumption and breakdown per sector are broadly in line with wider GB trends over the past ten years. Due to its more rural nature, a greater proportion of energy consumption is from oil and electricity, with fewer buildings connected to the gas network than the national average.

-2%

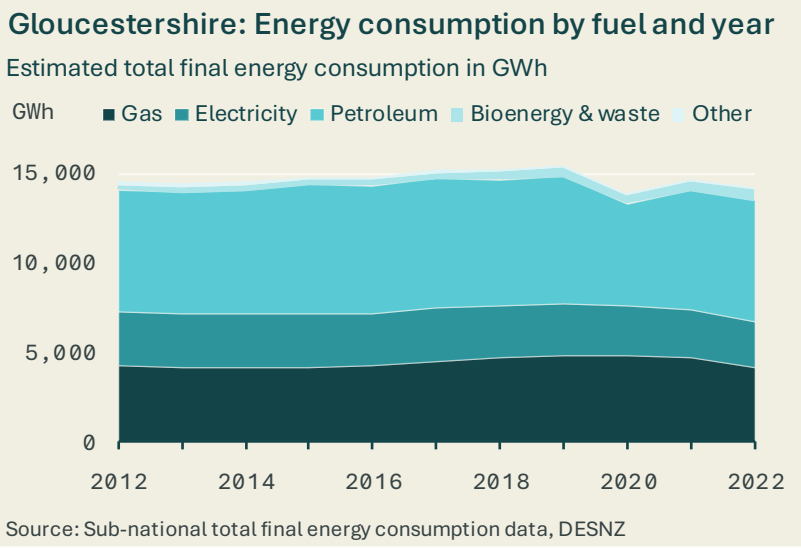
Change in total energy demand between 2012 and 2022.

40%

Proportion of 2022 energy consumption attributed to transport.

14.8 MWh

Total annual domestic energy consumption per household.

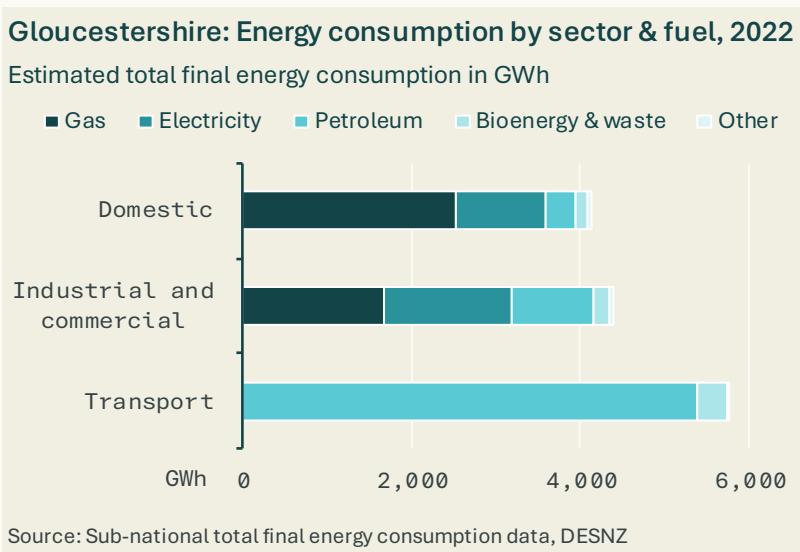


Energy consumption in Gloucestershire has remained broadly steady over the past decade, notwithstanding the impacts of the COVID-19 pandemic. This is despite population growth, meaning per-capita consumption has decreased.

Electricity has seen the biggest decrease, reducing by 14% between 2012 and 2022. Based on national trends, this is most likely to be the result of increasing appliance and lighting efficiencies in homes and non-domestic buildings.

Transport, similar to most local authority areas in the UK, is the largest sector for energy consumption. Almost all transport demand is in the form of petroleum (note that DESNZ statistics do not break out electricity for EV charging in this sector).

Gas makes up the majority of domestic energy consumption at 61%, similar to the UK equivalent of 66%. This reflects how a substantial proportion of homes in Gloucestershire have access to the gas network, in line with the overall trend seen across the country.





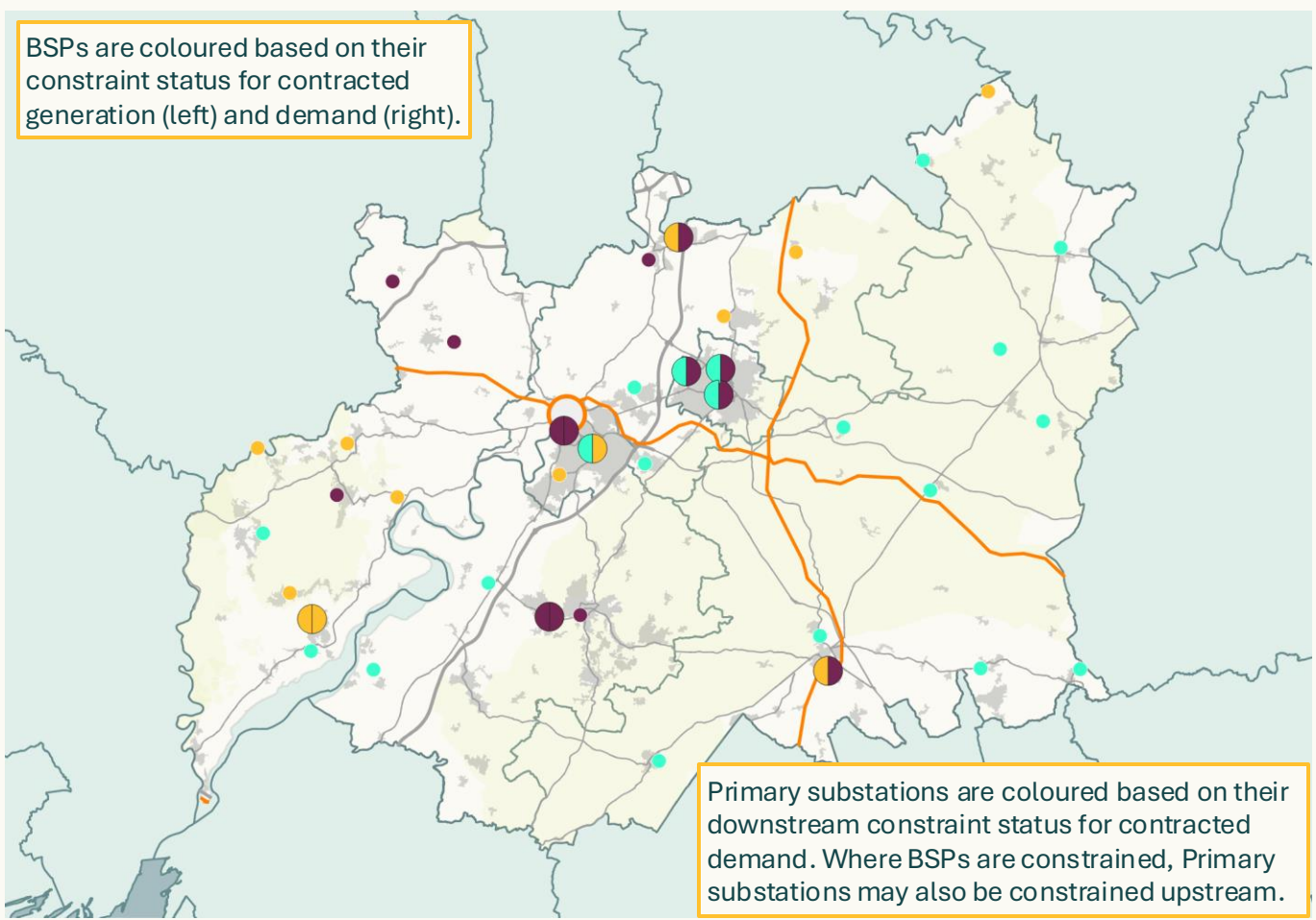
Electricity networks

Summary

Existing and developing energy infrastructure plays a controlling role in both the current energy baseline for an area and its potential local decarbonisation pathway for the future. Networked infrastructure, such as the electricity and fossil gas distribution and transmission networks, dictates the type of energy supply available to homes and businesses across the area.

