RURAL ENGLAND
NETWORKING / RESEARCH / LEARNING

Energy and Water Use in the English Countryside

A Report for Rural England CIC by Professor Martin Phillips, School of Geography, Geology and Environment, University of Leicester

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Executive Summary

This report examines patterns of domestic energy and water consumption in rural areas of England, drawing together secondary datasets and findings from a questionnaire survey of 80 rural residents from a diverse range of locations in rural England. It explores rural-urban and intra-rural variations in consumption levels, the technologies and practices used to reduce energy and water use, and the motivations and barriers shaping household consumption and conservation behaviours in relation to these two key resources. It also identifies challenges for low-income families.

The report begins by outlining the background context for the study, noting that recent decades have seen calls for reductions in energy and water consumption because of their respective causal and consequential connections to climate change, as well as concerns about rising energy and water costs and their impacts on the cost of living and energy and water poverty.

The report outlines the study's aims as being to: i) assess the character of energy and water consumption in rural England, ii) examine energy and water consumption reduction practices and technologies enacted by residents in rural England, as well as the employment of domestic renewable energy production; iii) evaluate the drivers of, and barriers to, technological adoption and practice change in relation to domestic energy and water; and iv) to consider motivational and attitudinal influences on energy and water use transitions.

The analysis in the report begins by examining secondary data on energy and water consumption. It demonstrates that rural England exhibits higher average per capita and per household levels of electricity consumption than are evident in the country's urban areas, and also highlights intra-rural variations in energy consumption levels, with smaller and more remote rural settlements tending to have the highest per capita and per household rates. Gas consumption displays similar rural-urban and intra-rural variations, although these are partly obscured by the presence of significant numbers of householders who are not connected to the mains gas grid. Such householders are, again, often located in areas of small and remote settlements, and often rely on oil, liquid petroleum (LPG), solid fuels (e.g. coal, coke, wood) or multi-source heating systems, although some are adopting forms of decarbonised renewable energy production. A further finding was that many of the areas with high proportions of dwellings with low-energy efficiency ratings are located in upland areas of England, where heating needs may be particularly acute, but house construction may make buildings both hard-to-heat and hard-to-treat.

There is a much weaker evidence base on water consumption than there is for energy use. Publicly available, spatially disaggregated data on water consumption is extremely limited, although analysis was conducted on information related to 10 water companies operating in England. This data suggests that rural per capita water consumption may be lower than in urban areas, with there also being significant regional variations. However, more spatially extensive datasets are needed before definitive conclusions can be drawn.

An analysis of the questionnaire survey responses helped develop further insights into rural energy and water consumption. Evidence is presented, indicating that many rural residents are actively seeking to reduce their energy and water consumption, as well as, in some cases, adopting domestic renewable energy production technologies. Solar was the

most widely adopted mode of domestic renewable energy production amongst respondents to the survey. Attention is drawn both to the adoption of energy and water saving technologies, including smart meters and energy-efficient boilers, and to changes in everyday water and energy consuming practices, such as cooking, washing, using electrical appliances, heating the home and brushing your teeth. It is shown that many rural householders are adopting a mix of technologies and practice change in attempts to reduce their energy and water consumption.

Climate change concerns emerge as a significant motivation for technological adoption and practice changes to reduce energy and water consumption, although economic considerations, such as energy and water prices and the cost of technology purchase and installation, were also motivational influences and barriers to change. Many households combined consumption-reduction strategies with cost-management practices, such as switching tariffs or purchasing fuels at favourable times. The report also highlights groups for whom consumption and conservation options may be significantly constrained, including older residents, people with health conditions, and households living in older, hard-to-treat properties or reliant on off-mains energy and private water supplies. Many rural householders are asset rich but cash poor.

While around a third of the survey respondents indicated they were very or moderately concerned about their own energy and water bills, expressions of these levels of concern rose to above 80% of respondents when people were asked about whether they thought other people might not be able to pay these bills. Concerns about distributional, procedural and recognitional justice ran through many respondent accounts. Alongside worries about energy and water affordability and security of supplies, there was widespread criticism of water companies, particularly in relation to leakages, pollution and perceived failures to invest in infrastructure. There were also concerns about self rather than public interests within decision-making and failures to recognise or respect consumers.

The report concludes by highlighting three, interrelated, policy implications of the study. First, it argues that energy and water policymaking needs to develop mechanisms to better recognise, and build on, the diverse forms of change and adaptation already being undertaken by many rural householders. The study found many instances of householders adopting a series of energy and water consumption reduction technologies and practices, with many clearly being strongly convinced of the benefits they had accrued from the changes they had made. There is, hence, a potential group of strong and experientially knowledgeable advocates for rural domestic renewable energy production and energy and water conservation, whose voices and knowledge could potentially be harnessed to promote change.

Second, and relatedly, there needs to be more extensive and detailed studies, particularly in relation to water consumption, where there is a clear lack of publicly accessible data that could be used to inform policy making. This lack is, it is suggested, particularly significant given the study's evidence of widespread criticism and distrust of water companies. Third, it is argued that policy makers need to recognise that people's responses to water and energy consumption initiatives may well be conditioned by wider normative assessments of performance on a range of other criteria, such that addressing and communicating information on other issues of concern, such as leakage reduction or water quality, might be central to the success of future consumption reduction initiatives.

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1. Introduction

1.1. Background Context

Concerns about energy and water consumption have grown over recent decades, in part related to their respective causal and consequential connections to climate change. The consumption of energy produced from carbon-based fuels has been identified as a major cause of global climate change, whose likely impacts include shifts in rainfall patterns. In the UK, rainfall changes include an increased likelihood of periods of low rainfall or drought during summer months and more frequent and high-intensity rainfall in winter months. The impacts of these changes have been seen to include a likely decrease in available water supply by 7% by 2045 (National Audit Office, 2020). This, alongside projected population increases and increasing demands for water, in part stemming from climate change, has led to predictions that by 2050, there will be a shortfall between demand and sustainable supplies of 5 billion litres of water per day (Environment Agency, 2024). In addition, climate change is likely to create significant challenges around flooding, effluent discharges and water pollution.

Over the last couple of decades, there have been significant reductions in levels of domestic energy consumption in England, except during the period of the Covid-19 pandemic, when there was a slight rise (DESNZ, 2023). In part, the general decline since the millennium has reflected efforts to increase the energy efficiency of buildings, driven in large part by concerns to reduce the consumption of carbon-based fuels and the associated emissions of greenhouse gases. However, technological developments and price reductions in digital smart metres, solar panels, heat pumps, energy-efficient electrical devices and boilers, as well as concerns over energy costs, fuel poverty and energy security, have all been policy and practice stimuli to reducing domestic energy consumption (see Bolton, 2025). The Government's recently announced Warm Homes Plan (DESNZ, 2026), for example, seeks to triple the number of UK homes with solar panels and increase the number of heat pump installations to 450,000 per year, in order to simultaneously address climate change, energy security, household energy costs and fuel poverty.

During the period of the Covid pandemic, there was also a rise in domestic water consumption (Abu-Bakar et al., 2021), and although there have been slight falls in water consumption since this time, use of water has generally increased over the last two decades. The Government has set a legally binding target, under the 2021 Environment Act, for there to be in England a per-capita reduction in use of public water supplies from a 2019-20 baseline of 20% by 2038 (Environment Agency, 2024). This is seen to require a reduction of domestic water use from its current level of around 134 litres per person per day (Environment Agency, 2025) to 122 litres, as well as reductions in water leakages by 37% and non-household water use by 9%, with further reductions by 2050 to 110 litres per person per day, a 50% leakage reduction and a 15% reduction in non-household water use. This is to be achieved when climate change itself is viewed as likely to decrease available water supply by 7% by 2045 (National Audit Office, 2020), as well as potentially create increased demands for water and a series of additional challenges around flooding, effluent discharges and water pollution. It is also expected that the population of England will grow by over 10 million people over the next two decades, with "a large part of this growth occurring in areas where water is already scarce" (Defra, 2019: 1).

In relation to both energy and water, consumption reduction strategies in the UK have often focused on the employment of technological solutions, including improved insulation in relation to energy and flow reduction equipment in relation to water use, although the adoption and efficient use of these technologies often requires awareness, behavioural actions and a willingness to pay, all of which may be limited amongst some consumers and may be impacted by other contemporary events and challenges, including concerns over a range of rising living costs. Household spending on energy in the second half of 2022 and the first half of 2023 was, for example, viewed as being 57% higher than it had been 23 months earlier (House of Commons Library, 2024: 11), while some water companies have recently requested that water bills be allowed to increase by up to 40% by 2050 (Simpson, 2024). However, major concerns have been raised by increased energy and water bills, both in relation to their general impacts on living costs, but also how they may particularly impact people on low incomes. A series of measures of fuel poverty have been developed for England since the early 1980s (see Semple et al., 2025), and studies have identified a range of geographical patterns to, and influences on, its occurrence (Bridgen & Robinson, 2025). These include research examining rural distributions and influences, with studies (e.g. Robinson et al. 2018; DESNZ, 2024a) highlighting the presence in rural areas of high fuel poverty levels and 'gaps' (which refer to the levels that fuel costs would need to reduce before households would not be in fuel poverty). Both features have been seen to relate, in part, to the presence in rural areas of higher proportions of ‘hard to heat’ (HTH), ‘hard to treat’ (HTT) and off-gas-grid homes, as well as low levels of pay in some rural businesses.

Low pay levels can clearly also impact the ability to pay water bills, and although less widely recognised than fuel poverty, water poverty has been viewed as impacting between 5 and 20 % of UK households (Sylvester et al., 2023). Furthermore, households suffering from energy poverty are also likely to experience water poverty, and vice-versa, as recognised by the Priority Services Register, which, for example, recognises how physical and mental health needs, as well as other vulnerabilities, can impact on both energy and water needs and accessibilities. Previous research by Rural England (Dunwoodie Stirton & Reed, 2023), for example, has highlighted how disruptions to energy and water supplies are more common in rural areas and could significantly impact on people who are reliant on medical equipment, such as oxygenators or heart monitors, or have physical or mental health conditions which mean that they are vulnerable to cold or hot temperatures or poor lighting conditions. On the other hand, many rural areas also have relatively high proportions of middle-class households with high incomes and large properties, with studies indicating that domestic energy consumption tends to increase with income levels (e.g. Büchs & Schnepf, 2013; Druckman & Jackson, 2008; Phillips & Dickie, 2015; Viggers et al., 2017).

Rising energy and water costs not only raise questions of poverty, social exclusion and health vulnerabilities, but have also been seen to impact on the enactment of water and energy conservation, both through fostering reductions in consumption as people seek to limit levels of personal/household expenditure, but also, conversely, through acting to heighten opposition to climate mitigation and adaptation policies, in part because these may act to further disadvantage those in poverty (Atkins, 2022; Salite et al., 2023). It has also been suggested that recent falls in energy prices may have led to increases in consumption (DESNZ, 2025), which, if sustained, could potentially undermine energy conservation strategies as well as lead households into energy poverty. As yet, however, there have been few examinations as to how such divergent influences play out in households in particular types of localities, including rural areas.

This report seeks to examine energy and water use in rural areas of England, drawing on research exploring patterns of consumption and the adoption of infrastructures, technologies and practices to reduce this consumption. Attention will be paid to the motives and barriers to adoption, as well as the degree to which perceptions of economic costs and climate change may facilitate or hinder energy and/or water consumption reductions.

1.2. Aims of Study

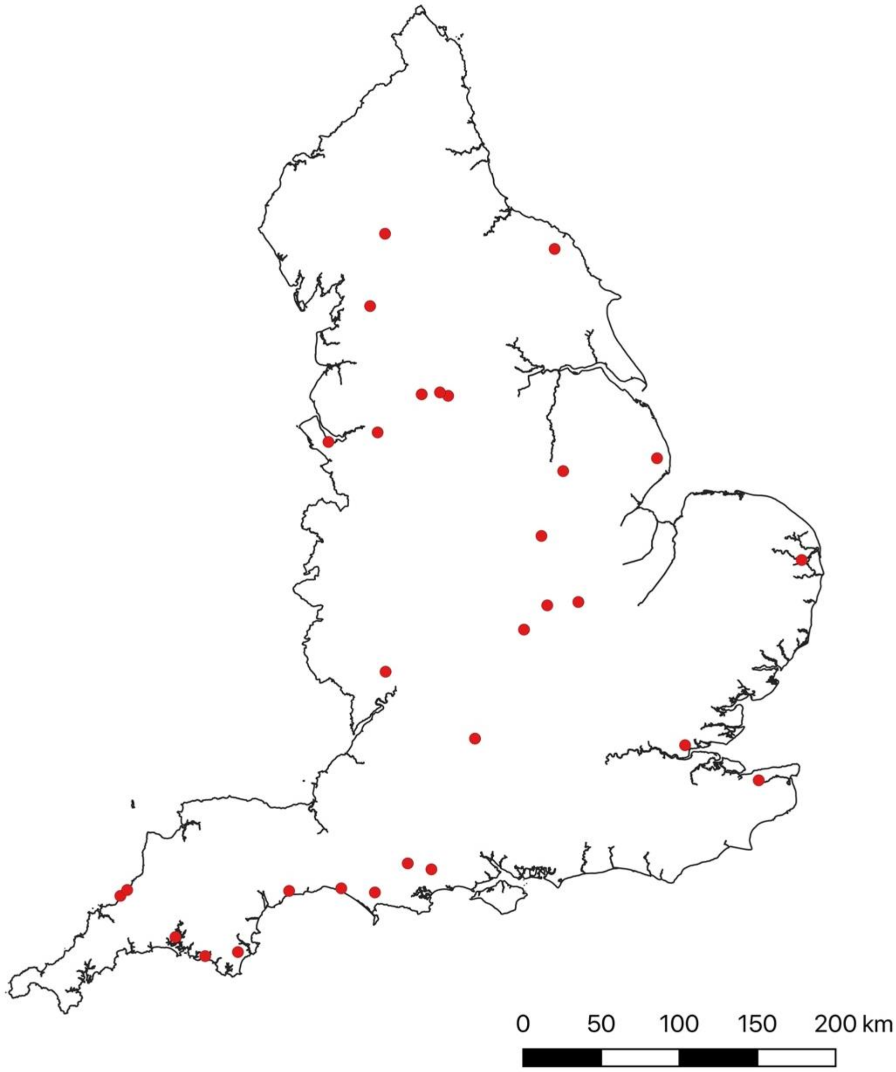
The specific aims of the research that this report draws on, were to:

1) Assess the character of energy and water consumption in rural England, considering both its variability from urban levels and its intra-rural variability;
2) Examine the level and character of energy and water consumption reduction practices and technologies enacted by rural residents, as well as their employment of domestic renewable energy production;
3) Evaluate the drivers of, and barriers to, technological adoption and practice change in relation to domestic energy and water;
4) Consider motivational and attitudinal influences on energy and water use transitions.

1.3. Methodology

To address these aims, the study employed two methodological approaches. First, it collated and analysed information and secondary datasets related to energy and water consumption produced by Government Departments, including the Department of Environment and Rural Affairs (Defra), the Department for Energy Security and Net Zero (DESNZ) and the Ministry of Housing, Communities and Local Government (MHCLG), as well as Non-Departmental Public Bodies such as the Environment Agency, Ofwat and the Office for National Statistics (ONS). Where datasets included some georeferencing, they were conjoined with rural-urban classifications produced by Defra for the 2011 Census (Defra, 2017b) and Office for National Statistics (2025c, 2025d) to enable analysis both of urban-rural differentiation and intra-rural variation.

Figure 1: Location of Respondents to Questionnaire Survey



Source: based questionnaire survey

Second, the study will draw on the results of an online questionnaire survey distributed via the Rural Service Network (RSN) and Rural England, and through contacting parish councils and leafleting in a selection of rural settlements. Overall, 80 people completed the questionnaire, with respondents being located across England (see Figure 1) and in a range of types of rural locations as identified in the Rural Urban Classifications of Defra (2017b) and the Office for National Statistics (2025d) (see Tables 1 and 2). Respondents to the survey were asked to identify that they were not only living in an area they considered to be rural, but also to characterise the type of rural area they were living in, drawing from a range of descriptors (see Table 3). Despite their differences, all three types of assessment indicate that the questionnaire included responses from a range of rural areas, including some that can be seen as having some urban characteristics, as well as others that involve small-scale settlements that are quite distant from urban centres.

Table 1: Self-Assessment of Residential Location of Survey Respondents

Character of residential location	% of questionnaire respondents
Suburban area on edge of town or city	5.0
Small rural town	21.3
Village	48.8
Hamlet	17.5
Open countryside with scattered dwelling	7.5

Source: questionnaire survey

Table 2: Residential Location of Survey Respondents According to Defra's Rural Urban Classification

Character of residential location	% of questionnaire respondents
Major Conurbation	3.6
Minor Conurbation	0.0
Urban City and Town	25.0
Urban City and Town in a Sparse Setting	10.7
Rural Town and Fringe	0.0
Rural Town and Fringe in a Sparse Setting	0.0
Rural Village and Dispersed	25.0
Rural Village and Dispersed in a Sparse Setting	14.3
Rural Hamlets and Isolated Dwellings	21.4
Rural Hamlets and Isolated Dwellings in a Sparse Setting	0.0

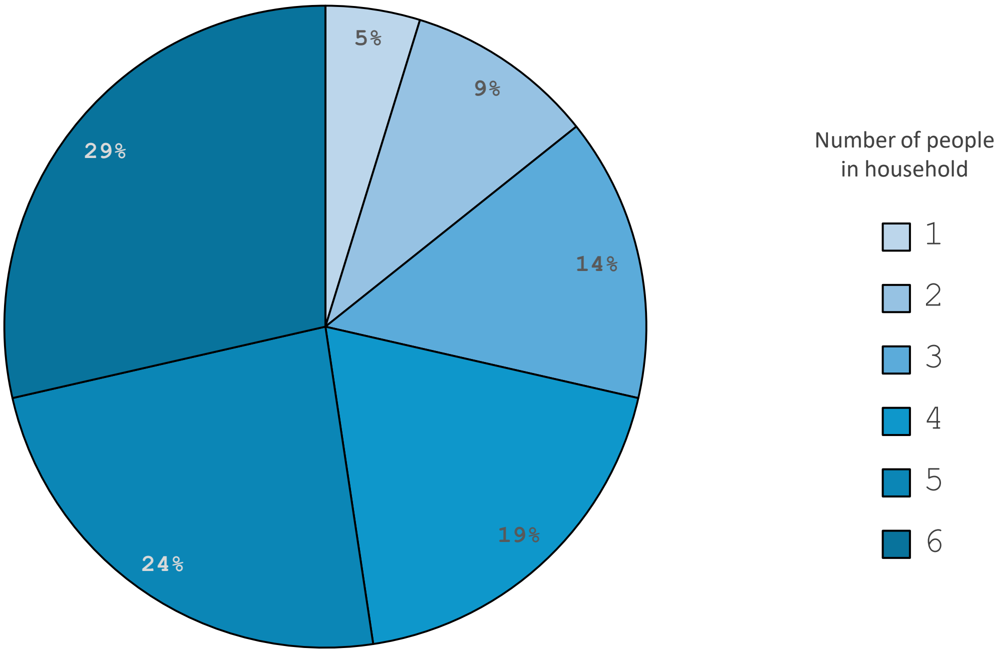
Source: based on questionnaire survey; Defra (2017b) *The 2011 Rural-Urban Classification for Output Areas in England*. London: Government Statistical Services.