In addition, non-energy infrastructure and environmental designations play a major role in future energy plans. Settlement areas, road networks, Protected Landscapes and key industrial areas all impact the types of decarbonisation solutions that are feasible and the opportunities available to decarbonise power, heat and transport.

The below map illustrates the key electricity infrastructure in the area, including the presence of National Grid transmission lines and substations and DNO Bulk Supply Point (BSP) and Primary substations.



Legend

Built-up areas

M-roads

Transmission lines

National Parks and National Landscapes

A-roads

Transmission substations

Generation

Demand

Bulk supply point substations

Primary substations

Unconstrained

Partially constrained

Constrained

3



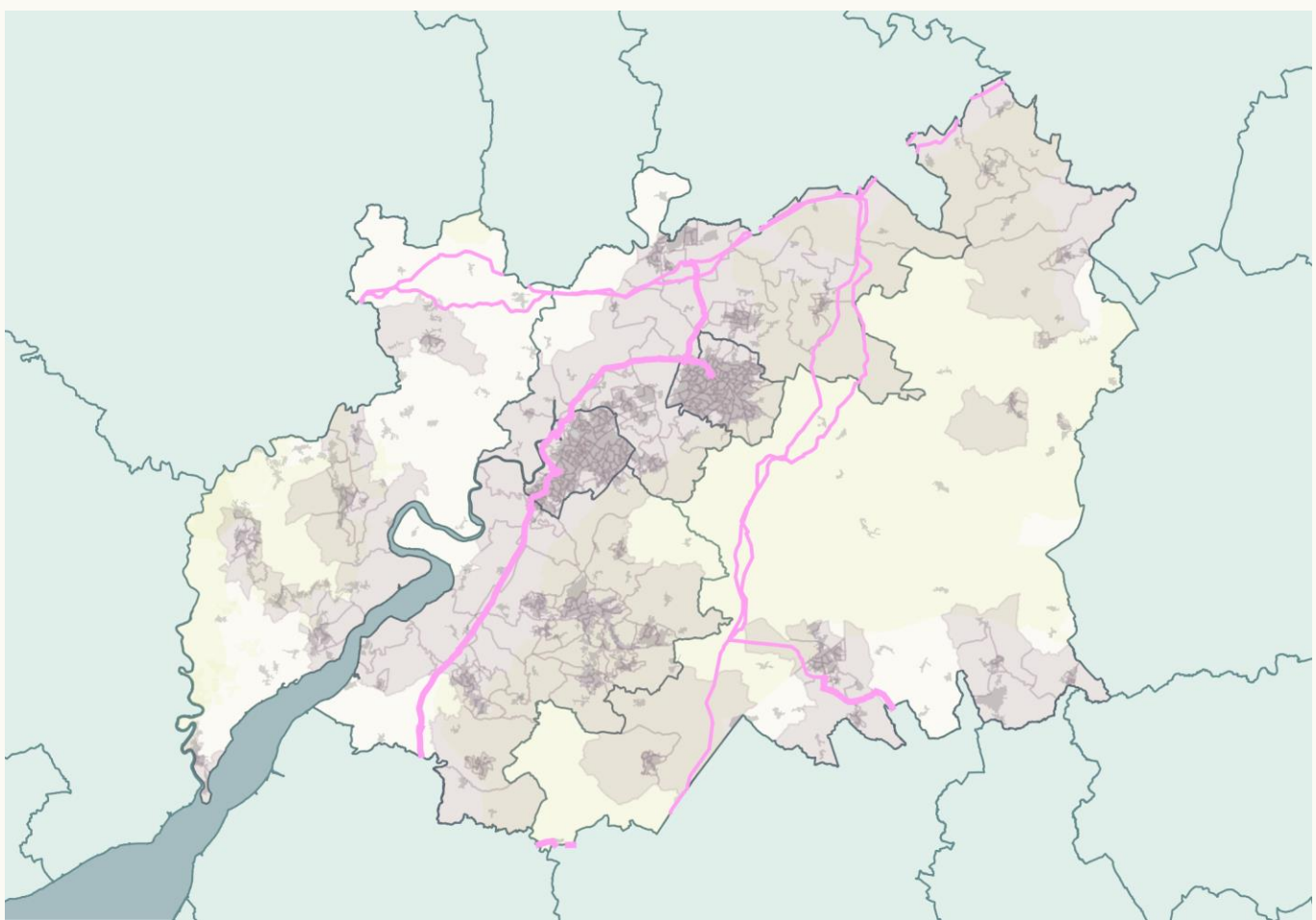
Gas networks

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The below map illustrates the key gas network infrastructure in the area, including the presence of National Gas transmission pipelines and substations and the Gas Distribution Network high pressure network.



Legend

Built-up areas

National Parks and National Landscapes

M-roads

A-roads

National Gas transmission pipelines

National Grid transmission lines

National Grid transmission substations



Renewable electricity generation

Summary

According to the Climate Change Committee, a UK net zero energy system will require at least five times more renewable electricity generation than today.

Gloucestershire has a strong history of solar PV deployment at both ground-mounted and rooftop scale. The pipeline of developing projects includes many large-scale solar and battery storage sites. In addition, Gloucestershire hosts the resources for potential onshore wind, offshore wind and bioenergy generation.

25k

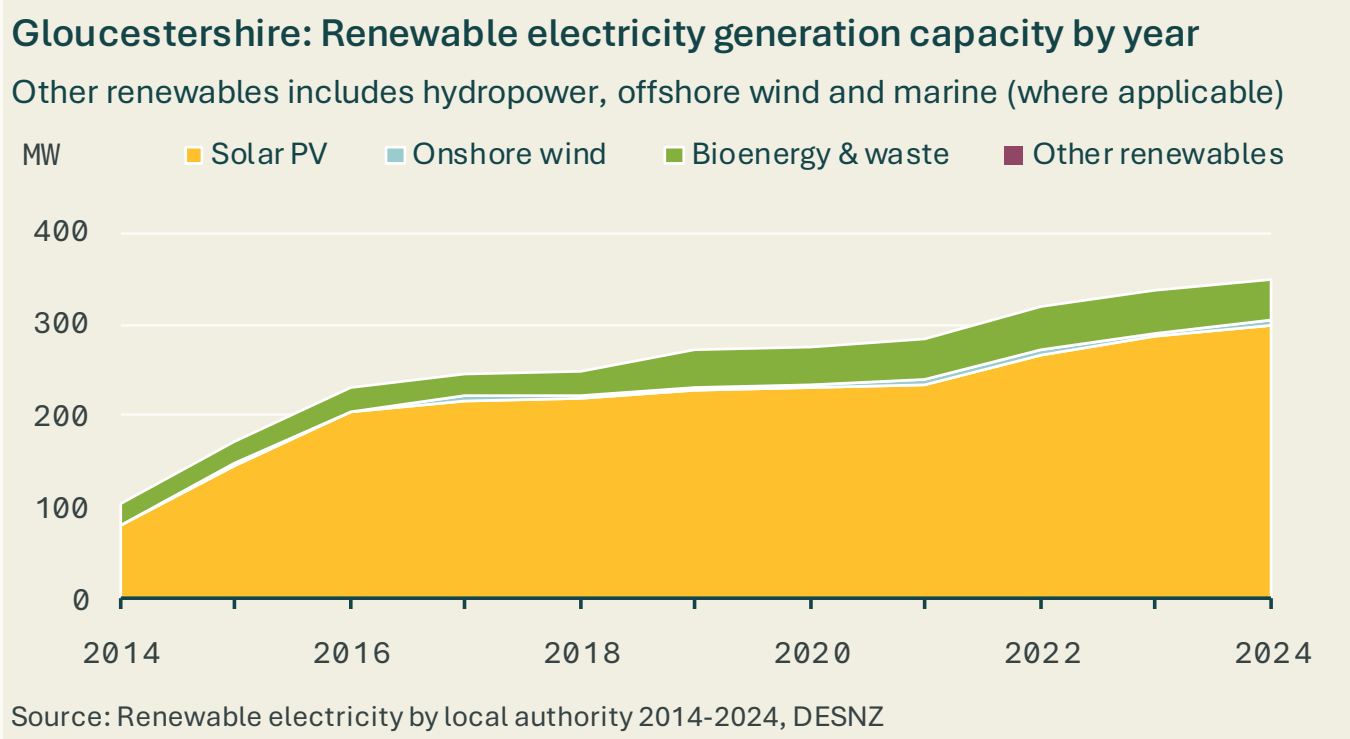
Number of MCS-accredited rooftop solar installations.

15%

Equivalent annual electricity demand met by renewable supply in Gloucs.

423 GWh

Total renewable energy generation in 2023.



Gloucestershire saw early deployment of solar PV projects during the early and mid-2010s, with developers supported by the Feed-in Tariff targeting high levels of solar irradiance. Since 2018, a mixture of solar PV, bioenergy and battery storage capacity has been deployed.

Due to its generally lower wind speeds, Gloucestershire has not seen the deployment of any utility-scale onshore wind projects. However, a [2023 study by CSE and LUC for Cheltenham, Gloucester and Tewkesbury](#) found technical potential for onshore wind across these areas.

At a smaller scale, Gloucestershire has seen increased numbers of small-scale solar installations. At a national level, greater uptake of rooftop solar PV is predominantly [driven by increased electricity prices](#). Nearly 40% of Gloucestershire’s 25,000 MCS-accredited rooftop solar PV installations have occurred since January 2022.



Renewable electricity generation

Summary

The UK governments [Clean Power 2030 Action Plan](#) sets out a pathway to a clean power system by 2030, focusing on rapid deployment of clean energy capacity across the whole of the UK. This includes ambitious targets for the rollout of renewables such as solar PV, onshore wind and offshore wind, alongside flexibility technologies such as battery storage, long-duration energy storage, and low carbon thermal generation from hydrogen and gas with carbon capture and storage. Analysis of the pipeline of clean energy projects in the planning system in Gloucestershire shows the area’s potential contribution to the Clean Power 2030 target.

540 MW

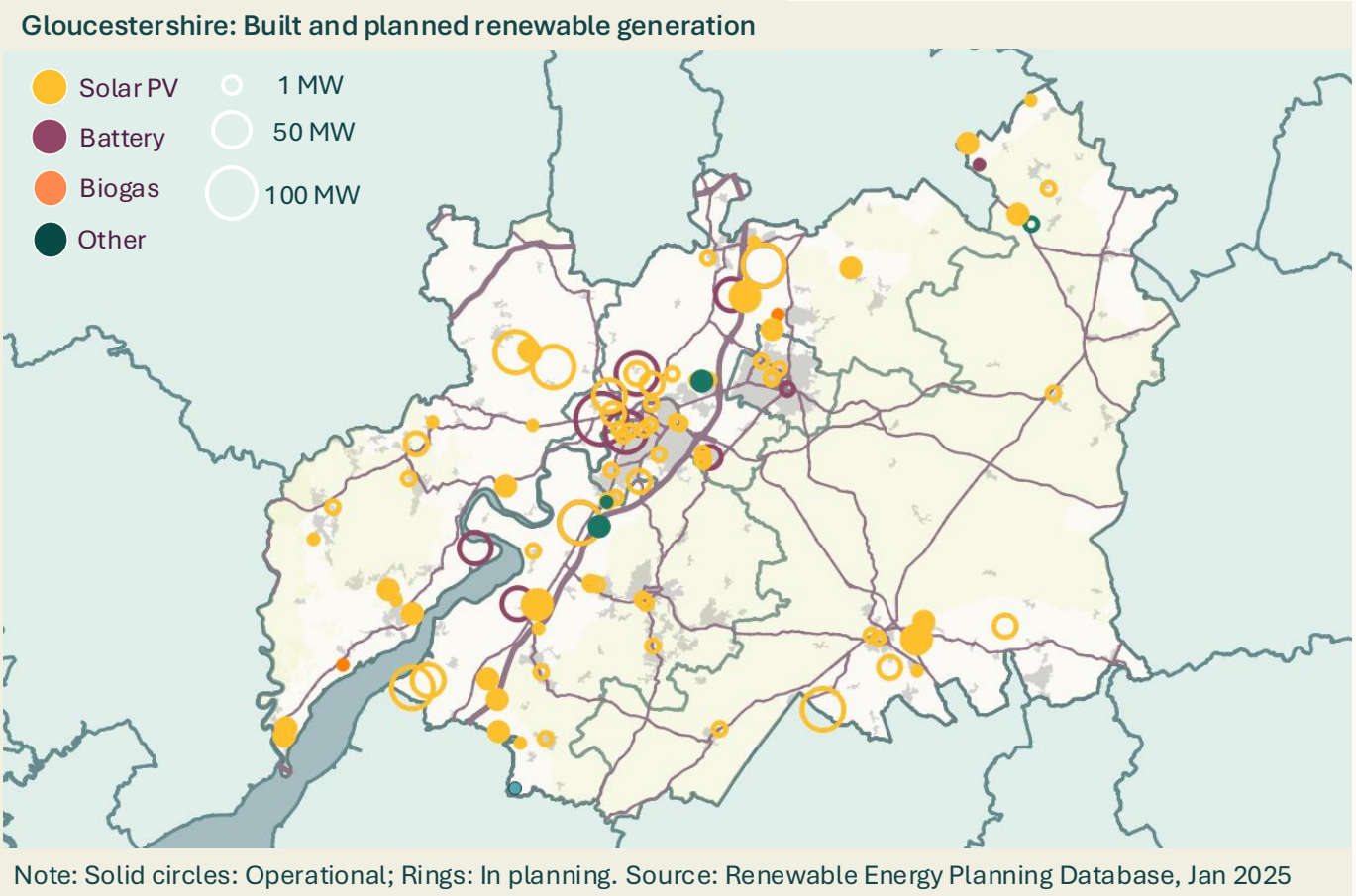
Capacity of battery storage with planning submitted or granted (Jan 25)

640 MW

Capacity of solar PV with planning submitted or granted (Jan 25)

100 MW

Largest pipeline site, a battery storage project west of Gloucester



Current renewable generation in Gloucestershire is dominated by solar farms deployed during the 2010s, with utility-scale developments present across the county.