Table 3: Residential Location of Survey Respondents According to Office for National Statistics' Rural Urban Classification

Character of residential location	% of questionnaire respondents
Urban: Nearer to a Major Town or City	32.1
Urban: Further from a Major Town or City	0.0
Larger Rural: Nearer to a Major Town or City	10.7
Larger rural: Further from a Major Town or City	3.6
Smaller rural: Nearer to a Major Town or City	25.0
Smaller rural: Further from a Major Town or City	28.6

Source: based on questionnaire survey; Office for National Statistics (2025d) Rural Urban Classification (2021) of Output Areas in EW.

Figure 2: Size of Households Among Survey Respondents



Source: questionnaire survey

As Figure 2 and Table 4 indicate, the respondents lived in a range of sized households, types and ages of property, with 86% of households consisting of more than 2 people, and 53% in households of over 5 people, 47% of properties being detached and almost 63% built between 26 and 100 years ago. Almost 54% of respondents were retired, just under 29% were in full-time employment or running a business full-time, and approaching 14% were working or running a business part-time. While the proportion of detached dwellings was close to the 44% average for rural England established in the 2021 Census (Defra, 2025), the figures for retirement were lower and the distribution of household size seems unexpectedly focused on larger units. This may reflect 'empty-nest' respondents including children who were no longer living in households in their responses, or alternatively, responses may have been attracted from people living in large households, perhaps because energy and water costs may be particularly high in such cases.

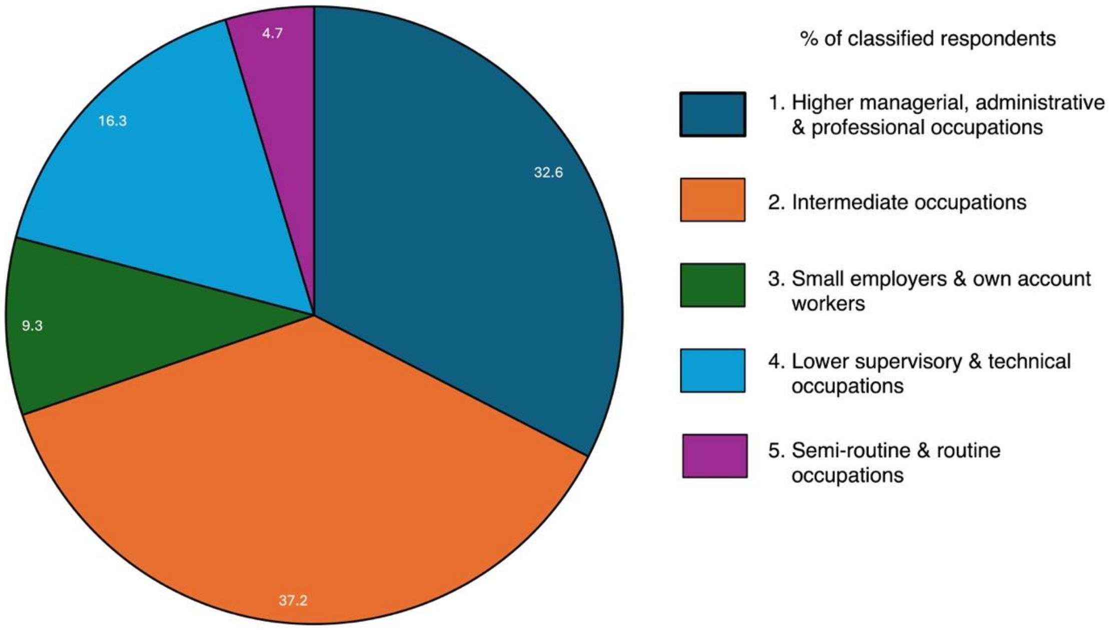
In terms of class composition, as illustrated in Figure 3, the survey had a high proportion of 'service class' respondents (i.e. NS-SEC 1), but had slightly more people classified as working in 'intermediate occupations', suggesting that it was people in the 'lower' rather than 'upper' middle classes who were drawn to respond to the survey. There was also a significant proportion of responses from people working in lower supervisory and technical occupations. It should, however, be noted that 43% of respondents failed to provide sufficient information to enable classification of their socio-economic class position, hence Figure 3 is based on only information from 43 survey respondents.

Table 4: Property Characteristics Survey Respondents' Lived In

Age of Property (years)	Number of Properties of Difference Types							
	Bungalow/ single-storey building	Cottage	Detached house	Semi-Detached house	Terraced House	Other property type	No property type given	Total Properties by Age
< 5 years	1		1					2
11 - 25			5	1	2			8
26 - 50	5		9	2	3			19
51 - 100	6		4	7	2		1	20
101 - 200			7	2	2			11
> 200 years		2	8	3	2	1	1	17
Other response		1	1					2
Don't know			1					1
Age of All Properties	12	3	36	15	11	1	2	80

Source: questionnaire survey

Figure 3: Class Composition of Survey Respondents, based NS-SEC 5 Class Classification



Source: questionnaire survey

It was hoped that a larger number of people would have responded to the requests for participation, and efforts were made to increase the number of respondents, both by recirculating information about the survey and by distributing details of the survey to a small selection of rural councils with diverse profiles of energy and water consumption. These efforts only increased the number of responses slightly. The limited sample size clearly means that the questionnaire survey cannot be taken to have produced a representative study, but the information and comments provided by respondents did provide valuable qualitative insights on water and energy consumption that are unavailable in the secondary datasets. Details of the age, employment status and class position of respondents who are quoted, along with a brief description of their property type and its physical characteristics, are given in Appendix 1.

2. Energy Consumption by Rural Residents in England

Rural areas of England have long been shown to have above-average levels of domestic electricity consumption (e.g. Commission for Rural Communities, 2005; Phillips, 2019; Phillips & Dickie, 2019), a feature that is also clearly evident in Table 5, which shows average rural domestic electricity and gas consumption figures for 2016 and 2023, along with information on the proportion of households that were not connected to mains gas and dwellings that were rated in the two least energy efficiency categories. To enable temporal comparison, Defra's (2017b) Rural-Urban Classification was employed, and it is evident that while rural areas in both 2016 and 2023 had average electricity consumption per capita and per

Table 5: Energy Consumption and Off-Gas-Grid and Low Energy Efficiency Dwellings in Rural and Urban Areas of England and Wales, 2016 and 2023-4

Area characteristic	Mean annual electricity consumption (kWh)				Mean mains gas consumption 2023			% of households off-gas-grid		% of dwellings with F or G energy efficiency certificates, 2024
	Per Person		Per Household							
	2016	2023	2016	2023	Per Person	Per Household	Per meter	2016	2023	
Urban major conurbation	1592.3	1370.4	3883.1	3395.9	4538.2	11410.1	12052.3	9.1	10.6	1.9
Urban minor conurbation	1500.8	1325.8	3542.5	3114.2	4806.4	11284.0	11430.2	5.0	6.8	1.9
Urban city & town	1651.6	1412.0	3917.4	3354.1	4551.9	10797.4	11117.4	6.0	8.4	1.9
Urban city & town in sparse setting	1735.1	1506.1	3911.7	3360.6	4591.1	10004.2	10219.6	7.3	11.5	3.5
Rural town & fringe	1875.4	1620.2	4408.9	3760.4	4691.1	10749.7	11693.6	8.7	10.7	3.4
Rural town & fringe in sparse setting	2071.2	1834.6	4499.1	3907.4	4425.2	9354.8	10872.1	9.5	12.6	7.0
Rural village & isolated dwellings	2467.2	2184.8	6037.0	5278.7	2548.1	6147.4	13918.6	33.1	34.6	11.2
Rural village and isolated dwellings in sparse setting	2564.3	2356.5	5912.4	5714.5	853.6	1892.8	12589.2	27.7	28.8	22.2
All rural areas	2155.5	1892.0	5144.7	4466.4	3622.3	8396.9	12487.9	19.5	21.3	7.7
All urban areas	1621.6	1391.9	3887.7	3361.2	4557.2	11062.5	11504.8	7.2	9.2	1.9
All areas	1716.9	1391.9	4112.1	3543.7	4355.1	10513.2	11608.0	9.4	11.7	2.8

Sources: based on Phillips, M. and J. Dickie (2019) Post carbon ruralities. In: M. Scott, M. et al. (eds.) *Routledge Companion to Rural Planning*. Routledge, p. 525; Defra (2017a) The 2011 Rural-Urban Classification for Local Authority Districts in England; DESNZ (2024b) Domestic electricity consumption by Lower Layer Super Output Area (LSOA), Great Britain, 2010 – 2023; DESNZ (2024c) LSOA domestic gas 2010 to 2023; DESNZ (2024d) LSOA estimates of properties not connected to the gas network; Office for National Statistics (2024) Energy efficiency of housing in England and Wales: 2024.

household figures that were higher than urban areas (by almost 33% and 36% respectively in per capita terms and 32% in both years per household), it is clear that there have been declines in both per capita and household electricity consumption figures for all categories of areas over this period. Rural villages and dispersed areas appear to have seen the largest per capita and per household reductions in electricity consumption, although their figures still remain higher than all other categories of areas, apart from those classified as Rural Village and Dispersed in a Sparse Setting.

The figures for mains gas shown in Table 5, by contrast, show lower per capita and per household consumption levels in rural areas than urban ones. However, the Table also demonstrates that rural areas have a lower proportion of households with mains gas supply, with the relative number of such premises actually increasing. This is in part due to governmental pressures on the construction industry to avoid fitting gas central heating in residential new-builds, but instead install alternative forms of domestic heating, including heat pumps and district heating systems. However, as Table 5 indicates, the proportion of properties without mains gas supply is significantly higher in rural areas, being particularly high amongst areas classified as 'Rural Village and Isolated Dwellings' and 'Rural Village and Isolated Dwellings in Sparse Settings' in Defra's (2017b) Rural-Urban Classification.

One implication of this high proportion of households without mains gas access is that the average figures for per household and per capita gas consumption are likely to be misleading, as they will be deflated through the inclusion of people and households who are not consuming mains gas. A more reliable figure is gas consumption per meter, and this indicates that the average consumption of gas, like electricity, is higher in rural than urban areas, and again is highest in areas classified as 'Rural Village and Isolated Dwellings' and 'Rural Village and Isolated Dwellings in Sparse Settings' in Defra's (2017b) Rural-Urban Classification. These areas contain settlements that are the smallest in population size and in relation to the sparse setting category, are relatively distant from other settlements. These two characteristics are also reflected in the Office for National Statistics' (2025c) updated Rural Urban classification, although this replaces sparsity with a measure of connectivity based on travel times to a major town or city.

Table 6 illustrates how electricity and gas consumption, as well as proportions of properties off-the-gas-grid and with low energy efficiency ratings, vary according to the latest Rural-Urban Classification. It clearly confirms the presence of significant rural-urban differences across all these aspects of energy consumption, and that smaller rural settlements, both near and distant from urban settlements, have higher levels of electricity and gas consumption, off-gas-grid properties and low energy efficiency buildings. The last feature, however, is significantly more prevalent in small rural settlements that are distant from urban settlements, a finding borne out by Figure 4, which shows the geographical distribution of the proportion of assessed premises in rural LLOAs with the two lowest and highest energy efficiency ratings.

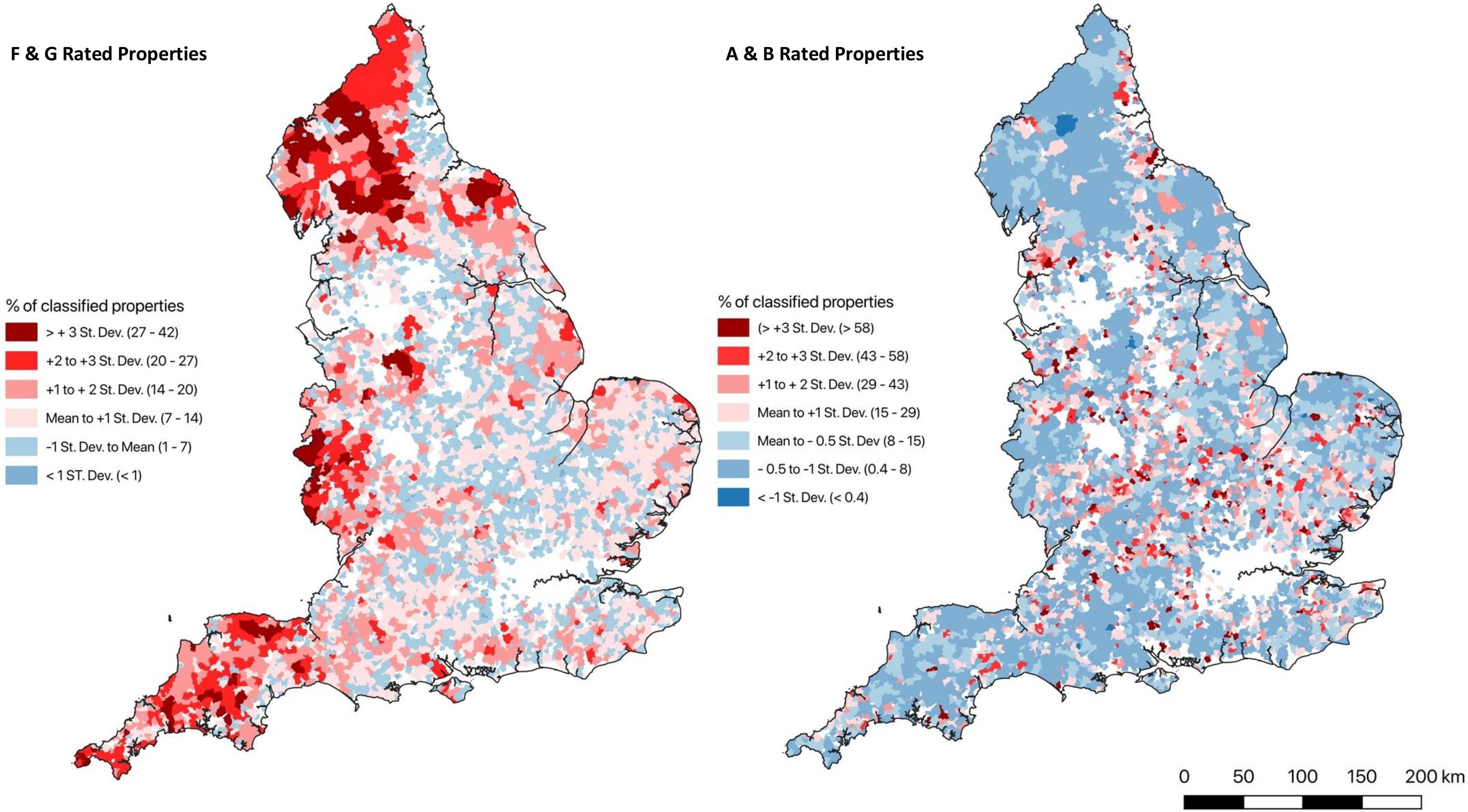
The distribution of the former shows a striking regionalised pattern, with residential

Table 6: Energy Consumption, Off-Gas-Grid and Low Energy Efficiency Dwellings in Rural and Urban Areas of England, Defra 2025 Classification

Area characteristic	Annual consumption per meter 2023 (kWh)				Percentage of households off-gas-grid 2024	% of dwellings with energy efficiency certificates F & G 2024
	Electricity		Mains Gas			
	Mean	Median	Mean	Median		
Urban: Nearer to a major town or city	3188.8	2552.3	11581.2	10344.0	9.8	1.8
Urban: Further from a major town or city	3112.4	2469.3	10262.3	9045.1	10.1	2.2
Larger rural: Nearer to a major town or city	3468.1	2692.1	11823.7	10637.1	9.7	2.8
Larger rural: Further from a major town or city	3558.9	2717.9	10860.1	9558.7	12.6	5.0
Smaller rural: Nearer to a major town or city	4891.0	3504.1	14398.2	12665.8	32.6	9.2
Smaller rural: Further from a major town or city	4915.1	3532.7	13225.3	11513.8	34.7	14.2
All rural areas	4169.5	3091.0	12611.1	11178.3	21.5	7.1
All urban areas	3183.4	2546.4	11487.6	10251.8	9.8	1.8
All areas	3345.7	2636.1	11650.4	10386.0	11.7	2.7

Sources: based on DESNZ (2024b) Domestic electricity consumption by Lower Layer Super Output Area (LSOA), Great Britain, 2010 – 2023; DESNZ (2024d) LSOA estimates of properties not connected to the gas network; Office for National Statistics (2024) Energy efficiency of housing in England and Wales: 2024; Office for National Statistics (2025c) Rural Urban Classification (2021) of LLSOAs in EW.