Projects in the planning pipeline, composed almost entirely of larger-scale solar PV and battery storage projects, are predominantly located on the outskirts of demand centres of Gloucester and Cheltenham.

* Waste and landfill generation are included in the REPD data despite not being low carbon



Bioenergy

Summary

Bioenergy has historically played a role in Gloucestershire’s energy in the form of biomass for heating and, a lesser extent, for power generation. Bioenergy could play a role in decarbonising several sectors by providing similar qualities to fossil fuels with lower life-cycle carbon emissions, but it is a limited resource.

Gloucestershire currently hosts a number of bioenergy projects such as anaerobic digestors for farm waste. The outputs of these sites are used to produce on-site heat and power, or to produce bottled gas.

8

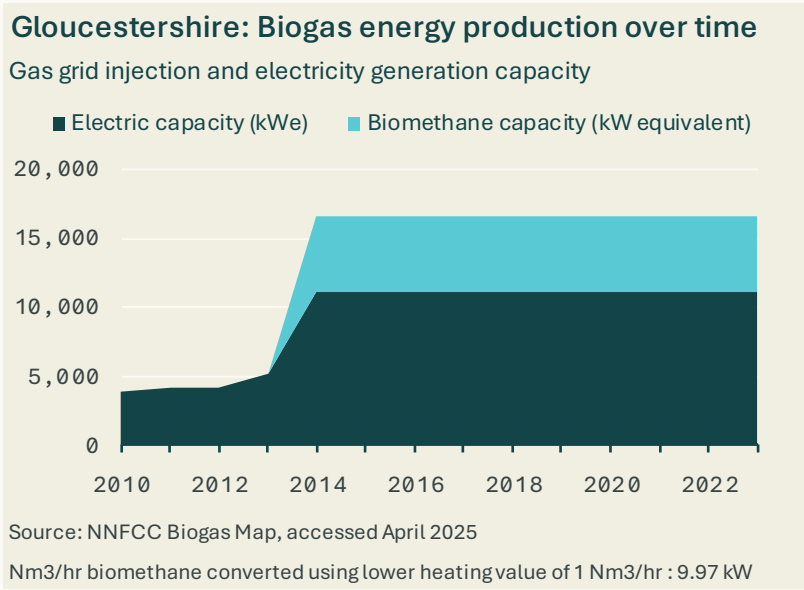
Number of known biogas projects as per the NNFCC Biogas Map

70%

Proportion of total land area in Gloucs. used for agriculture

767

Just this many homes use wood as their only heat fuel (Census 2021)

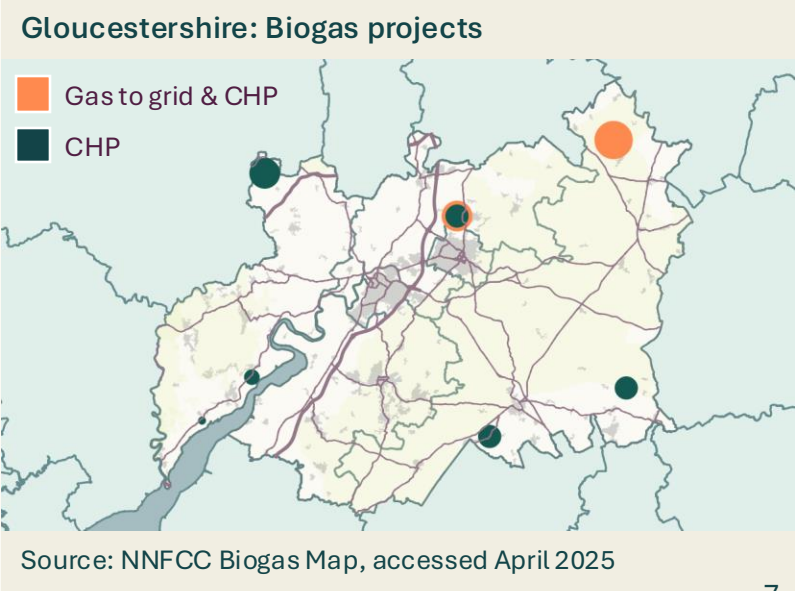


Based on project-level data from the National Non-Food Crops Centre’s (NFCC’s) Biogas Map, Gloucestershire hosts 8 biogas production sites. All of these sites were developed between 2008 and 2014.

Since 2014, there has been no recorded development of biogas sites for on-site CHP usage or gas-to-grid injection. Subsidy support for biomethane production through the likes of the Renewable Heat Incentive has dropped off in recent years.

Mapping the known biogas projects in the Gloucestershire area shows a range of locations across the more rural outskirts of the county. These sites are located in areas of the county with high proportions of agricultural land use.

In a trend mirrored in other areas of the South West, the vast majority of these sites use the biogas produced for on-site Combined Heat and Power (CHP) activities. As most sites are farm-based, the on-site energy generation can reduce costs.





Current heating technologies

Summary

Achieving net zero will require upgrades to nearly every home and business: to keep heat in, to keep energy use low and to switch to low carbon heat sources. It is one of the greatest challenges of net zero, but also one of the biggest opportunities for green jobs.

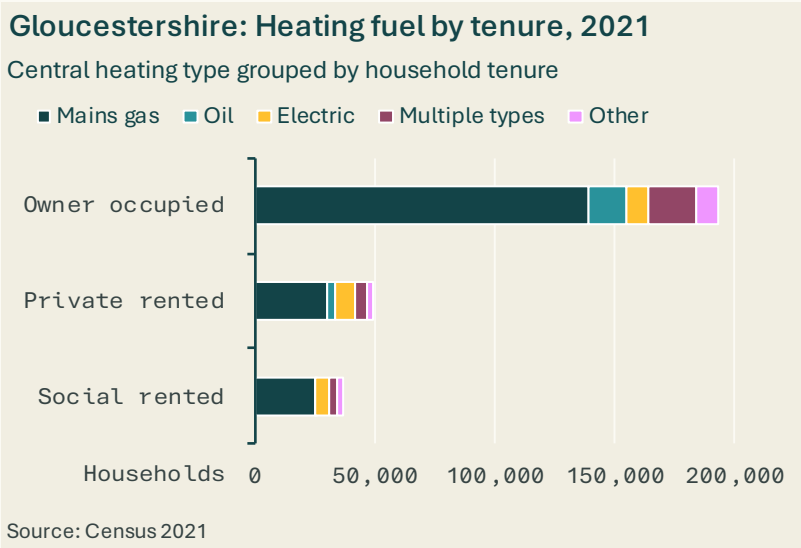
Gloucestershire has a high proportion of homes heated by gas, owing to a high proportion of households being located in major population centres. In off-gas areas, oil central heating is most common.

19%

Proportion of homes with no gas network access.

250k

Number of homes currently heated by fossil fuel heating systems, which would need replacing to achieve net zero (figure is approximate due to ‘multiple’ and ‘other’ heating types in the Census 2021 data).



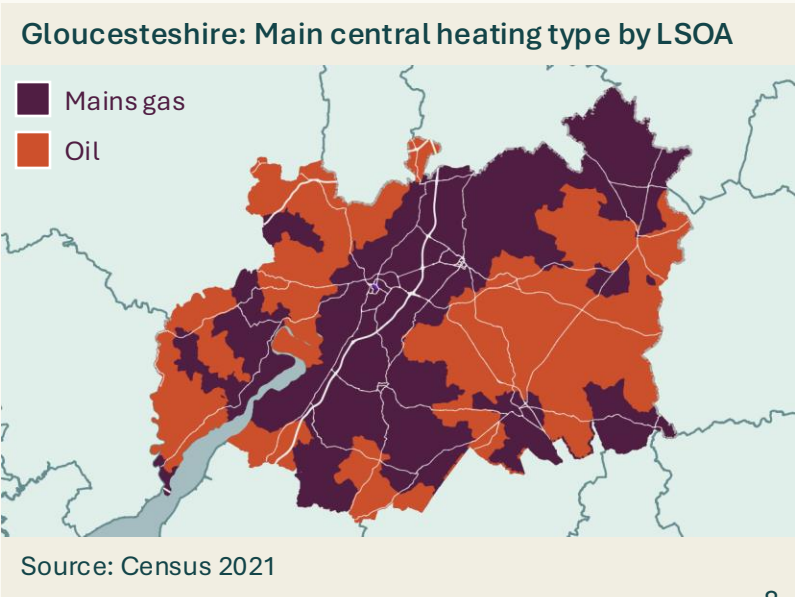
Overall, Gloucestershire has a high proportion of homes with access to mains gas for heating. Oil heating is less common, with less than 10% of homes using heating oil as their primary fuel source.

Private and social rented homes, which are more prevalent in population centres, are more likely to be electrically heated, making up 15% of these properties. While electric heating has no direct carbon emissions, it can be one of the most expensive forms of heating for occupants.

This data set does not include individual electric units used to heat a household.

Mapping the main central heating type by Lower Super Output Area shows a clear picture of gas availability in Gloucestershire. Mains gas is the predominant throughout the ‘spine’ of the county following the M5 motorway, including the major population centres of Gloucester and Cheltenham.

Across the eastern and western sides of the county, where gas network availability is much lower, oil is the predominant central heating type. However, despite covering a large area of land, this accounts for less than 10% of households.





Low carbon heating

Summary

Low carbon heating uptake is low across the UK, with the vast majority of homes fuelled by fossil fuels in the form of mains gas or heating oil. While around one in six homes in Gloucestershire is heated by a low emissions heating system, most of these are night storage heating or direct electric heating, which are often some of the most expensive forms of heating. Heat pump uptake has been increasing in Gloucestershire in recent years, with nearly 2% of homes now hosting a heat pump – nearly twice the UK average.

1.8%

Proportion of homes with a heat pump.

16%

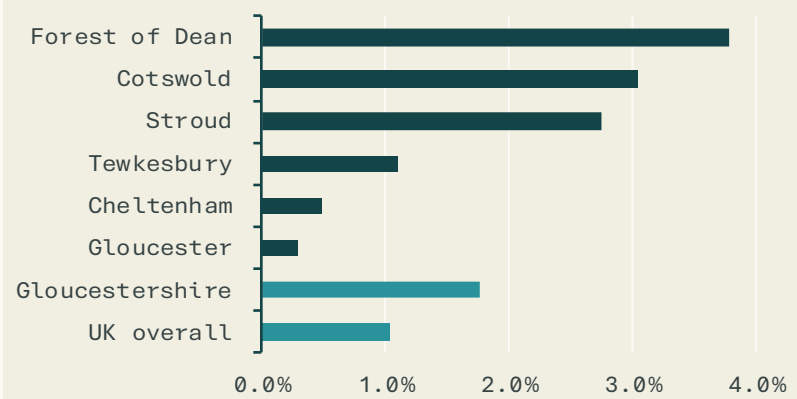
Homes using low emissions heating systems (includes electric heating).

824

Number of homes upgraded through Green Home Grants (Dec 2024)

Gloucestershire: Percentage of homes with heat pumps

MCS-accredited heat pump installations vs households



Source: MCS data dashboard, April 2025

Almost 2% of homes in Gloucestershire have installed an MCS-accredited heat pump, with the majority of these air-source heat pumps.

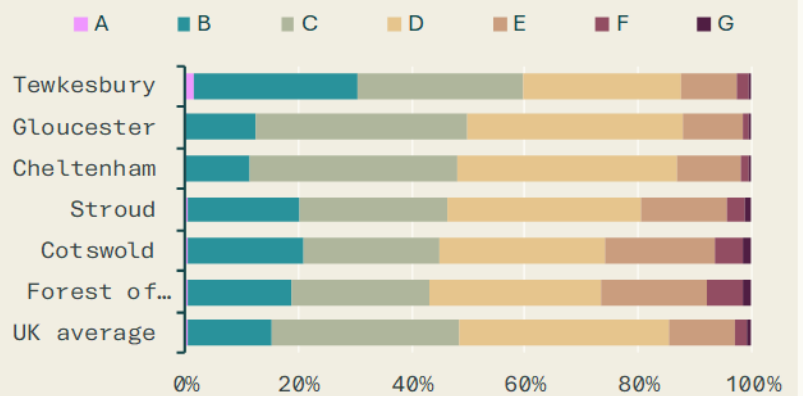
Analysing this uptake by district shows a clear pattern of uptake in more off-gas districts in the county, with much lower uptake in the urban centres of Gloucester and Cheltenham. Heat pump uptake in the UK has historically been higher in off-gas areas, where heating fuel costs have typically been higher or more variable compared to mains gas.

The energy efficiency of homes is a key factor in reducing energy demand and carbon emissions, as well as aiding in the uptake of low carbon heating measures such as heat pumps.

Compared to the UK overall, Gloucs.’ housing stock shows a similar range of EPC ratings. However, there is variability on a district level, with a greater proportion of homes rated E or below in Forest of Dean and Cotswold. This could be due to the areas having less access to mains gas, as fuel costs are a key component in the EPC rating formula.