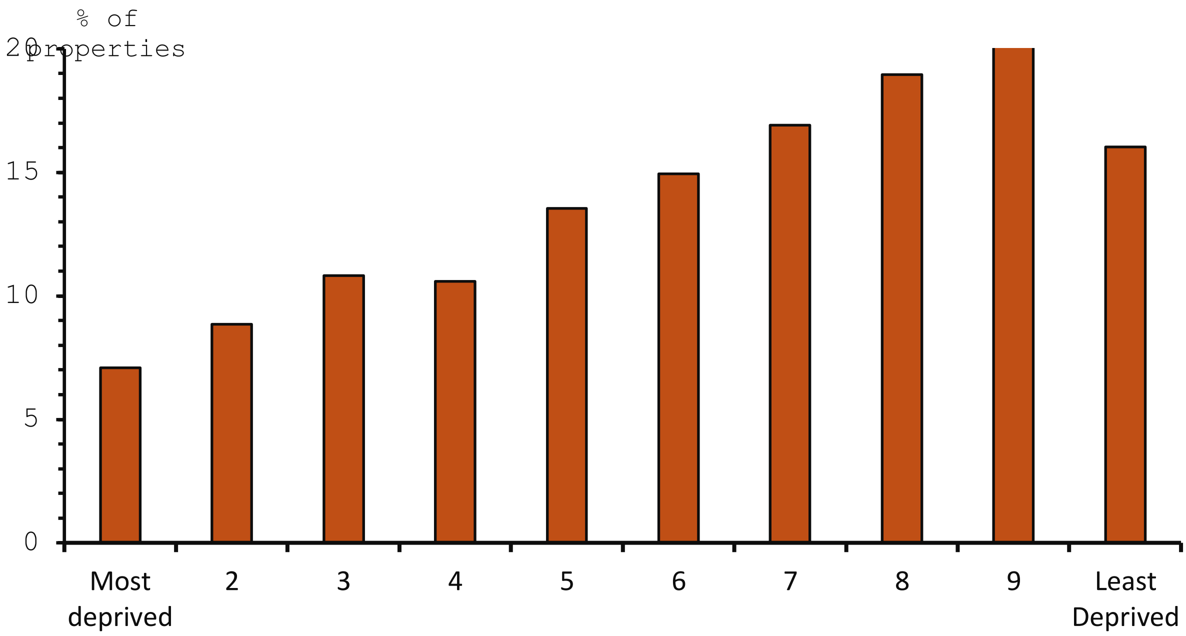
Figure 4: Low and High Energy Efficient Buildings in Rural England, 2024



Sources: based on Office for National Statistics (2024) Energy efficiency of housing in England and Wales: 2024; Office for National Statistics (2025c) Rural Urban Classification (2021) of LLSOAs in EW properties with poor energy efficiency (i.e. Bands F and G) being relatively more common in more remote and upland regions, such as Cumbria, Northumberland, North Yorkshire, the Staffordshire Moorlands, the Malvern Hills in Shropshire, the Black Mountains in west Herefordshire, Exmoor and Dartmoor in Devon, and Bodmin and the Lizard Peninsula in Cornwall. Heating needs may be particularly important in such areas, but high proportions of dwellings may be hard-to-heat and hard-to-treat to make more energy efficient due to the use of solid wall construction, both because of the historic use of stone in buildings in these locations and because of planning development controls focused on conserving the aesthetic character of buildings in their regions.

Figure 4 also highlights that most rural areas have very low proportions of properties assessed in the highest two bands (i.e. A and B), with those having these ratings tending to be located in the Home Counties or in areas close to major cities, including Birmingham, Exeter, Newcastle and Norwich. There clearly may be class or income influences on the distribution of high-energy efficiency housing, which is borne out to a large degree in Figure 5, which shows the proportion of A- and B-rated premises in rural Lower Level Superoutput Areas (hereafter LLSOAs) assessed against the decile of these areas in the 2025 Index of Multiple Deprivation (hereafter IMD2025). This Figure shows there is a tendency for the proportion of properties to be higher as areas become less deprived, although there is a slight decline in the least deprived decile.

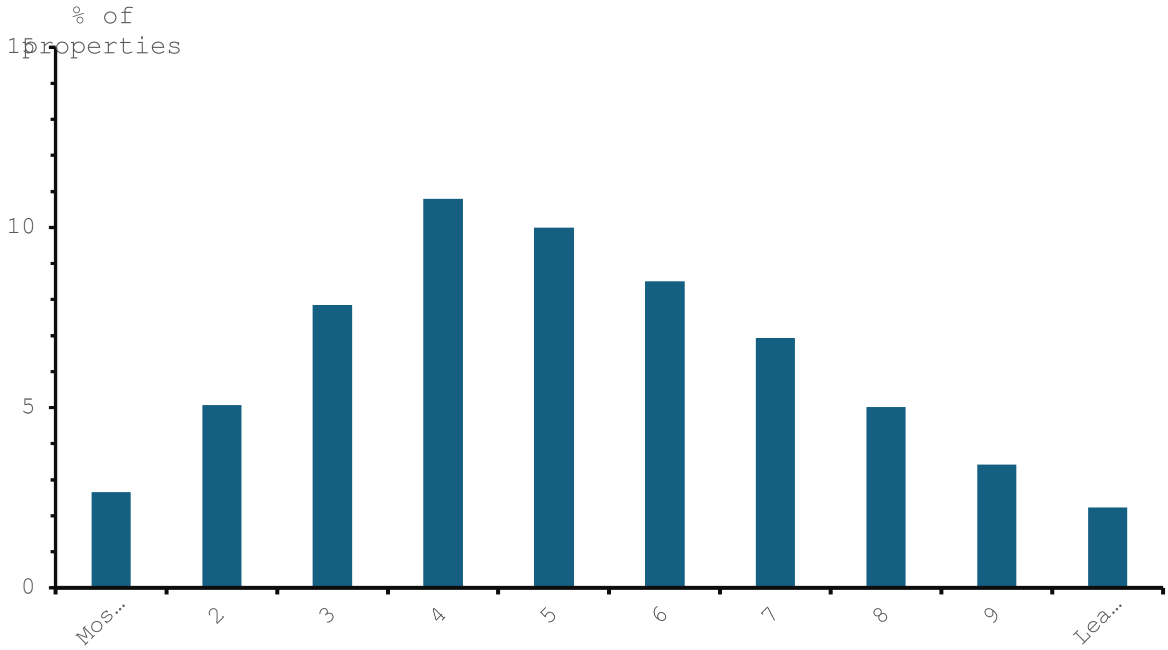
Figure 5: Proportion of Residential Properties in English Rural LLSOAs with A and B Energy Ratings against 2025 Index of Multiple Deprivation Decile.



Sources: based on Office for National Statistics (2024) Energy efficiency of housing in England and Wales: 2024; Office for National Statistics (2025c) Rural Urban Classification (2021) of LLSOAs in EW; MHCLG (2025b) English Indices of Deprivation: File 1.

A much less linear relationship is evident when the proportion of premises with the two lowest energy-efficient assessments (grades F and G) is assessed against IMD2025 decile (see

Figure 6: Proportion of Residential Properties in English Rural LLSOAs with F and G Energy Ratings against 2025 Index of Multiple Deprivation Decile.

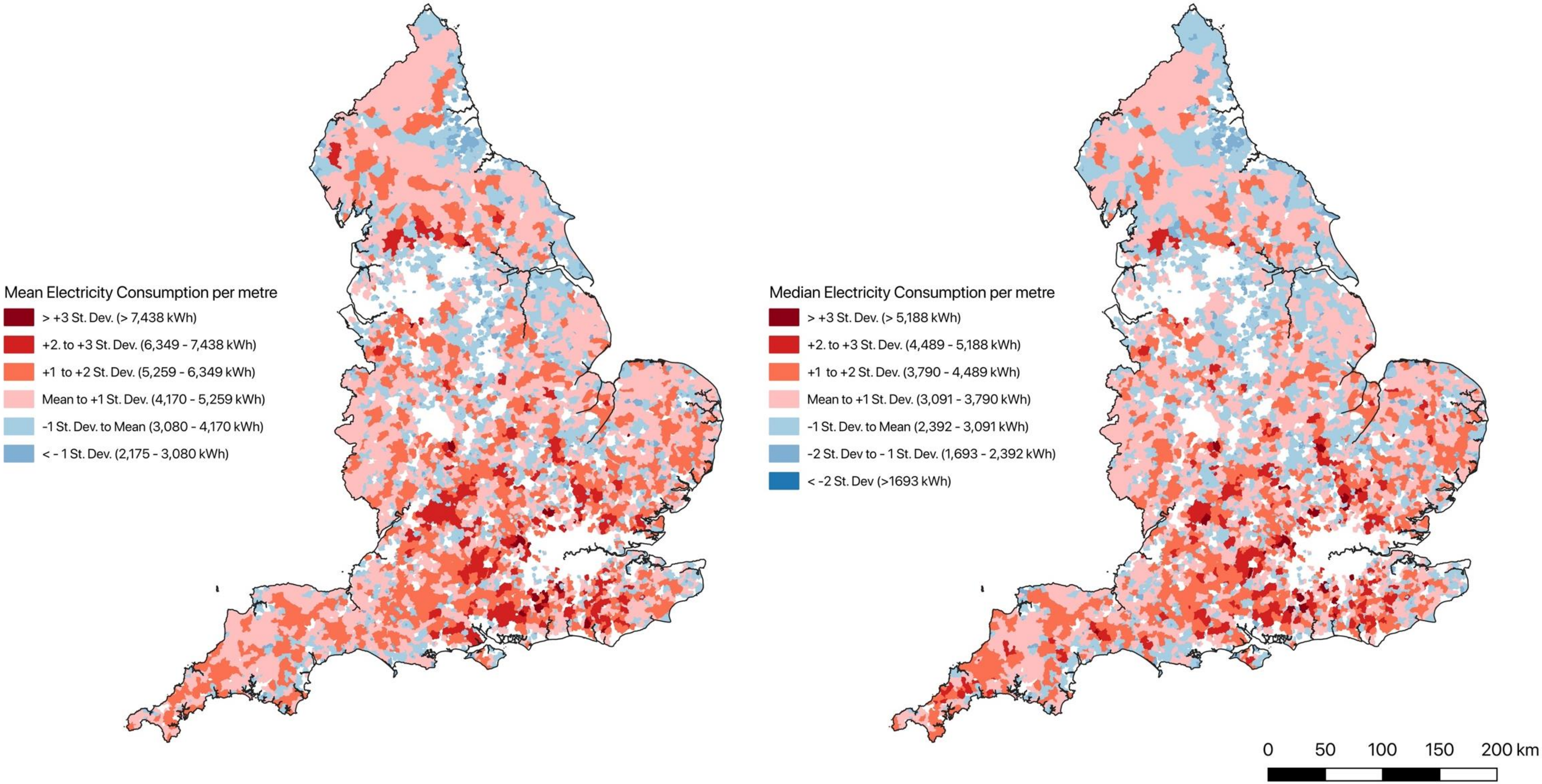


Sources: based on Office for National Statistics (2024) Energy efficiency of housing in England and Wales: 2024; Office for National Statistics (2025c) Rural Urban Classification (2021) of LLSOAs in EW; MHCLG (2025b) English Indices of Deprivation: File 1.

Figure 6). This Figure suggests that rural areas with both high and low deprivation scores often have quite low proportions of dwellings with low energy efficiency performance, whilst areas that are more middle-ranked in relation to deprivation may have higher proportions of residential properties with low energy efficiency rankings. This distributional pattern highlights how poor energy efficiency may reflect a series of extra-economic influences, including the age when buildings were constructed and the style of dwellings.

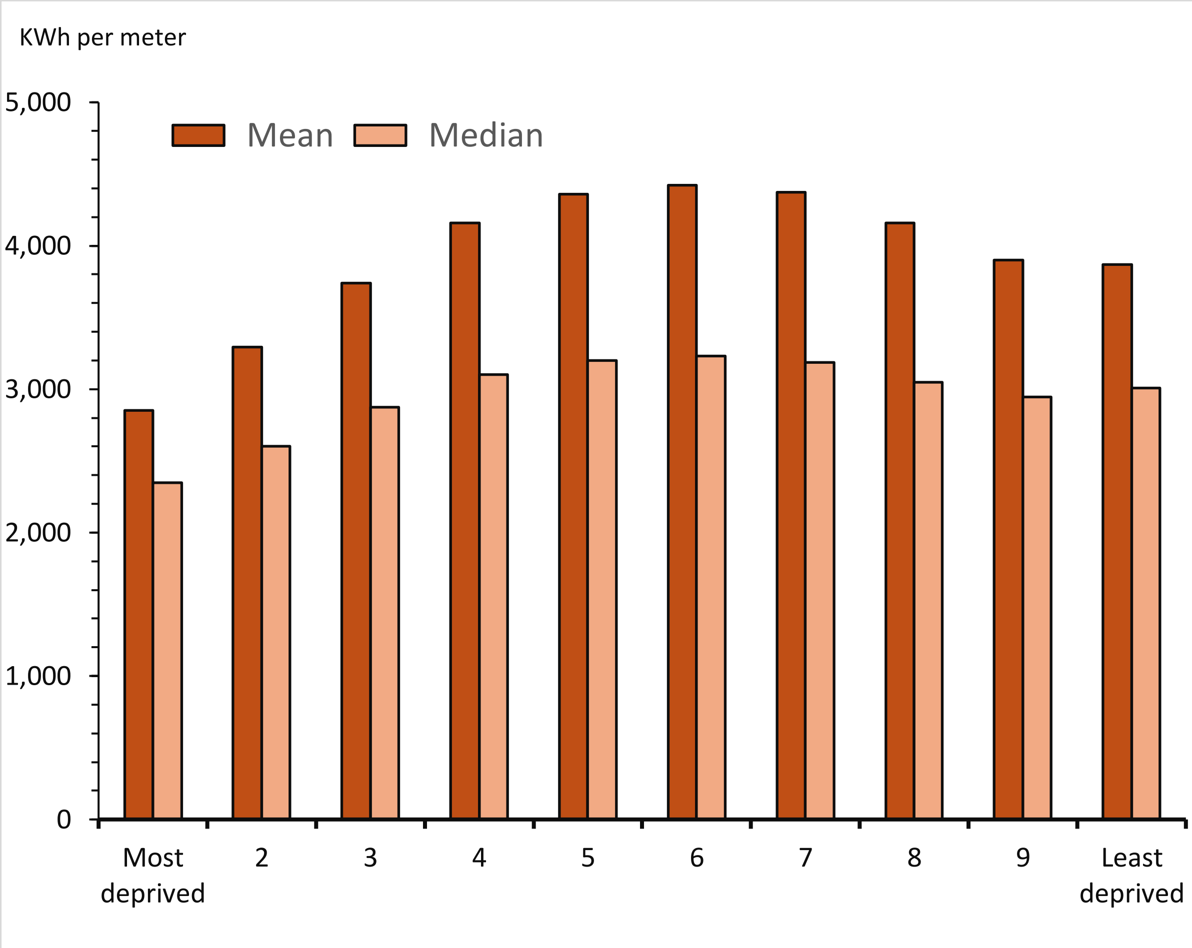
Figure 7 shows the mean and modal distribution of electricity consumption per meter in rural areas of England as defined by the Office for National Statistics' (2025c) Rural Urban Classification. The maps broadly show similar distributional patterns, with rural areas with higher levels of electricity consumption appearing to be concentrated in southern England and in regions relatively distant from urban centres in northern England. Many of the areas with high levels of electricity consumption were also areas with relatively large numbers of low energy efficiency housing, and it has already been argued that the distribution of the latter appears to have some association with areal differences in deprivation levels. Given this, it may be expected that differences in electricity consumption may also reflect areal differences in deprivation levels. Figure 8 indicates that this is the case, to a degree, for both mean and median per meter electricity consumption levels, although levels do fall in each of the four least deprived deciles. This might stem from the increasing presence of premises with high energy efficiency in many of these deciles (see Figure 4), although a range of other factors may also be significant, including variations in household size, building construction and the use of non-electricity based forms of energy.

Figure 7: Mean and Median Electricity Consumption in Rural England, 2023



Sources: based on DESNZ (2024b) Domestic electricity consumption by Lower Layer Super Output Area (LSOA), Great Britain, 2010 – 2023; Office for National Statistics *(*2025c) Rural Urban Classification (2021) of LLSOAs in EW

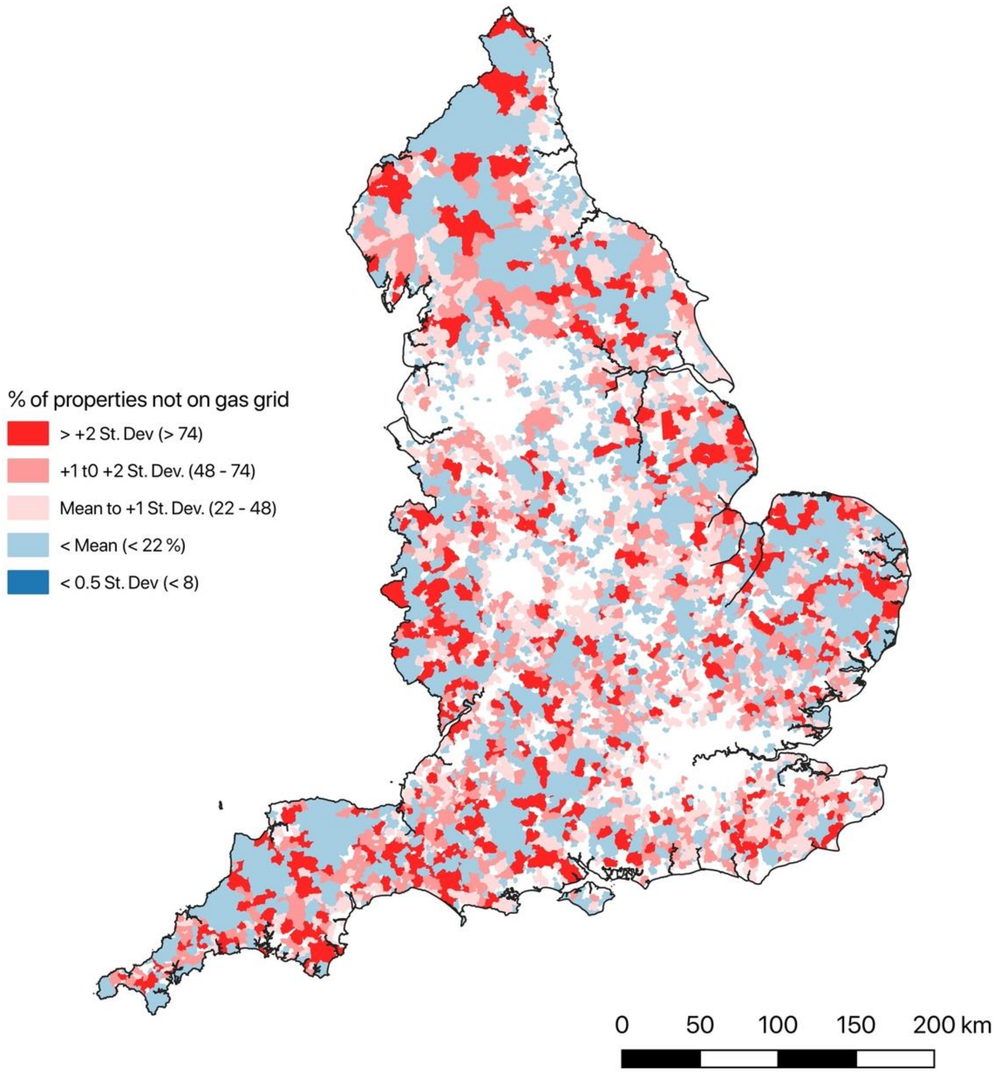
Figure 8: Mean and Median Electricity Consumption 2023 in Rural LLSOAs by 2025 Index of Multiple Deprivation Decile



Sources: based on DESNZ (2024b) Domestic electricity consumption by Lower Layer Super Output Area (LSOA), Great Britain, 2010 – 2023; DESNZ (2024d) LSOA estimates of properties not connected to the gas network; Office for National Statistics (2025c) Rural Urban Classification (2021) of LLSOAs in EW; MHCLG (2025b) English Indices of Deprivation: File 1.