Gloucestershire: Percentage of homes by EPC band

EPC ratings for domestic properties from the last ten years



Source: Regen analysis of EPC certificate data

Where a home has multiple EPC certificates, only the most recent has been used



Fuel poverty

Summary

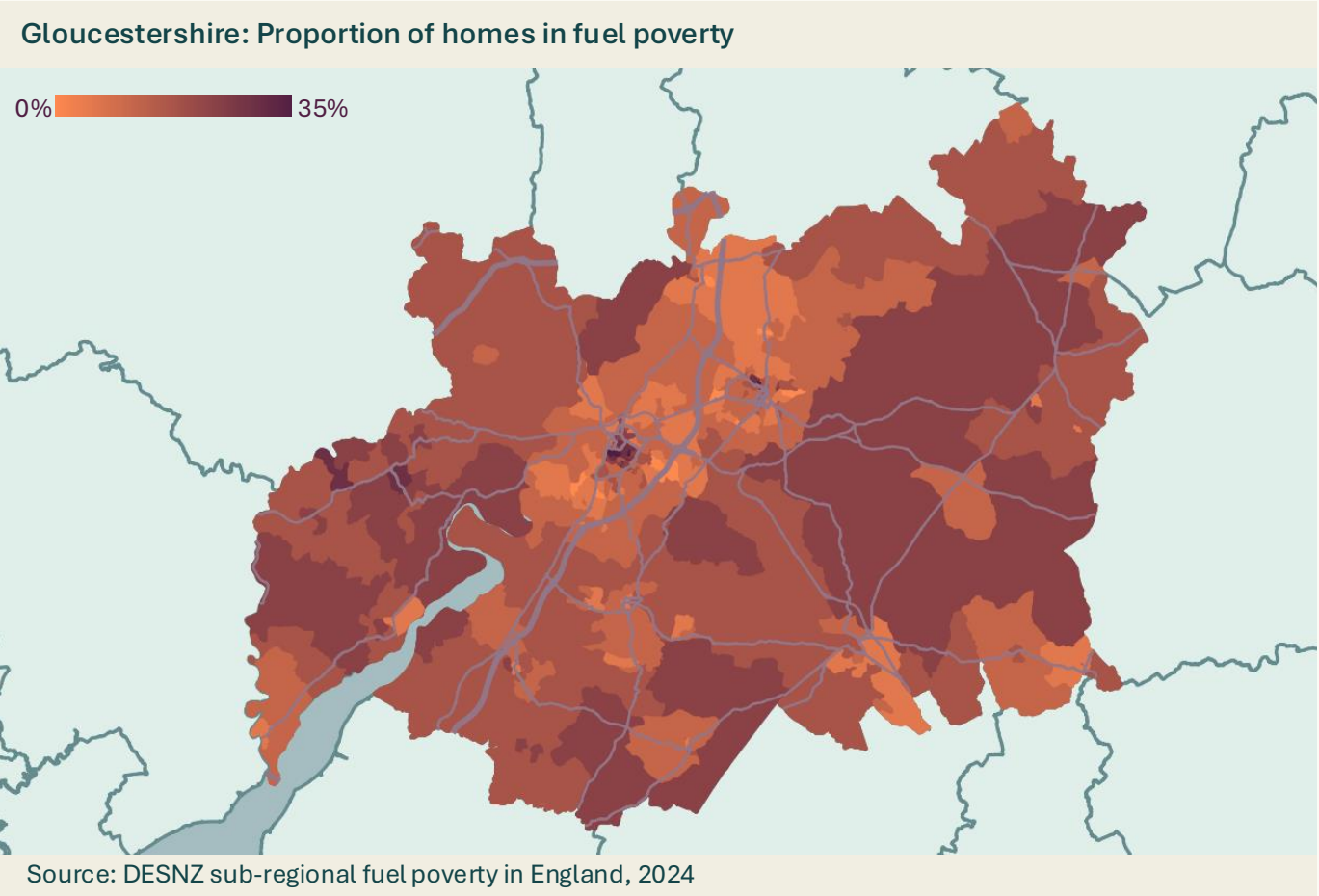
High energy costs over recent years have contributed to increased numbers of households in fuel poverty across the UK. Fuel poverty is defined here as when a household has an EPC rating of D or below, and after heating costs have been paid, the household's residual income is below the poverty line. Fuel poverty is an issue in every area, but is particularly prevalent in areas with older, poorly insulated homes without access to the gas network, or in low-income areas with high levels of electric heating.

11.2
%

Proportion of households in fuel poverty in 2022. For comparison, this is below the UK average of 13.1%.

29.2
%

Homes in fuel poverty - LSOA with the highest levels of fuel poverty, located in Gloucester.



Mapping the proportion of homes in fuel poverty across the county reveals important sub-regional trends in the data. While the average proportion of homes across the county is 11.5%, below the UK average, several LSOAs have more than one-fifth of homes in fuel poverty. On the opposite end of the spectrum, some LSOAs has less than 4% of homes in fuel poverty. The spatial trend shows hotspots of fuel poverty in the very centre of urban areas, generally aligning with electric central heating locations. In contrast, urban areas outside of city centres and wider suburban areas see some of the lower levels of fuel poverty. Off-gas areas, where heating oil is main forms of heating, tend to see higher levels of fuel poverty due to greater heating costs.

Current vehicles



Summary

A shift to electric vehicles is anticipated in the next decade, with the 2030 ban on new fossil fuel cars and market growth. Decarbonisation of transport also requires a shift in private vehicle use, to active travel and public transport to reduce energy use, tackle congestion and improve air quality and health.

Like the rest of the UK, the vast majority of vehicles registered in Gloucestershire are fuelled by petrol or diesel. Gloucestershire has high levels of vehicle ownership compared to the rest of the UK.

1.5

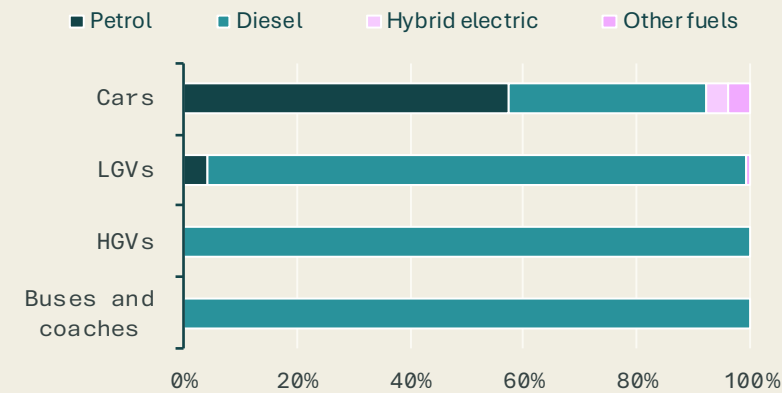
Vehicles per household (vs 1.2 for England and Wales overall).

415 k

Number of vehicles currently fuelled by fossil fuels, which are not compatible with net zero. Figure is approximate due to undefined 'other' fuel types in the Department for Transport data.

Gloucestershire: Vehicle by body type and fuel

Proportion of vehicle body types by fuel system



Source: Vehicle licencing statistics data table VEH0105: Q2 2024, DfT

Based on DfT vehicle registration data, over 90% of cars and nearly 100% of all other vehicle types are fuelled by petrol or diesel. Currently, only cars have a significant uptake of hybrid or electric vehicles.

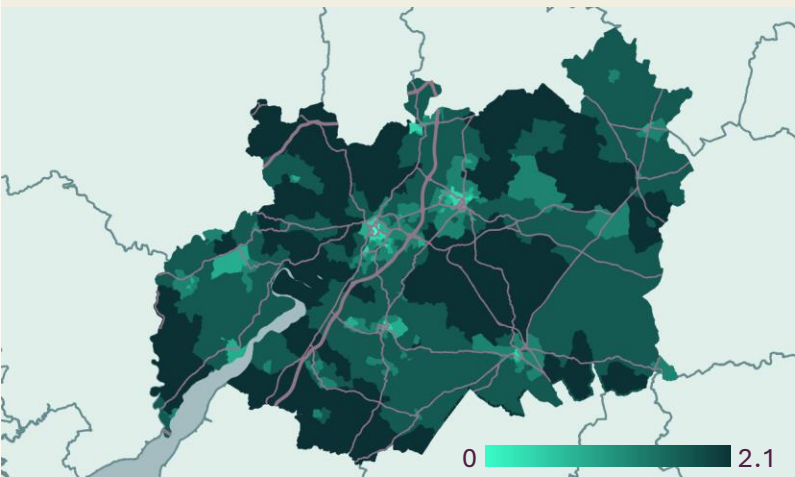
In addition to vehicles registered within the county, emissions from vehicles from outside the area are also significant. This includes HGVs, LGVs and coaches operating across the region or nationally, alongside the impact of tourism in summer months.

Car and van availability across the county broadly aligns with rurality, with much lower levels of vehicle ownership around the likes of Gloucester, Cheltenham and Cirencester.

In the most rural reaches of the county, average vehicle ownership can exceed two vehicles per household in some LSOAs.

Areas with greater vehicle ownership generally correspond to higher average miles driven per household, as car reliance is higher in these areas.

Gloucestershire: Car/van availability per household by LSOA



Source: Census 2021

Electric vehicles



Summary

Alongside public transport and active travel, electrification is increasingly regarded as the most feasible form of decarbonisation for almost all forms of transport, from private cars and vans to HGVs and buses. Plug-in hybrid and battery electric vehicles have been gaining increasing market share over recent years. The UK's Zero-Emissions Vehicle mandate requires car manufacturers to progressively increase the share of electric vehicles they sell in the UK, aiming for all new vehicles sold in the UK to be zero emission by 2035.

2.1%

Around 2% of vehicles in Gloucs. are battery electric or plug-in hybrid.

+87%

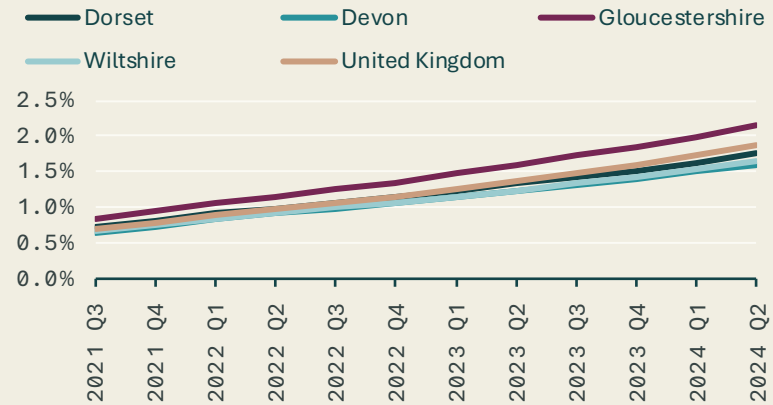
Change in the plug-in proportion of vehicles from Q2 2022 to Q2 2024.

9,800

Total number of plug-in vehicles registered (Q2 2024)

Gloucestershire: Plug-in private EV proportion over time

Proportion of private vehicles that are battery electric or plug-in hybrid



Note: Private vehicles make up 45% of EV registrations. 'Company' keepership has been excluded as the registered location is often not representative.

Source: Vehicle licencing statistics data table VEH0142: Q2 2024, DfT

The proportion of private plug-in vehicles registered in Gloucestershire has been steadily climbing in recent years, from 0.8% in Q3 2021 to 2.1% in Q2 2024. This is marginally above other South West counties and the overall UK average, suggesting that EV uptake is driven predominantly by overarching market and national policy forces rather than local considerations.

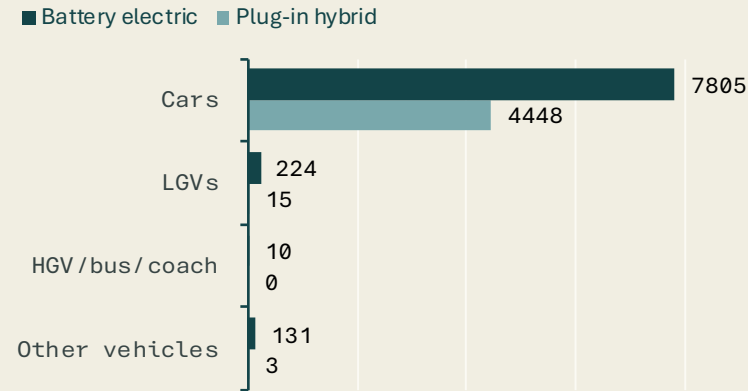
Note that 'private' keepership vehicles account for around half of all EVs. However, 'company' keeperships, including company car leases, are often registered in a different area to their use, and as such have been excluded from the chart.

In terms of registered electric vehicles by body type, cars make up the overwhelming majority of electric vehicles in Gloucestershire. Despite having a higher average mileage than some other areas of the country, total battery electric vehicles is almost double the number of plug-in hybrid vehicles.

While non-car electric vehicles are less common, a growing number of battery electric LGVs are being registered in Gloucs., alongside a small number of other vehicles such as electric motorcycles.

Gloucestershire: Electric vehicles by body type

Number of registered plug-in vehicles by body type as of Q2 2024



Source: Vehicle licencing statistics data table VEH0142: Q2 2024, DfT

Electric vehicle charge points



Summary

Electric vehicle charging infrastructure is a key part of the electrification of transport. While early adopters of electric vehicles have often installed a charger at their home to provide most of their charging requirements, en-route charging will always be required. In addition, a significant proportion of car owners do not have access to off-street parking and as such will be reliant on public charge points for all of their charging needs. Charge point installations have increased substantially in recent years in both number and charging speed.

858

Total number of publicly available EV chargers (Jan 2025)

+118 %

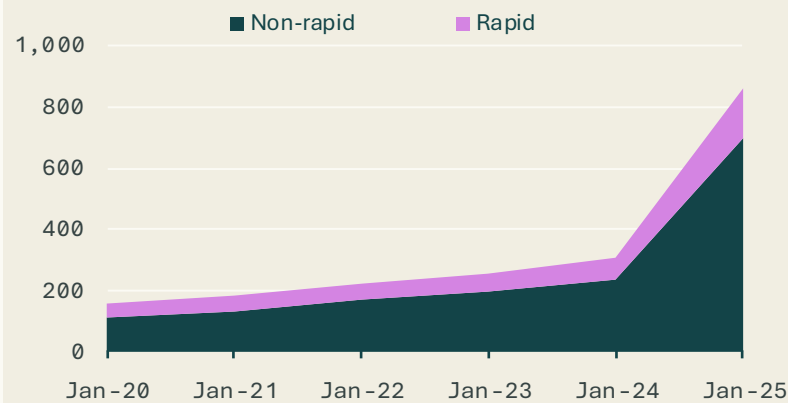
Change in the number of rapid chargers in Gloucs. from 2024 to 2025.

£3.1m

Gloucestershire's allocation of the Local Electric Vehicle Infrastructure fund

Gloucestershire: Publicly available EV chargers by year

Number of rapid (50 kW+) and non-rapid EV charging devices



Source: Electric vehicle public charging infrastructure statistics: Jan 2025, DfT

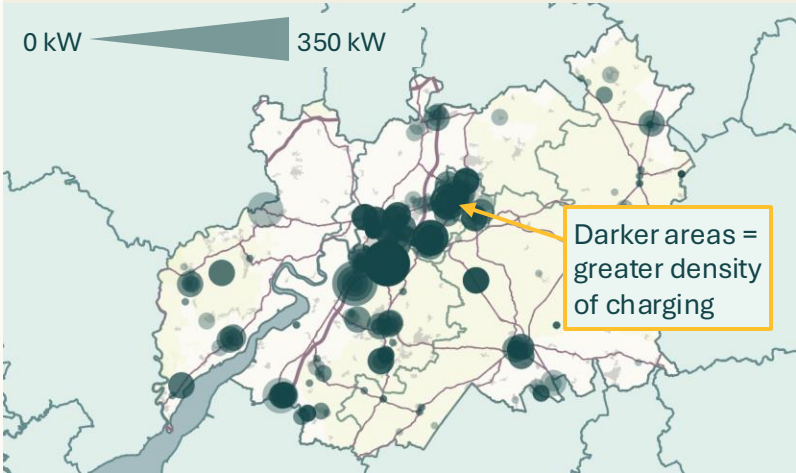
2024 saw the highest ever number of rapid and non-rapid EV chargers installed in Gloucestershire, with over 500 publicly available chargers installed. Around a fifth of these chargers are rapid chargers (50 kW+), although the number of rapid chargers doubled in the past year.