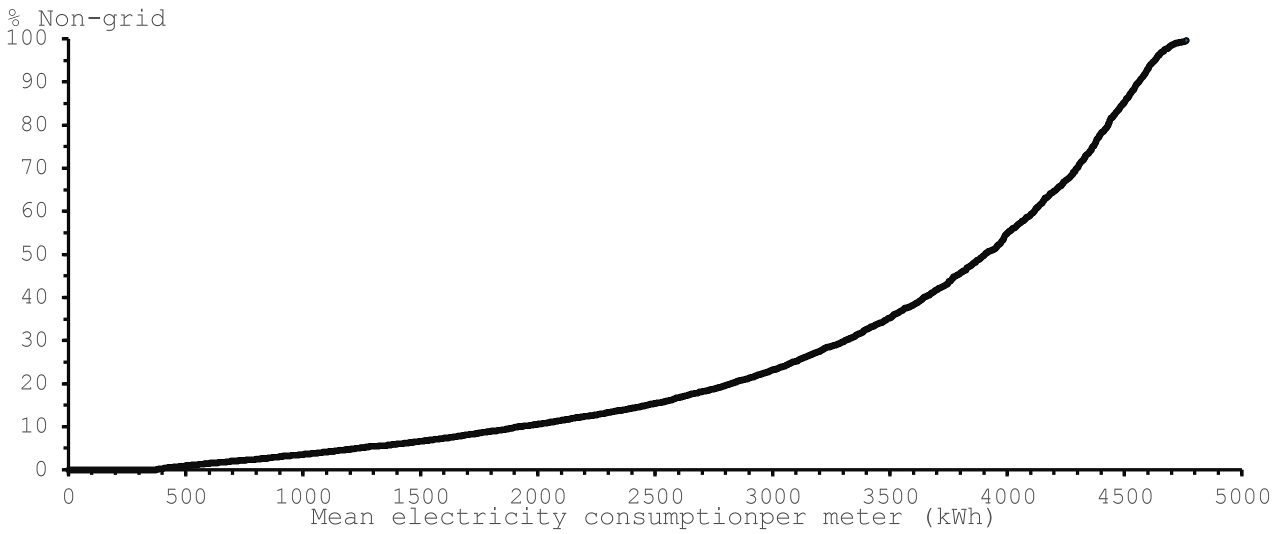
In relation to the use of non-electricity-based energy, it has already been shown in Tables 5 and 6 that rural areas, and particularly those with smaller-sized settlements, have a lower proportion of households with mains gas supply. Figure 9 shows the geographical distribution of households without mains gas supply, and it is clear that some of the areas in northern England with high per capita electricity consumption also appear as areas with many off-gas-grid households. However, it is also apparent that many rural areas across England had high proportions of households without a gas-grid connection, including many in southern England, which as noted earlier, also has many LLSOAs with high per capita electricity consumption. As Figure 10 indicates, there does seem to be a strong correlation between mean electricity consumption and the proportion of properties without a gas-grid connection. This suggests that, in part, the high levels of electricity consumption in these areas reflect supply substitution of electricity to heat homes when mains gas supply is unavailable. However, it is also important to recognise that many homes in areas without mains gas supply make use of other energy sources, including oil, wood or liquid petroleum gas (hereafter LPG), as well as

Figure 9: Proportion of Properties not on Mains Gas-grid, 2023



Sources: DESNZ (2024d) LSOA estimates of properties not connected to the gas network; Office for National Statistics (2025c) Rural Urban Classification (2021) of LLSOAs in EW.

Figure 10: Mean Electricity Consumption by % Off-Gas-grid Properties in Rural LLSOAs, 2023.



Sources: based on DESNZ (2024b) Domestic electricity consumption by Lower Layer Super Output Area (LSOA), Great Britain, 2010 – 2023.

Table 7: Sources of Energy Used in Domestic Central Heating in Rural England, 2021

Source of domestic heating	Average Proportion of Households in Rural Output Areas				
	Larger rural: Nearer to major town or city	Larger rural: Further from major town or city	Smaller rural: Nearer to major town or city	Smaller rural: Further from major town or city	Total Rural
Mains gas only	79.5	66.9	44.5	25.9	55.8
Oil only	3.0	7.6	24.7	35.5	17.1
Two or more energy sources (excluding renewable energy)	8.5	9.4	12.3	15.1	11.2
Electric only	5.3	10.2	6.1	8.5	6.9
Tank or bottled bottle gas	0.8	1.4	5.5	5.4	3.3
Renewable only	0.4	0.9	2.0	2.7	1.4
Two or more energy sources (including renewable energy)	0.7	0.8	1.4	1.7	1.1
Solid fuel only	0.3	0.4	0.8	1.2	0.7
Wood only	0.1	0.2	0.8	1.3	0.6
Other form of central heating	0.4	0.4	0.4	0.4	0.4
District or communal heat networks only	0.2	0.3	0.1	0.1	0.2

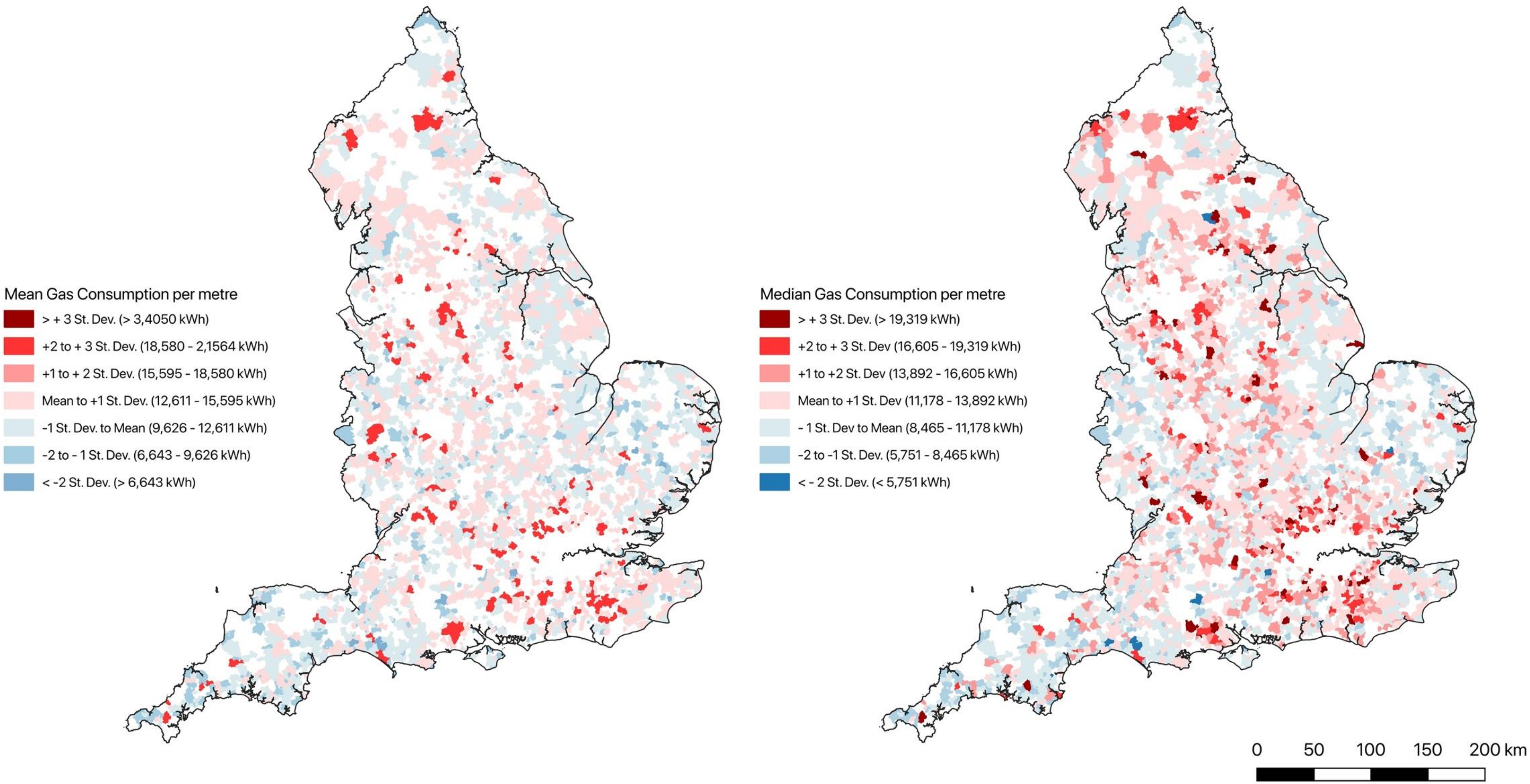
Source: based on Office for National Statistics (2021). Census 2021, England and Wales, TS046 – Central heating; Office for National Statistics (2025d) Rural Urban Classification (2021) of Output Areas in EW.

decarbonised renewable energy sources, such as air and ground source heat pumps and solar power

The 2021 Census included questions about the sources of energy used for domestic central heating, and as shown in Table 7, these give a clear sense of the relative significance of gas and other forms of energy sources used to heat homes. While gas clearly predominates in all forms of rural areas identified in the Office for National Statistics' (2025d) Rural-Urban Classification, it is clearly more widely used in areas with 'larger rural settlements', which corresponds to towns and urban-rural fringe areas (Office for National Statistics, 2025a). This is borne out in Figure 11, which shows that areas of high mean and median gas consumption in rural areas of England are often found in areas close to urban centres.

By contrast, Table 7 shows that oil, tank or bottled (LPG), solid fuel, wood, renewable and central heating systems running on more than one energy source, are all more prevalently used in rural areas with 'Smaller settlements', such as villages, hamlets and dispersed dwellings. In these areas, it is oil, multi-source and electric systems that are the most widely employed alternatives to the use of mains gas, although, as previously mentioned, there has been some relative decline in the use of mains gas connections in the last decade.

Figure 11: Mean and Median Mains Gas Consumption in Rural England, 2023



Sources: based DESNZ (2024c) LSOA domestic gas 2010 to 2023; Office for National Statistics (2025c) Rural Urban Classification (2021) of LLSOAs in EW.

Overall, it has been shown that rural areas of England consistently exhibit higher levels of per capita and per household electricity consumption than urban areas, despite overall declines in electricity use between 2016 and 2023. These higher levels are most pronounced in smaller and more remote rural settlements, which also have a significantly greater proportion of properties off the mains gas-grid and with low energy efficiency ratings. Average per capita and per household gas consumption figures are, on average, lower in rural than urban areas, although this largely reflects the high number of households without gas connections, with per meter gas consumption being higher across rural areas. Aggregated figures for rural areas clearly hide considerable intra-rural variation, it being shown that smaller rural settlements tend to have higher levels of electricity and gas consumption, off-gas-grid properties and low energy efficiency buildings, across both well- and less-well-connected regions. It was also evident that the presence of energy-efficient buildings tended to decrease and energy consumption levels increase, as areal deprivation scores decreased, a seemingly somewhat contradictory but not unexpected finding (see Buyuklieva et al., 2024; Cass et al., 2022). Attention has also been drawn to fuel substitutions in areas with no mains gas supply, and how renewable energy sources are potentially becoming drawn into these practices, as well as into efforts to decarbonise domestic energy consumption.

3. Water Consumption by Rural Residents in England

Domestic water consumption in the UK has been much less widely studied than energy consumption, in part because there are significantly fewer sources of publicly accessible and spatially disaggregated information. While the Department for Energy Security and Net Zero (DESNZ) and the Office for National Statistics produce extensive georeferenced datasets related to energy consumption, there are no nationally equivalent datasets related to water consumption, although Ofwat and the Environment Agency do produce national summaries that include breakdowns of per capita consumption within each of the privatised water companies, as well as reports of performance against a range of indicators, including water quality, leakage levels, supply interruptions, pollution incidents, and use of the Priority Services Registers (PSR) by vulnerable householders. The Environment Agency's assessment of 'Water Resources for 2024-2025', for instance, reports that average household water consumption was 136.5 litres per day, which was a decrease of 0.5 litres from the figure for the previous year (Environment Agency, 2025). Just under 12% of households in England were paying through smart meters, while just under 63% were paying through a metered charge (Environment Agency, 2025). However, as indicated in Table 8, there were variations in these figures between different water suppliers.

The information provided by the Environment Agency, Ofwat and most of the private water companies does not present any indicators of rural levels of consumption, although some of the companies have deposited information on the Stream open data platform (www.streamwaterdata.co.uk), which does enable the identification of rural areas using LLSOAs. Figure 12 shows the per capita water consumption levels for 10 of the companies

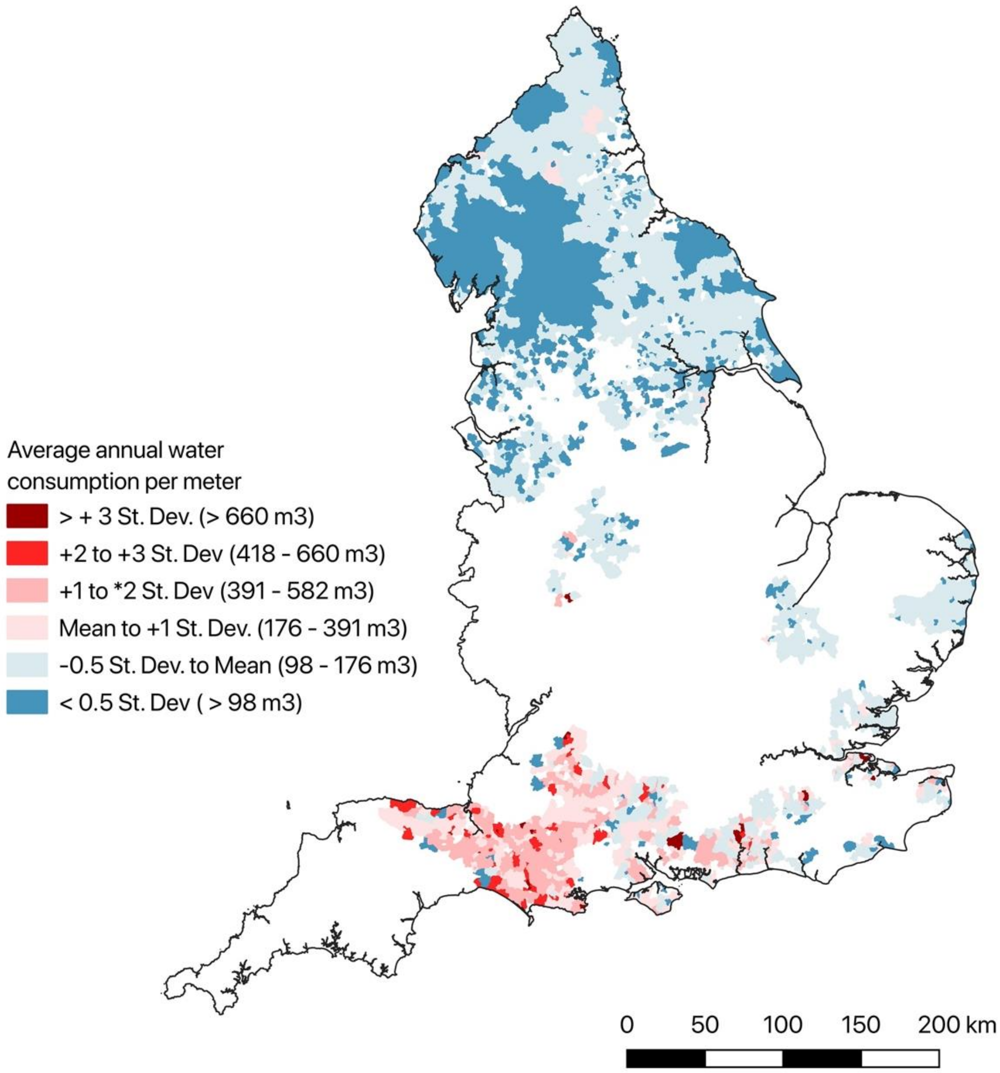
Table 8: Water Consumption and Meters by Water Companies, 2024-*5*

Water Company	Average Per Capita Water Consumption (litres per day)	% of households with Smart Meter	% of household on metered tariff
Affinity Water	233.3	1.3	71.4
Anglian Water	224.4	47.7	84.9
Bristol Water	215.7	0.0	67.3
Cambridge Water	218.7	13.7	74.0
Essex & Suffolk Water	220.8	21.0	65.8
Northumbrian Water	246.9	4.7	44.4
Portsmouth Water	241.6	0.2	37.8
SES Water	208.7	0.1	68.8
Severn Trent Water	212.8	12.4	52.6
South East Water	233.4	0.0	88.6
South Staffs Water	227.5	7.0	43.0
South West Water	275.1	5.3	83.3
Southern Water	206.8	0.0	84.1
Thames Water	238.0	24.3	59.1
United Utilities	227.8	0.1	48.3
Wessex Water	238.0	0.0	73.7
Yorkshire Water	230.4	3.1	59.3
All Companies in England	229.2	11.9	62.7

Source: based on Environment Agency (2025) Water Resources 2024 to 2025: Analysis of the Water Industry's Annual Water Resources Performance

listed in Table 8, namely Anglian, Cambridge Water, Northumbrian Water, Portsmouth Water, SES Water, South Staffs Water, Southern Water, United Utilities, Wessex Water and Yorkshire Water. These figures are for 2023, with the exception of Wessex Water, where the data is for 2022. This difference is potentially significant, as 2022 was a warmer year than 2023, although they were both years of warm weather in England, ranking only behind 2025. It is certainly evident that the per capita domestic rural water consumption figures for Wessex Water appear from Figure 9 to be significantly above the average figures across the ten water companies, although the average per capita figures for this water company in 2024-5 were below those of Northumbrian Water and Yorkshire Water, despite the rural per capita figures

Figure 12: Average Water Consumption in Rural LLSOA, Selected Water Companies



Source: based on processing on data accessed from the Stream data portal (www.streamwaterdata.co.uk) and used under a CC BY 4.0 License.

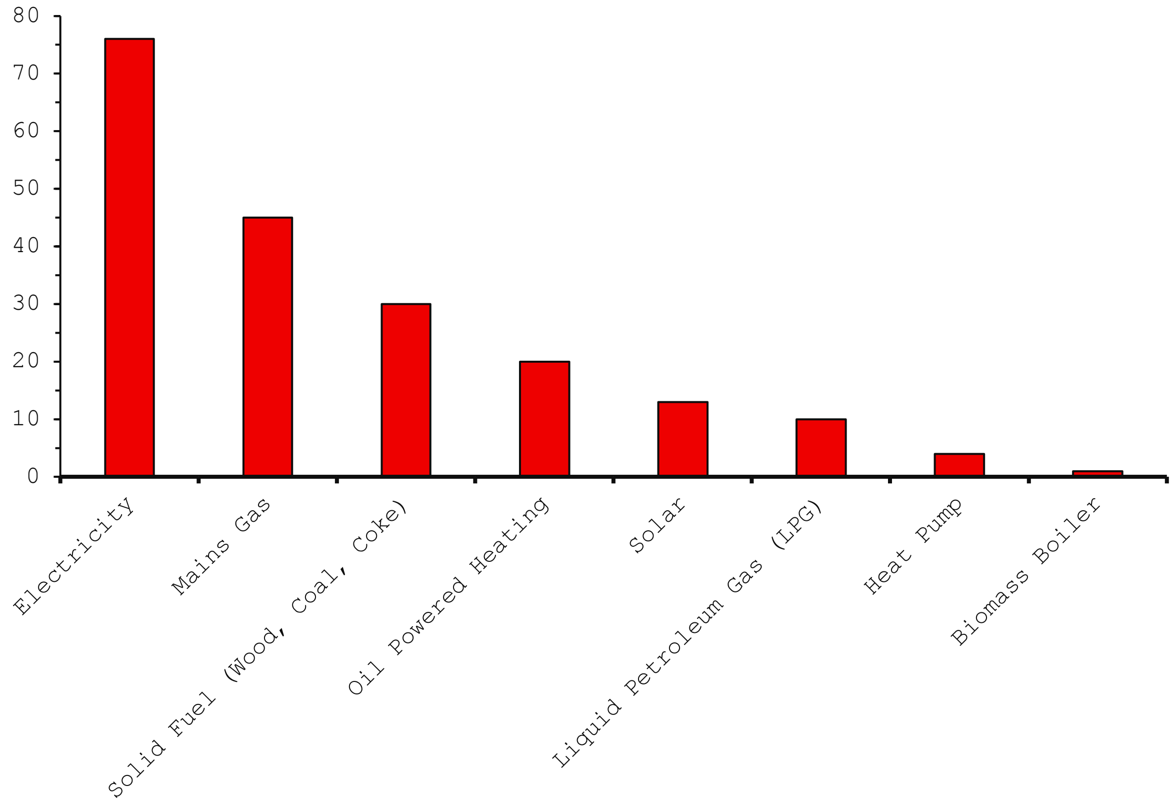
for these two companies being noticeably lower than those of Wessex Water in Figure 12. Comparison of Table 8 and Figure 12 suggests that for many water companies, there may be significantly lower per capita consumption levels in rural areas in comparison with urban ones, and there also appears from Figure 12, to be some regional variations, with rural areas in northern England having generally lower per capita consumption levels than those in southern parts of the country. Such variations are not unexpected, as temperature and rainfall differences are likely to impact levels of domestic water consumption. However, with only data from 10 water companies being made currently available on the Stream open data portal, more in-depth analysis of regional and rural-urban differences in water consumption is not currently possible from publicly accessible secondary datasets.

The limited availability of water consumption data stands in strong contrast with central government distribution of data related to a series of aspects of energy consumption. This may well contribute to the limited availability of studies on water consumption issues in comparison with those on energy consumption. Given these limitations, the production of new primary data may be particularly valuable, and some further investigation of water consumption, and the motivations, technologies and practices that might be reducing its current use will be presented in the following sections of this report, drawing on the results of the questionnaire survey.

4. Rural Consumption of Energy and Water: Impressions from a Questionnaire Survey

Figure 13 shows the sources of domestic energy supply used by respondents to the questionnaire survey conducted for this study. Although the survey was quite small, as discussed in the earlier methodology section, its respondents were drawn from a diverse range of locations in England, its results on domestic energy use are broadly in line with the analysis of the 2021 Census discussed earlier, with electricity and mains gas supply appearing as the predominant source of energy supply for just under 75% of respondents. There was, however, a stronger reliance on electricity amongst respondents, with just over 49% percent using it as their main source compared to the slightly over 25% who stated that mains gas was their primary energy source.

Figure 13: Sources of Domestic Energy Used by Survey Respondents



Source: Questionnaire Survey

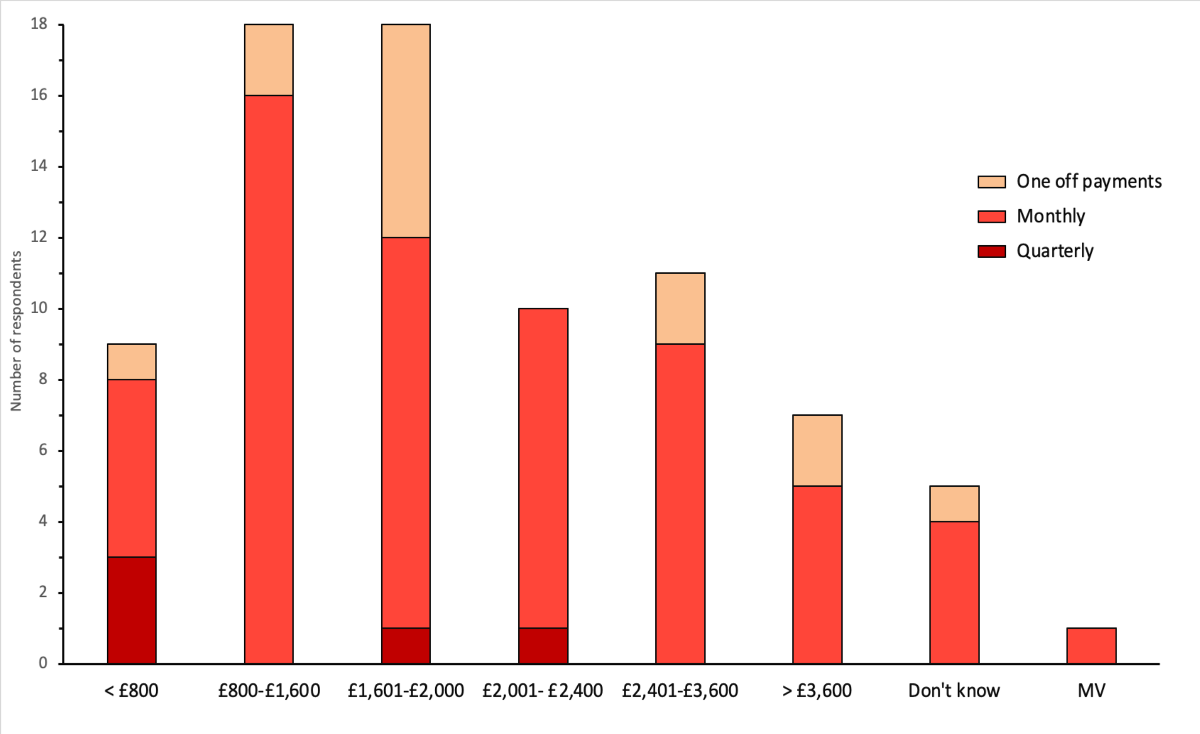
Almost 37% of respondents appeared to be totally reliant on grid-supplied electricity and/or gas. It was, however, also evident that many households made use of a range of other sources of domestic energy, including solid fuels, such as coal, coke and wood, oil and liquid petroleum gas (or LPG). Just under 17% of households in the survey used oil as their principal source of domestic heating, and just over 5% used LPG in a similar way. Overall, just under 46% of respondents to the survey made use of oil or solid fuel as a source of domestic energy, a figure that was significantly higher than the 32% calculated as the national proportion of households living in rural areas that made use of solid fuel or oil-fired heating systems to heat their homes, which in turn is significantly higher than the 8% calculated for urban areas (MHCLG, 2025a). As highlighted in Table 7, use of oil, solid fuel and LPG for heating homes is, however, uneven within rural areas, being particularly used in areas of 'smaller' rural settlements, which as noted in Tables 1-3, were the home of a significant proportion of the survey's respondents. Only just under 4% of respondents did not have a central heating system, with just under 28% having installed this since they had moved into their current home and just over 68% having moved into a home with a central heating system already in place.

Just over 17% of the respondents to the survey made use of some form of decarbonised renewable energy source, with solar sources being the most widely used, as indicated in Figure 13. Thermal and photovoltaic systems contributed equally to solar installations, with the only other renewable energy systems mentioned being four references to heat pumps and one reference to a biomass boiler. The latter, and two of the heat pump installations, were conducted alongside the use of solar panels. It was hence clear that the survey included a few cases of multi-system renewable energy investments, as illustrated by this example:

> "The property is not on mains electricity, water or sewerage. I have installed solar panels, 14kWh of batteries and an air source heat pump to replace an oil-fired boiler and storage heaters. The solar panels and batteries have been installed partly because my house often suffers from power cuts, e.g. cut off for 48 hours after Storm Arwen. This is only going to get worse as climate change-induced severe weather incidents happen" (R9 – for more details of respondents, see Appendix 1).

Figure 14 records the stated annual cost of the principal source of domestic energy used by respondents to the questionnaire survey, along with the form in which payments were being made. The modal value of recorded payments was between £800 and £2,000 per annum, with 76% of respondents paying their energy bills monthly. The modal values appear broadly consistent with statistics of domestic energy consumption produced by the Office for National Statistics (2025b), which calculated average total annual domestic energy bills as being at £2,131 in 2023/24, while average annual electricity bills were at £1,010 and average annual gas bills were at £983 for the same period. The question on energy costs in this rural survey was for the cost of the principal source of domestic energy, which as noted earlier,

Figure 14: Annual Cost of Principal Source of Domestic Energy by Payment Frequency



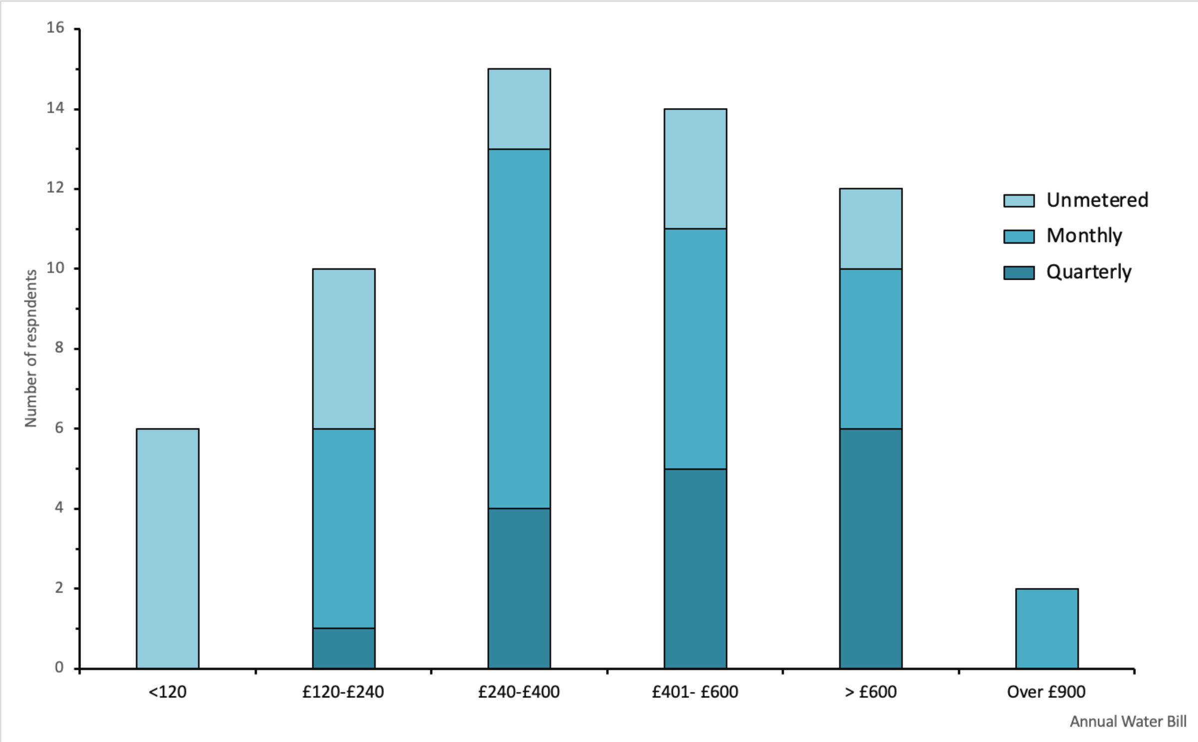
Source: Questionnaire Survey

was predominantly electricity or gas. This means that the Office for National Statistics' figures for electricity and gas expenditure may be seen as a reasonable equivalent to those elicited through the questionnaire survey, as opposed to the higher figure for average total annual domestic energy bills.

Figure 15 shows annual payments for domestic water supplies and whether these were charged on the basis of metered readings or via some form of fixed charges. It appears that 64% of respondents were paying bills of between £240 and £600, and a further 25% were paying bills of below £240. The national average water bill in England and Wales for 2025-26 is £604 (or £287 excluding sewerage), and whilst some people noted the amount being paid for water and sewage, in most cases a single figure was given.

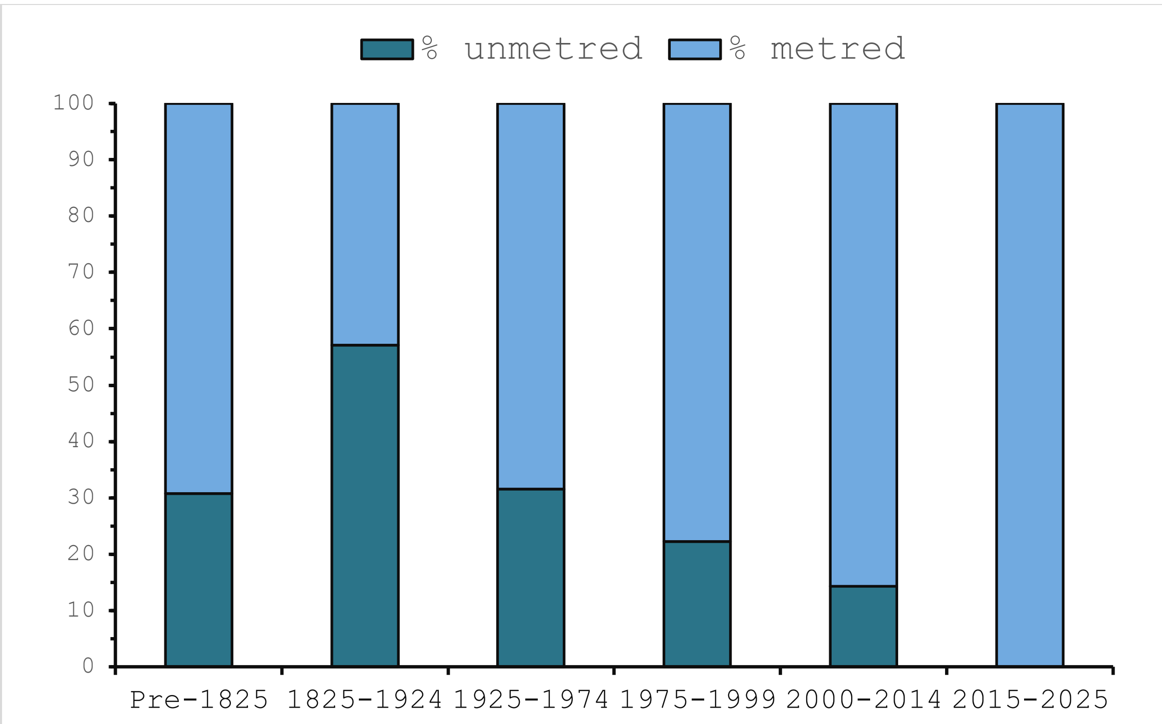
It appears that just over 64% of respondents to the questionnaire survey had metered water charging, which is just above the national average (see Table 8). The proportion of this form of charging has been rising over recent years, in part as a consequence of the installation of smart meters in new residential buildings as well as the upgrading of meters to digital smart ones in many existing buildings. As indicated by Figure 16, the questionnaire survey suggested that the proportion of properties with metered water billing increased with more recently constructed buildings, although of the nine residents living in properties over 200 years old who paid for water through metering, eight had transitioned to this way of billing after their movement into these properties. By contrast, of the seven residents living in properties

Figure 15: Payments for Water



Source: Questionnaire Survey

Figure 16: Mode of Water Billing by Age of Dwelling



Source: Questionnaire Survey

constructed in this millennium, six had moved into a dwelling with water metering already installed.