Gloucestershire has seen a particularly high growth in publicly available EV chargers over 2024, almost trebling the total number of chargers.

Current EV charging capacity in the area, mapped by total capacity and density of EV chargers, shows a clear focus around population centres of Gloucester and Cheltenham.

This aligns with the route of the M5 and associated service stations, which feature a large number of high capacity rapid and ultrarapid chargers designed for fast en-route charging.

Gloucestershire: EV charging capacity and density



Source: OpenChargeMap, Q4 2024



Greenhouse gas emissions

Summary

Gloucestershire’s greenhouse gas emissions have decreased substantially over the past two decades as the UK progresses towards decarbonisation. Progress towards reducing emissions from domestic, commercial, industrial and waste sectors has been particularly impactful, with these sectors reducing emissions by between 47 and 56% since 2005. Transport and agriculture have not decreased as dramatically. While emissions are continuing to decrease, the ‘harder-to-decarbonise’ areas of each sectors’ emissions will need to be tackled between now and 2050.

-33%

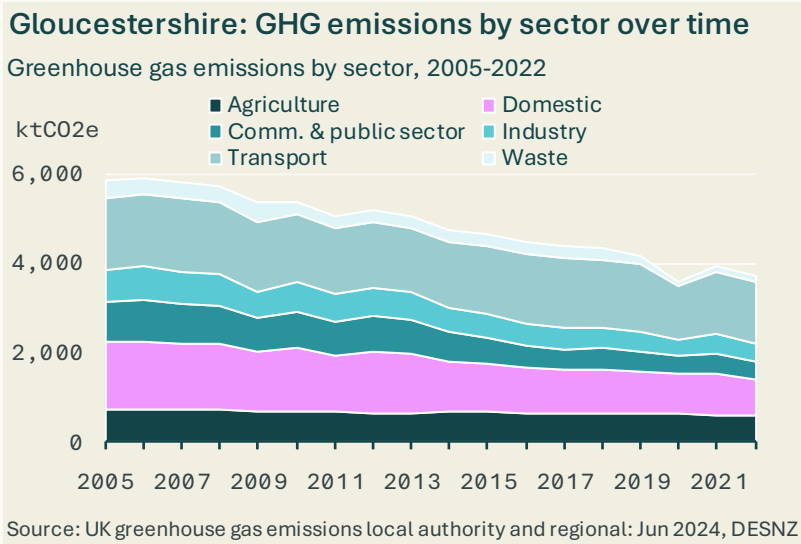
Change in Gloucs.’ greenhouse gas emissions 2005-2022.

4.0 tCO2

Gloucestershire’s per-capita carbon emissions

-47%

Decrease in domestic GHG emissions in Gloucs. since 2005

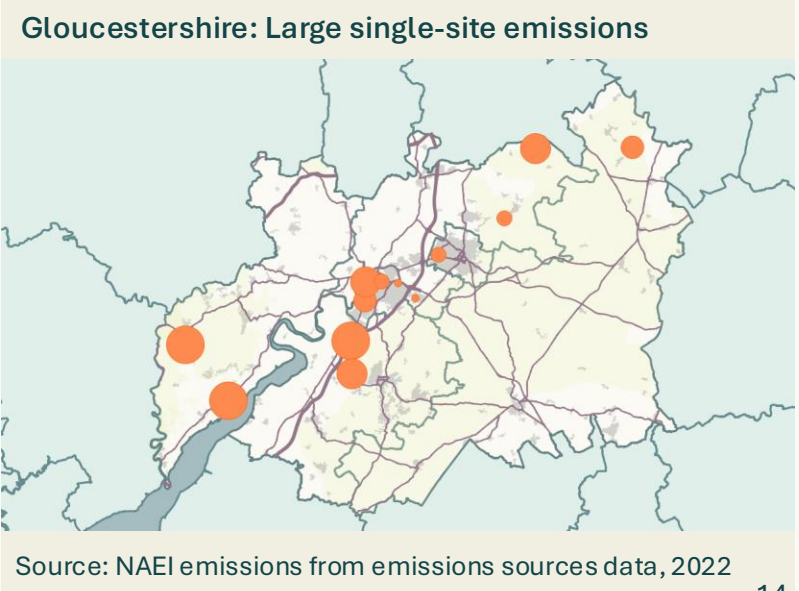


Gloucestershire’s largest greenhouse gas emitter is currently transport, representing 34% of emissions in 2022. Transport emissions have decreased by only 12% since 2005, compared to decreases of 47% in domestic emissions, 47% in industrial emissions and 56% in commercial and public sector emissions over the same timeframe.

The largest decrease, however, has been seen in the waste sector. Emissions now total just 137 ktCO2e in 2022, a 64% reduction on the 383 ktCO2e emissions in 2005.

The National Atmospheric Emissions Inventory includes fourteen major points sources of emissions in Gloucestershire. There is a wide variety of sectors represented across these sites, with nine sectors represented. This includes brickworks and asphalt production, fossil fuel power producers, energy from waste facilities and hospitals, alongside several food and drink production premises.

While most of these sites are located along the built-up spine of the county, two of the largest emissions sources are located in the Forest of Dean.



Sources

Energy demand and infrastructure

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[Regional and local authority electricity consumption statistics, DESNZ, 2024](#)

[Regional and local authority gas consumption statistics, DESNZ, 2024](#)

[Network route maps, National Grid, 2025](#)

[Network route maps, National Gas, 2025](#)

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[Renewable Energy Planning Database, 2025](#)

[The MCS Data Dashboard, MCS, 2025](#)

[Biogas Map, NNFCC, 2024](#)

[Land use in England 2022, DLUHC, 2022](#)

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[Central heating – Census 2021, ONS, 2025](#)

[Tenure – Census 2021, ONS, 2023](#)

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[Energy Performance of Buildings Data: England and Wales, 2025](#)

[Fuel Poverty in England: sub-regional, DESNZ, 2024](#)

[Green Homes Grant Local Authority Delivery \(LAD\) and Home Upgrade Grant \(HUG\) release, December 2024, 2024](#)

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[Car or van availability – Census 2021, ONS, 2023](#)

[VEH0105 – Vehicle licencing statistics data tables, DfT, 2024](#)

[VEH0142 – Vehicle licencing statistics data tables, DfT, 2024](#)

[Electric vehicle public charging infrastructure statistics, DfT, 2025](#)

[OpenChargeMap, 2024](#)

Emissions

[Emissions from point sources, National Atmospheric Emissions Inventory, 2022](#)

[UK greenhouse gas emissions: local authority and regional, DESNZ, 2024](#)