The questionnaire survey conforms to more general statistics that indicate that the majority of rural respondents, like their urban counterparts, rely on electricity and mains gas for domestic energy, although reliance on electricity is more widespread and many households also make use of other energy sources, including oil, solid fuels, LPG and decarbonised forms of renewable energy, particularly solar. Annual energy costs for most respondents broadly aligned with national statistics for electricity and gas expenditure, but the results for water bills were difficult to assess because it was unclear whether or not sewage bills were being included. Just over 64% of respondents appeared to be on metered billing, which was more prevalent in newer homes, although it was clear that some residents of older properties had water meters installed after they had moved into their homes.

5. Energy and Water Conservation by Rural Residents

It was clear from responses to the questionnaire that the installation of meters did motivate some residents to consider reducing their levels of water and energy consumption:

> "As I am on a water meter, I try to be conservative … [although] we seem to be using more and unable to conserve enough" (R7);
>
> "In summer we turn off the central heating, hot water is timed, don't use log fuel or, if we can avoid it, the oil powered Rayburn. The entire lot comes on in winter, thus our bill is tiny, then huge - the energy suppliers can't cope and constantly change our direct debit up, and there is a lag which I have to manually adjust every spring" (R66).

Table 9 also indicates that a range of energy and water conservation technologies or infrastructures were being used by rural residents, with roof insulation and double glazing being clearly the most widely employed. These technologies have long been promoted as highly effective ways to improve the energy efficiency of homes, although it was also clear that many of the respondents had installed them into their current homes. Energy-efficient boilers and smart electricity metres had also been installed in properties by over half the respondents, while approaching a third had installed water metres and a slightly smaller number of people were living in properties that had already had these installed. However, over a third of respondents were living in properties without water metres, smart electricity metres or cavity wall insulation, while over half of the respondents had not installed any system to capture rainwater. It should be noted that smart meters often rely on mobile phone connectivity, which remains a real issue in many rural areas (see Phillips, 2025).

It was also evident that some households employed these energy and water conservation technologies in conjunction with renewable energy production as well:

Table 9: Installation Energy and Water Conservation Technologies

Energy and Water Conservation Technologies	Installed before moved in	Installed since move in	Do not have
Roof insulation	39.5	56.6	3.9
Double glazing	62.3	33.3	4.3
Energy efficient boiler	24.7	50.7	24.7
Smart electricity meter	9.6	56.2	34.2
Cavity wall insulation	45.6	19.1	35.3
Water meter	31.6	32.9	35.5
Rainwater collection system	6.9	38.9	54.2

Source: Questionnaire Survey

"I have solar panels installed at my own cost. I use power in the day when the panels are generating as much as I can. I have a water meter, and also three water butts and so use water from the butts for the garden if needed" (R52);

"We now have solar panels and a storage battery. Any need to use excess energy (e.g. oven, washing machine), we check our battery or use when it's cheaper to use energy … for electricity we are often 99% self-sufficient on sunny days during summer. {Liquid Petroleum] Gas during summer is only for cooking on the hob and heating water" (R57);

"Installed our air-sourced heat pump and solar panels, moved to an Octopus tracker tariff, moved to a water meter, stopped having baths … this summer we've been in credit due to solar panels" (R21);

"New double-glazed windows, insulated loft, and considering heat-pump. We save water by using grey water for the garden, although this does not affect the bill as not on a meter" (R23).

While the last respondent highlighted that there were no direct economic benefits to some of the conservation actions they were taking, other respondents did indicate that employment of energy conservation and renewable energy production technologies could, in some cases, produce significant changes in energy expenditure, use and consumption patterns:

"Installed solar panels, so electricity use plummeted and now on tariff giving cheap electricity at night. So will top up battery at night and use that in autumn/winter. Received about £600 in SEG [Smart Export Guarantee] payments now" (R54);

"Summer - we use virtually no gas and get superb quantities of solar-generated electricity. Winter - precisely the reverse" (R67);

> "In summer, we sometimes export more energy to the grid than we use, despite plugging in our hybrid car. For example, in the first two weeks of August, we consumed £21 and exported £34. In the winter, we don't tend to generate enough to even charge our batteries, so we pay much higher prices (we tend to use more in the winter as well). Although the direct debit aims to flatten out the variation, it can't predict how sunny it will be, so it's not accurate for about half the year" (R57).

However, it was also clear that adoption of technologies of energy conservation and renewable production was being limited by perceived barriers, including installation costs and disruption, the level and timing of cost savings, the suitability of particular premises and locations for installation, and planning regulations (see Table 10). The significance of such perceptions has been highlighted in recent research conducted for Rural England, which highlighted what was described as the 'hidden costs' of installing renewable energy systems (Stonebridge et al., 2025). Rural areas are often seen to include high proportions of 'hard to heat' and 'hard to treat' homes, but often these terms are employed in ways that reduce homes to buildings (Robert & Henwood, 2019), and thereby neglect the emotional and material losses that may be produced when installing a new system of heating or energy production.

Energy and water conservation do not necessarily require technological installations and can often be produced through behavioural or practice change (Shove, 2010; Shove & Walker, 2010; 2014). As Shove and Walker (2014: 47) observe, "energy is used not for its own sake but as part of, and in the course of, accomplishing social practices", as indeed are technologies, including ones that may be seen to foster reductions in energy consumption. The questionnaire survey, hence, included a question asking respondents to comment on how often they used a variety of energy- and water-consuming technologies that were bound up in the social practices of everyday living, including cooking, washing clothes, brushing their teeth and using everyday domestic appliances and computers. Table 11 shows that a high proportion of respondents to the survey claimed that they undertook energy/water saving practices such as turning off lights and appliances when not in use, not leaving computers on overnight and using eco or half-load modes on dishwashers or washing machines. Regular use of ovens was also lower than for micro-waves and air fryers, although in the latter case, over 27% of people with these cookers were apparently not using them. It was also noticeable that almost 73% of respondents kept taps running when brushing their teeth.

Qualitative comments also referred to the adoption of energy- and water-saving practices:

> "Turn things off when not in use. Still have devices and appliances that are permanently on in standby mode" (R19);

Table 10: Perceived Barriers to Adoption of Energy Conservation and Renewable Production Technologies

Theme	Illustrative comments
Installation costs	"[Thought about] solar energy and heat source pumps, but far too expensive" (R16); "I got quotes for solar panels, but couldn't afford it" (R45); "Solar PV (with battery) and heat pump - would like to install all, but can't afford at the moment" (R34);
Level and timing of costs savings	"Solar panels were too expensive and as pensioners we would probably not live long enough to reap the rewards" (R30)
Suitability of premises/ location	"Solar panels were considered, but house is not aligned in favourable direction. Ground source and air source need to be installed during initial build, as I do not have radiators/pipework. House is entirely electric, other than bottled gas hob. No gas in village" (R23); "water meter would have had to be installed in our living room" (R42) "[Thought about] solar panels, but we don't have a water tank in the loft" (R47) "I have looked at heat pumps, but they are unsuitable for our spread-out bungalow" (R50). "Would like solar panels &/or ground/air source heat pump, but very old house, equals far too expensive to retrofit" (R51) "[Thought about an] air source heat pump - engineering wise a very efficient use of energy, but concerned about upheaval of installation, as boiler is in attic and we're elderly. However, new designs seem to be coming through which should be less invasive" (R71) "Ground/air source heat pump - solid walls, therefore not suitable. [installed] solar … initially as Feed in Tariff at the time was linked to energy performance certificate, meant that exported energy would receive a very poor rate because of solid walls. Also, too expensive at time. Biomass boiler - researched this but insecure fuel supply. Only company supplying pellets over 30 miles away and they wanted us to collect and would not deliver. Also, would need 25kg bag per day to feed system, which I wouldn't be able to feed into hopper, so would need it blown through a pipe from a storage room near the property" (R 55).
Planning Regulations	"We installed secondary glazing. Listed building, so can't do most things" (R63) "We looked at solar for electric but National Park told us we need planning permission which we would probably only get for one or two panels, so it wasn't worth it" (R75)

Source: Questionnaire Survey

Table 11: Water and Energy Consuming Technology Related Everyday Practices

Technology Related Practice	% of Respondents with Access to Technology	% of Respondents with Access		
		Practice regularly	Practice occasionally	Do not practice
Turning off lights/appliances when not in use	100.0	91.1	6.3	2.5
Cooking using an oven	98.7	46.2	50.0	3.8
Leaving computers on overnight	98.7	13.0	13.0	74.0
Lower thermostat temperature	96.2	52.6	31.6	15.8
Using eco or half-load modes on dishwashers or washing machines	93.7	68.9	20.3	10.8
Cook with a microwave	92.4	57.5	37.0	5.5
Turn domestic appliances off rather than leaving on standby	81.0	53.1	45.3	1.6
Cooking with air fryer	62.3	47.9	25.0	27.1
Leaving tap running whilst brushing your teeth	15.5	72.7	18.2	9.1

Source: Questionnaire Survey

"We are very careful and avoid wastage where we can. We minimise heating the house in the winter and wear layers of clothing rather than increase the heat. Thermostat is set to 18 and only on for a few hours in the evening. This is also healthier than hot rooms, so fine" (R23);

"Because we are over 80, we need to keep the main rooms quite warm during the day, but keep other rooms cooler, especially the bedrooms" (R50);

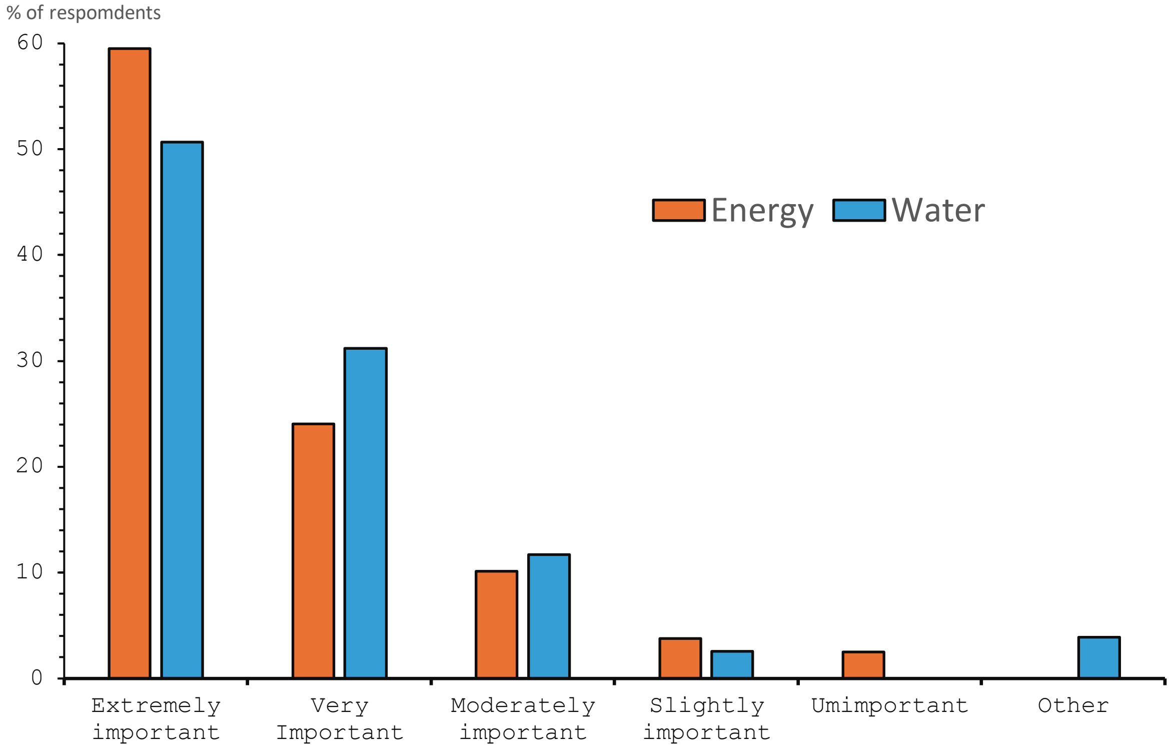
"We use what we require and as our house is old and cold, we wear lots of clothes so as to reduce consumption" (R55);

"We use eco-programmes for both the dishwasher and washing machine, and have a shower instead of a bath. We also have three water butts for watering the garden" (R 69);

"My central heating is off from March till September. During winter I wear a fleece and only turn the heating on if I have to … careful now, use the oven with regard to batch cooking" (R34);

"Use of slow cookers. We use ours several times a week … to save money. Very mindful [of water use], apart from the teenager with long hair who likes 20-minute showers" (R 21).

Figure 17: View on Reductions in Energy and Water Consumption in UK



Source: Questionnaire Survey

The last quote makes explicit reference to the adoption of particular practices and technologies in order to reduce energy costs, and as will be discussed in the next section, it was clear that the price of both energy and water was a subject of considerable concern for many respondents. It was also evident that, as Figures 17 and 18 demonstrate, the majority of respondents expressed considerable support for energy and water reductions across the UK, and even more saw its importance as likely to increase in the next decade.

There were three respondents who chose to provide an 'other' response to the question relating to reductions in water consumption (Figure 17), with these all independently referring to the level of leakage within the water supply system:

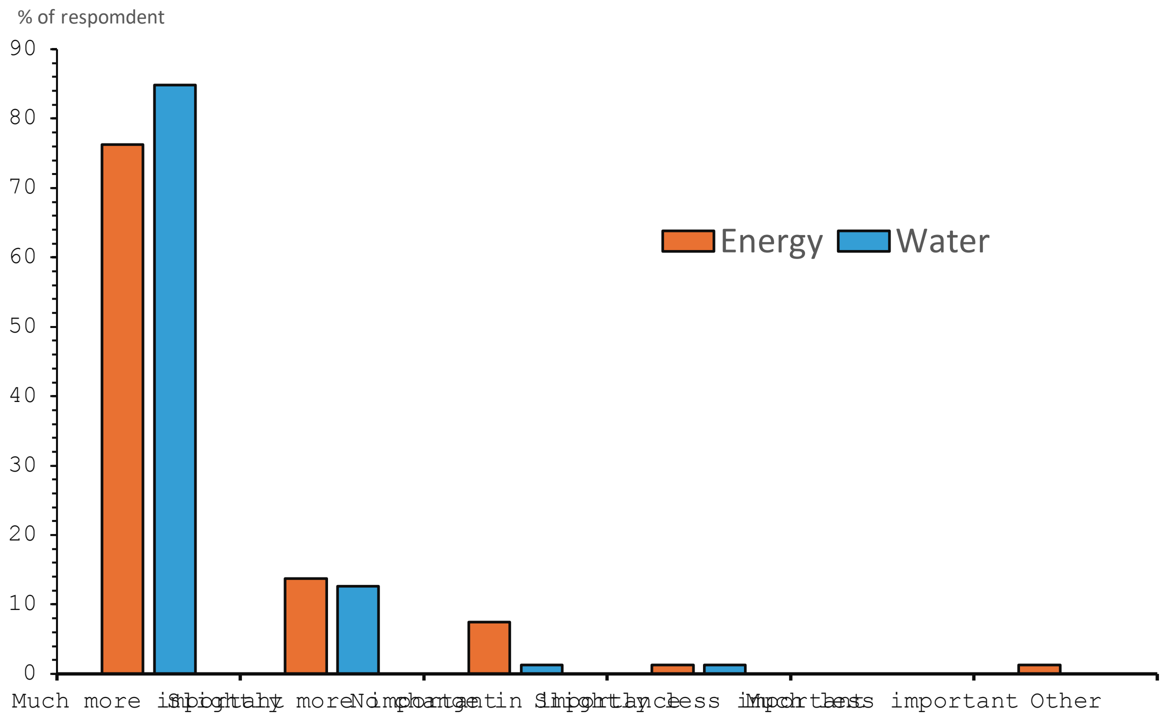
"Far more important for water companies to reduce their appalling wastage first!" (R4);

"It should not be required to reduce what is an essential necessity. Mismanagement in the past has led to this situation, not overuse of the commodity" (R16);

"Need to deal with leaks quickly" (R46).

The level of leakage has been an issue of continued Governmental concern, with Ofwat (2025c: 5) reporting that while the water companies had committed to reduce annual leakage by 16% over the 2020-25 period, they had only achieved a 9% reduction, and were therefore being set a 'challenge' to deliver a "further 20% reduction from 2024-25". Ofwat has also fined a series of water companies for failures to meet environmental performance targets related

Figure 18: Views on Significance of UK Energy and Water Conservation over next Decade



Source: Questionnaire Survey

to sewage and wastewater management (e.g. Ofwat, 2025a, 2025b), and it was highly evident that water companies were viewed very negatively by many respondents:

> "Too much water wasted by water companies, leaks never fixed and too high bonuses paid to management, putting up costs to consumers" (R15);

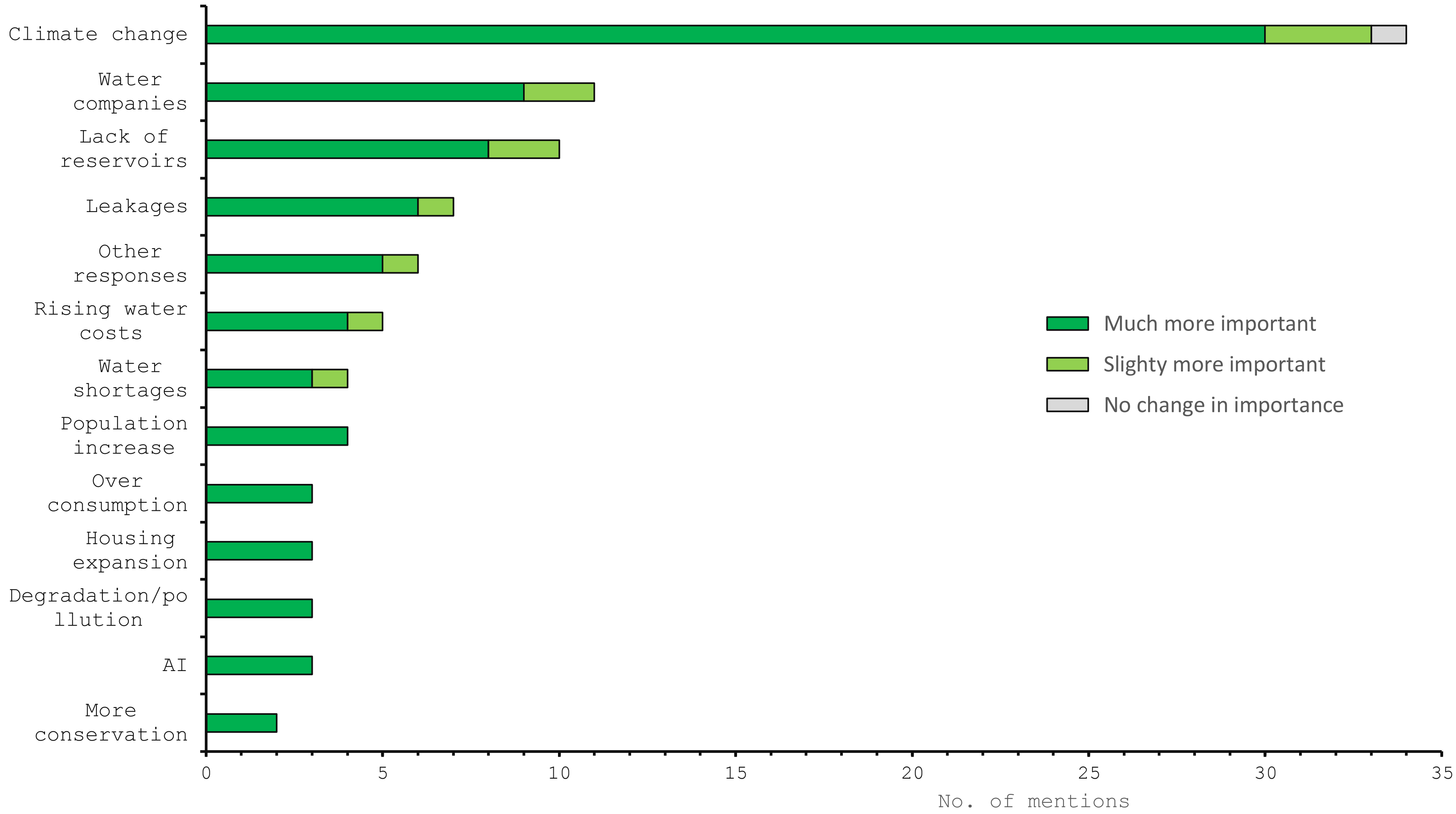
> "the water companies have frittered away the legacy they were given - too many leaks, too much pollution, no extra reservoirs built" (R28);

> "[Water prices] far too high. Mostly due to the profits, bonuses, wasteful projects and bureaucracy. They spent millions and 2 years with a bodged and unnecessary river works /pipes behind my house" (R17);

> "my objection is to the obscene profits and the corporate structure which allows most of my payments to go to the investors and on interest payments. I do not object to investing in a good, safe, fair water system which respects the environment" (R23).

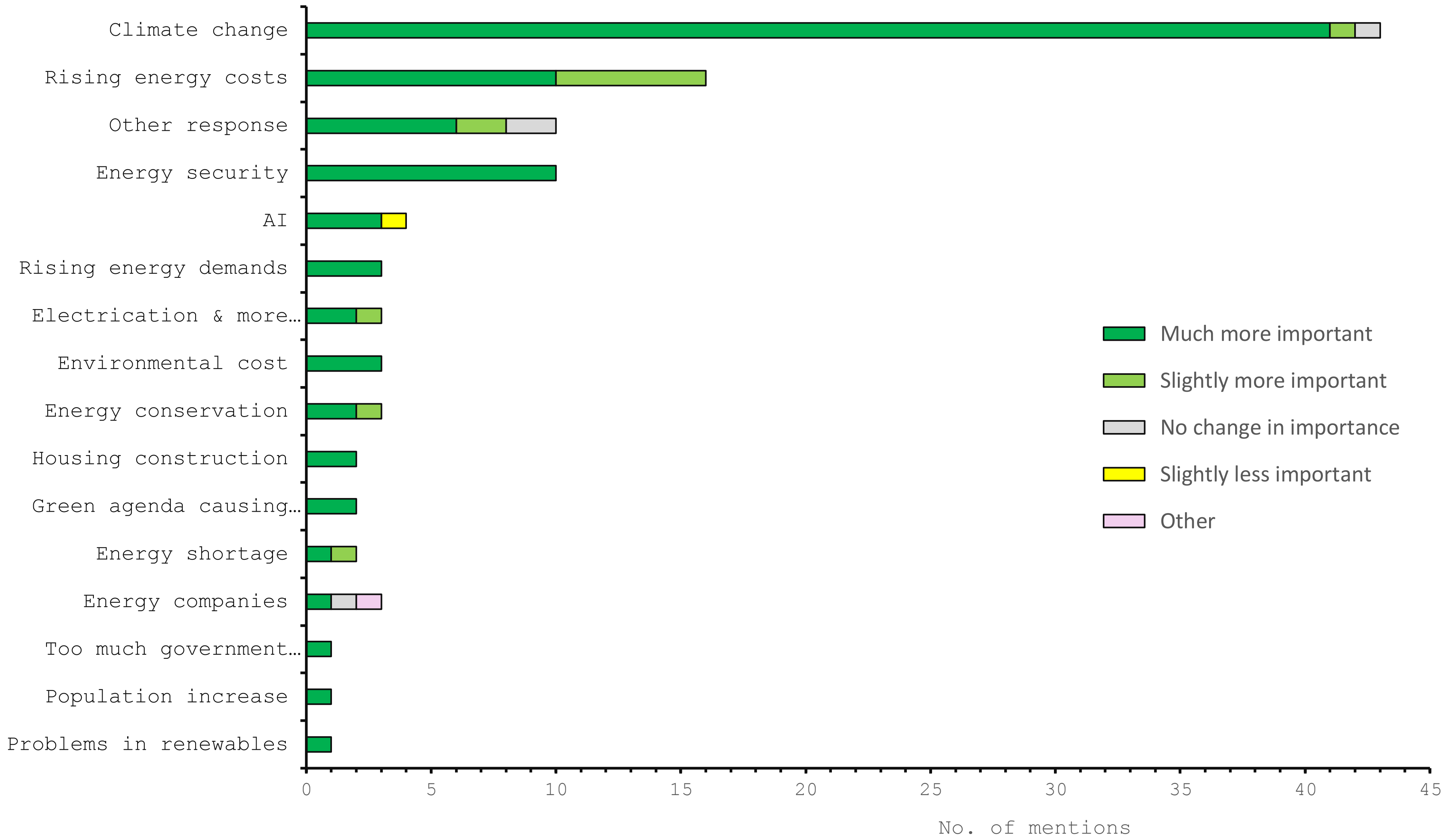
Figures 19 and 20 summarise the explanations given by respondents about their assessments of the significance of energy and water conservation over the next decade, and the frequency of expressions of disquiet about the actions of water companies is very evident in the former graph, with leakages also figuring in four further responses, although in these no associations were made with the actions or inactions of these organisations. Across both

Figure 19: Rationales for Assessment of Significance of Water Conservation in Next Decade



Source: Questionnaire Survey

Figure 20: Rationales for Assessment of Significance of Energy Conservation in Next Decade



Source: Questionnaire Survey

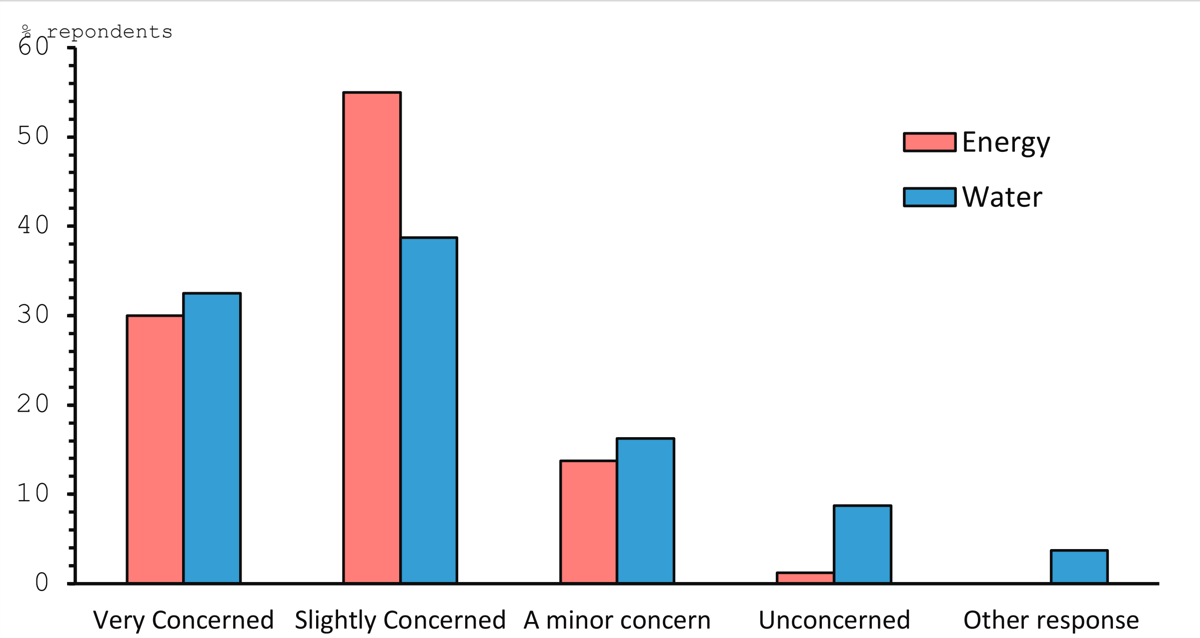
Figures, climate change features as the major rationale for assessments of the importance of water and energy conservation, with failures to construct reservoirs appearing alongside water companies and leakages as major areas of concern in relation to the former. In relation to energy, whilst there were a few expressions of disquiet about the actions of supply companies, the principal drivers of future conservation actions were seen to be rising energy costs, energy security and the development of AI and data processing centres. Energy security concerns ranged across both "global uncertainties" (R36) linked to gas and oil supplies, and localised fluctuations and interruptions in electricity supplies, linked to extreme weather events and for renewable energy sources, such as solar and wind power, to seasonal and daily variations. A much wider series of concerns and factors were also drawn into discussions of energy conservation than was evident in accounts relating to water.

This section has clearly identified that amongst the surveyed group of rural residents, there was considerable interest and support for effecting reductions in energy and water use, both within their own households and also within wider society. All but a few respondents were living in dwellings which had roof insulation and double-glazing installed, while energy-efficient boilers and smart electricity metres were being employed by over half the respondents. While only 17% of respondents appeared to have installed renewable energy production systems in their properties, many of these householders were combining these systems together and employing a series of energy and water conservation measures. Such households were reporting significant reductions in their annual energy costs, although it was also clear that these, and many other respondents, felt that there were many barriers to the adoption of conservation and renewable energy technologies. Many respondents who were concerned about energy and water consumption were therefore resorting to more behavioural or social practice-based adaptations, such as minimising heating, using eco settings, reducing oven use and wearing warmer clothing. Clearly, it may be that respondents with concerns over energy and water consumption may have been more likely to respond to the circulation of details of this study, and it was certainly evident that a large proportion of the participants in the survey saw the reduction of energy and water consumption as very significant issues, both now and into the next decade. Clearly many of the respondents perceived climate change to be a major reason to be concerned about energy and water consumption, although it was also evident that this was often conjoined with concerns about economic costs, fairness and responsibility, issues that will be further discussed in the next section, which will consider how concerns about energy and water consumption connected to a series of wider relations and concerns.

6. Energy and Water Concerns amongst Rural Residents

This report has already discussed the expenditure of respondents on energy and water consumption (see Figures 14 and 15), and references to energy and water prices and costs have also appeared at many other points in discussions, including of Figures 19 and 20 in the preceding section. As noted in the introduction to this report, energy prices for domestic

Figure 21: Levels of Concern About Current Energy and Water Bills



Source: Questionnaire Survey

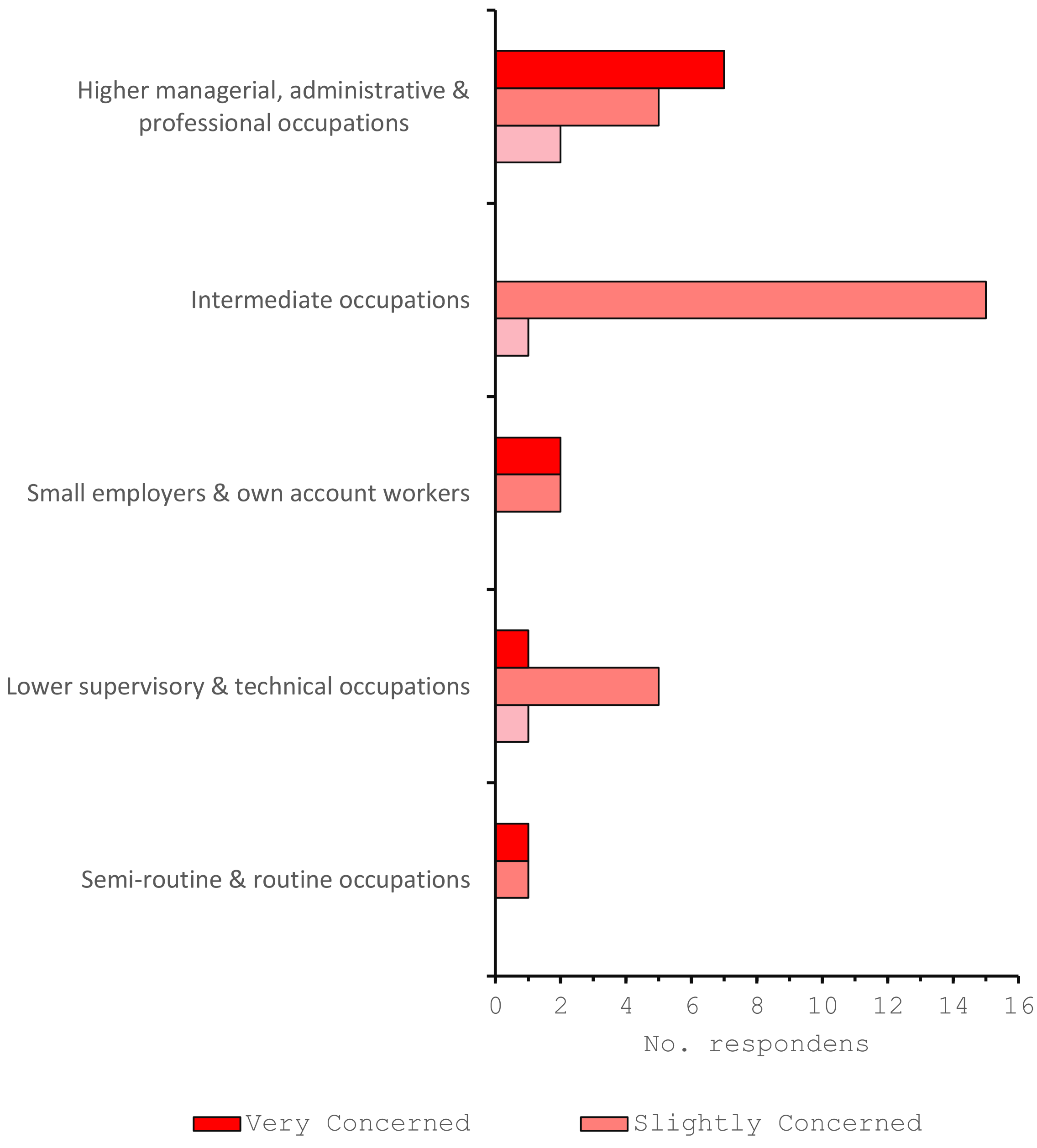
consumers have risen significantly since 2021, and as Figure 21 indicates, there were expressions of concern amongst the survey respondents about the levels of their current energy and water bills. Expressions of 'slight concern' were a little more numerous than those related to being 'very concerned', and there were relatively more people expressing minor or no concern in relation to water than energy bills.

It also appeared that 'very concerned' responses were concentrated in the higher managerial, administrative and professional group of respondents (see Figure 22), although again it is important to note that only 57% of respondents provided sufficient information to enable classification of their socio-economic class position. Having said this, Figure 22 does suggest that concern over energy bills did not necessarily equate directly with people's income and economic situation, a viewpoint that gains further support when levels of concern about bills are assessed against property type (Figures 23 and 24). Across detached, semi-detached and terraced housing, very similar proportions of people stated they were 'very concerned' about energy and water bills. Furthermore, the proportion of people 'very concerned' about water and energy bills was lower in bungalows than in detached, semi-detached and terraced housing, and there were expressions of unconcern about water bills across detached properties, cottages and terraced housing.

The lack of generalised associations between expressions of concern about payment of bills and socio-economic class or housing type should not be taken to equate with there being no specific instances of material difficulties in payment of bills:

> "[energy prices are] way too high, especially for pensioners and a partner who has been ill with cancer and feels the cold … on a meter and can't afford the cost of monthly bill" (R15);

Figure 22: Concerns About Paying Current Energy Bill by Social Class

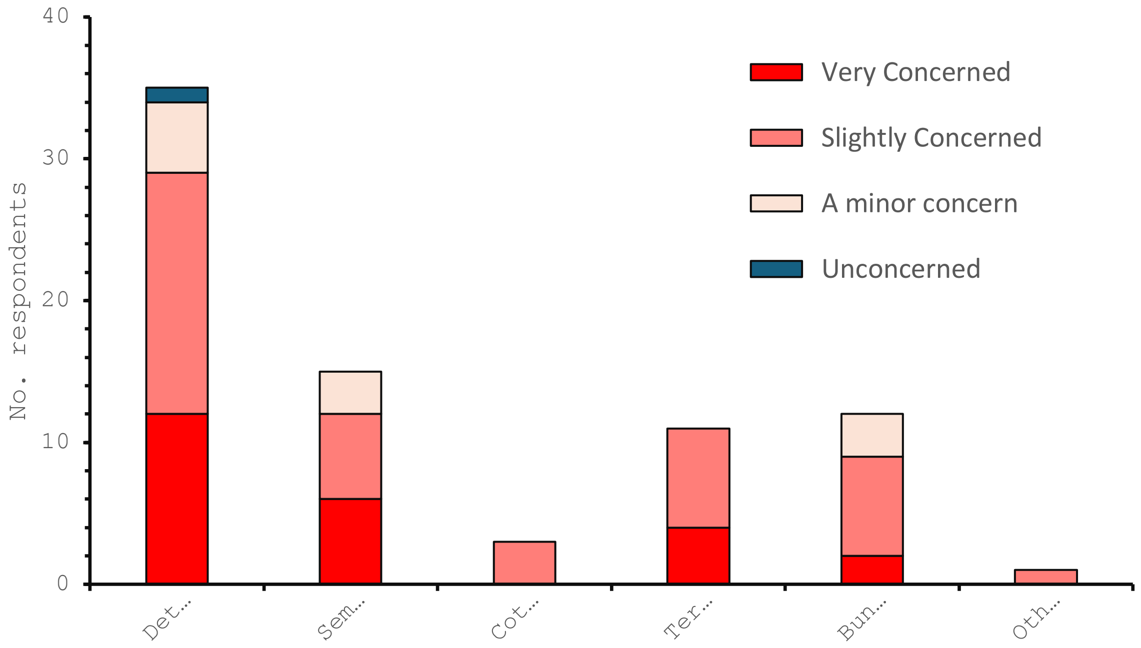


Source: Questionnaire Survey

> "solid fuel always in use, but [bill] probably three times as much in winter … too expensive … try to be frugal, but very cold house and elderly disabled mother. Use a lot of coal/coke in winter … [private water supply, but] have no water at present, spring water run dry, so waiting for rain" (R11).

Neither of these respondents, or their family members, had apparently registered for the Priority Services Register, although 19 other respondents did say that they, or a member of their household, was on this support scheme.

Figure 23: Levels of Concern about current Energy Bills by Property Type



Source: Questionnaire Survey

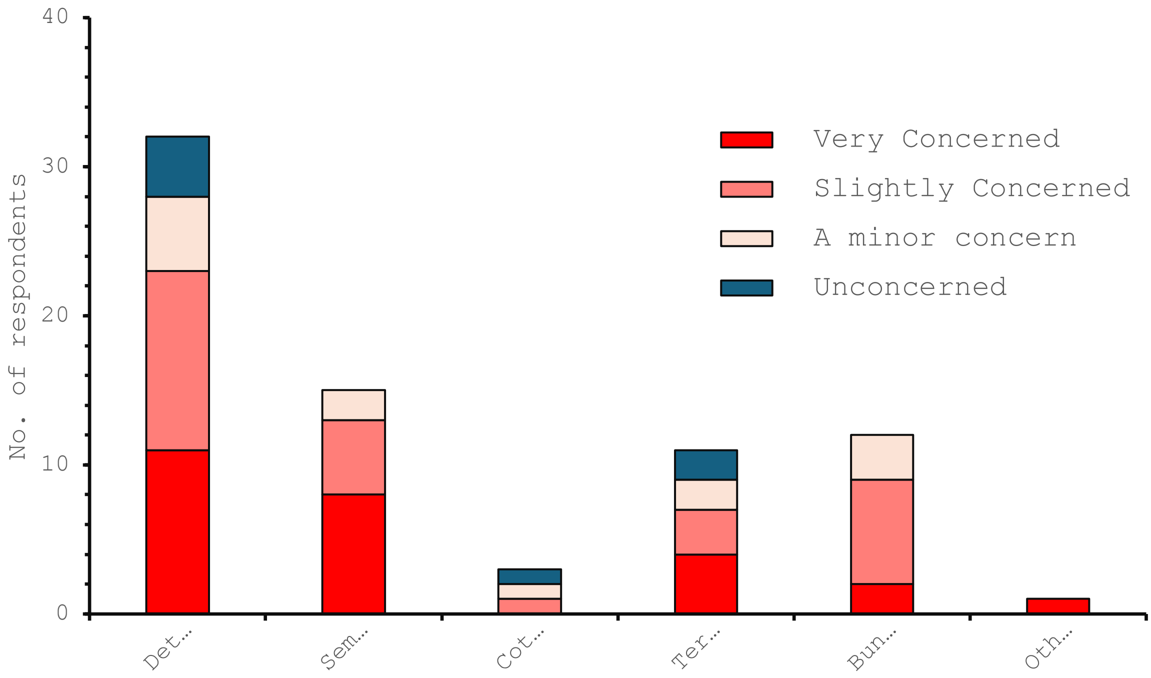
The last quote makes reference to a household not having mains-supplied water, and there were two others which also made use of private water supplies, and 18 respondents that appeared to be off-mains gas and reliant on oil, LPG or solid fuels for heating. Several of these respondents referred to the high energy costs they incurred, particularly in the winter months:

> "For our oil, we top up in summer, but the use is much heavier in winter, so therefore, the expenditure doesn't match the use. For electric, it is a bit heavier in the winter due to more lighting etc. It is expensive and for oil it fluctuates hugely" (R37);

> "We pay for electricity by direct debit and our use is probably only slightly less in summer. We try to buy oil when it is cheap, so often in the warmer months, but during warm weather, we only use oil for heating the water" (R51);

> "Use much more [energy] in winter. During summer, the only heating is the oil-fired AGA for cooking and hot water, with an overspill radiator in the bathroom. Spring and autumn, we top up with the wood stove in the main living room. Winter, the oil-fired central heating comes on when the household temperature drops below 18 during the day and 13 at night, more electricity as we also have dehumidifiers running and the smaller stove in the other main room is lit for a few hours a day - this one uses mainly wood but also some smoke-less coal … since the energy crisis, when stoves became fashionable, even the log price has sky rocketed, I used to pay £70 - £80 a dumpy for kiln-dried ash, now it's £170 on the last delivery. We watch the crude barrel price to know when to buy oil … it's come down a lot, but is still much more than it was even 5-10 years ago" (R74).

Figure 24: Levels of Concern about current Water Bills by Property Type



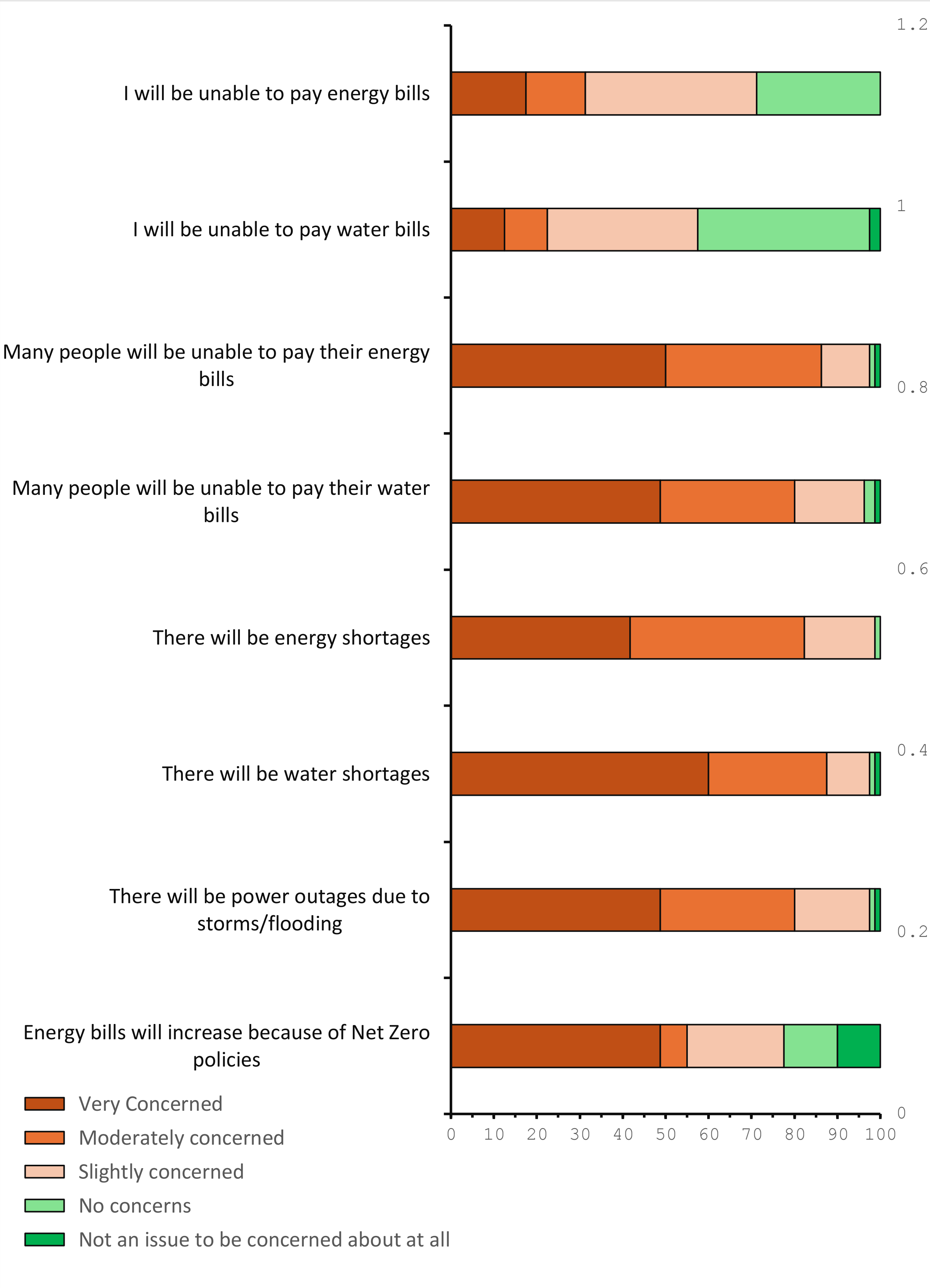
Source: Questionnaire Survey

These quotes highlight that a range of practices are employed to deal with high, and fluctuating, fuel prices, in addition to the employment of practices and technologies to reduce fuel consumption. It was indeed evident that many respondents using other energy sources made use of price rather than energy reduction strategies: 15% of respondents mentioned undertaking price reduction practices such as "shopping around" and "switching" providers and tariffs. These practices were, in the majority of cases, conjoined with consumption reduction efforts as well, but they highlight how cost rather than consumption levels is often a concern for many people, notwithstanding the significance placed on climate change and other environmental issues in relation to rationales for future energy and water conservation (see Figures 19-20).

When respondents were asked to think about whether they may in the future become unable to pay their energy and water bills, there was a significant decrease in levels of high concern in comparison to the responses to current concerns (compare Figures 21 and 25). This suggests that concerns over prices may be very much related to short-term conditions, although when asked about concerns over other people's ability to pay water and energy bills in the future, expressions of being 'very concerned' increased by almost a third for energy and by over a third for water. This suggests that expressions of concern about energy pricing may often be linked into normative rather than personally strategic assessments, and there were certainly a series of statements expressing moral as well as practical concerns about the energy and water supply systems in the UK:

"[Energy prices] have led millions of people into fuel poverty, not to mention people risking their health and safety to save money. In the 21st century, in a democratic,

Figure 25: Future Concerns



Source: Questionnaire Survey

developed country, people should not have to choose between eating or paying energy bills" (R1);

"As low energy users, we are also aggrieved by the high cost of the standing charge, which is the same regardless of whether you are a low or high energy user - this represents 30% of our annual bill" (R69);

"Appalled companies are making high profits and paying high bonuses, yet saying price of energy needs to increase" (R7);

"We are being ripped off through the incompetence of privatisation, government mishandling and as a consequence of the war caused by Russia. [Water prices are] far too high. Mostly due to the profits, bonuses, wasteful projects and bureaucracy" (R17);

"Unfair that electricity prices are primarily linked to the cost of imported liquid gas when much of our electricity is now generated by wind and solar and nuclear" (R64);

"I object to the obscene profits of the energy giants, but I do not object to the money being invested in renewable energy (excluding nuclear). I really object to the continual lies by the establishment and big corporations who are just protecting their income … People don't mind investing in good services but do mind being used as a cash-cow for obscene profits for international investment funds and corporates. Energy and water should be nationalised or extremely tightly regulated as they are essential services" (R23);

"[Energy prices in the UK] are too high. Electricity companies say they are using renewables, but the prices continue to rise with little explanation. They claim the increased prices are to provide the service, but then reveal massive profits" (R19).

These quotes focus on a wide range of issues, including very specific concerns about the level of standing charges and the linkage of electricity charges to international wholesale gas prices, to more general disquiet about levels of profits, bonuses, services and transparency over decision making. However, they can be seen to all encompass concerns about injustice, with these ranging from 'distributional justice' issues of levels of payments, to 'participatory or representational justice' concerns related to involvement in decision making, and onto matters of 'recognitional justice', whereby people feel that they are not being recognised or respected (see Fraser, 1997; Lamont, 2023). This final sense of injustice is perhaps quite vividly illustrated in the following quote, which also contains distributional and representational strands of argument:

"I feel I'm shouting into the void, and it won't make any difference because the fat cats are winning … We're being ripped off to pay CEO's ridiculous wages (nobody needs that amount of money to live comfortably) and dividends to shareholders, while people are in fuel poverty and using food banks … [Water] needs to be put back into public ownership, and the water companies prosecuted for gross negligence. They should have been investing in the infrastructure, new reservoirs and planning for climate change. It's not as though it was a surprise! … I try my best, but as someone of limited funds (a carer and pensioner), I can't always afford the most energy-efficient options. Health conditions necessitate keeping warm and replacing outdated equipment isn't always possible … the Fat Cats who own the water companies … they're expecting the public to rally round to save the day while they pay themselves megabucks and expect us not to notice. Seriously! … A small minority creaming off vast pay cheques and bonuses while expecting the majority to put up with higher bills, poor service, fuel and water poverty and suffer in silence!" (R9).

Figure 25 also assesses levels of concern about other aspects of future water and energy provision, including potential disruptions related to water shortages and interruptions in electricity supply related to weather events such as summer droughts and winter storms, which are both likely to increase in frequency and severity in England as a consequence of climate change, as well as whether people thought energy bills would increase because of Net Zero Policies. The results indicate that there were considerable levels of concern about future interruptions in supply, including those which can be seen to relate to climate change, but also that almost half of the respondents felt that Net Zero policies could contribute to increasing energy prices. Having said this, there were also a significant number of respondents who indicated that they had no or no significant concerns about this issue, and as discussed earlier in this report, there were clearly many people who were very actively committed to addressing climate change through adaptations in their domestic practice of energy and water consumption. One clear example of such a response is shown below:

> "Tried to conserve water by washing clothes only when necessary, with a full load; taking shorter showers; never using a hose; not watering my lawn; choosing draught-tolerant plants; minimising running taps; using Hippos in my cisterns; twinned my toilets; urged others to take similar actions. Never using a tumble drier or dishwasher; washing up once a day; installing external insulation on my house; not leaving appliances on standby; not using my big oven; cooking one-pot dishes in the winter; eating mainly raw foods in the summer; checking my gas, electric and water meters regularly; using a truly green and ethical gas and electricity supplier; taking part in local action groups and campaigns to encourage minimising waste of water and energy resources; currently researching options for alternative sources of energy, which I had in my previous home. I have taken all these actions and will add more in the future to try to help to reduce wastage and conserve resources for my great-grandchildren" (R48).

Many of the respondents to the survey clearly had a series of concerns about energy and water consumption that went beyond personal worries about rising bills, although there were also widespread expressions of disquiet about these increases, particularly in relation to energy. It was evident that some respondents were experiencing significant challenges in both paying for energy and adopting measures that might decrease their consumption. These included vulnerable groups such as the elderly, people with health conditions and households reliant on off-mains energy sources or private water supplies. Given that some rural regions have relatively high proportions of these groups, there is an important rural dimension to energy consumption that needs to be recognised. Significant numbers of rural residents are routinely engaging in cost reduction practices, often in combination with consumption-reduction ones as well. The normalisation of such strategies may act to dampen concerns about energy and water price rises, with it being evident that many respondents did not foresee themselves as likely to face significant challenges in paying future energy or water bills. This finding is, however, based on a very small survey, which included a high proportion of lower-middle-class respondents. Despite the small survey size, it was evident that many of the participants in the survey, used it to articulate strong normative and moral critiques of the UK's energy and water systems, drawing on what might be viewed as distributional, participatory and recognitional senses of justice.

7. Conclusion and Policy Implications

This report has examined patterns of domestic energy and water consumption in rural areas of England, drawing together secondary datasets and a small questionnaire survey, to explore levels and rural-urban and intra-rural variations in energy and water consumption, the technologies and practices of consumption reduction; and the drivers and barriers shaping household behavioural changes in energy and water consumption and in the adoption of decarbonised renewable energy production systems. It has demonstrated that rural energy and water consumption is characterised by substantial spatial variability, shaped by settlement size and remoteness, housing stock characteristics, infrastructural and technological change, household composition, socio-economic resources, environmental conditions and local circumstances.

In relation to energy, the report confirms long-standing evidence that rural households exhibit higher levels of per capita and per household electricity consumption than urban ones, with particularly elevated levels occurring in many smaller, more remote settlements. While overall electricity consumption has fallen since 2016, these declines have not removed persistent rural–urban differentials, nor the marked intra-rural variation associated with off-gas-grid properties and low energy efficiency housing. Gas consumption also exhibits rural-urban differentiation, with average rural per-meter consumption being higher than in urban areas, and again, there is intra-rural differentiation, with areas of small, more remote, settlements having higher levels of per metre consumption. Many of these types of areas also have high proportions of off-gas-grid and low energy efficiency properties, with there consequently being a greater use of oil, LPG, solid fuel and multi-source heating systems in these areas. Subsequent to the conduct of this research, there has been a further rapid rise in oil prices due to conflict in the Middle East, which has led to the UK Government announcing the provision of financial support, via the Crisis and Reliance Fund in England, for "low-income households in rural communities" that rely on oil-heating (HM Treasury, 2026).

The proportion of premises in rural areas without a connection to mains gas increased between 2016 and 2023, reflecting pressures to decarbonise the domestic energy system. There is evidence that renewable energy systems are impacting practices of fuel substitution that have long been enacted in areas with no mains gas supply, although the report also indicates that rural households can be highly dependent on other carbon-based fuels, as well as grid-supplied electricity. The report also highlighted that rural residents had concerns over security of energy supplies, which traversed grid-supplied electricity, international supplies of oil and gas, and the production of solar and wind power.

Analysis of rural water consumption is significantly limited by the lack of publicly accessible georeferenced datasets. Analysis of the data of 10 water companies suggested that rural per capita water consumption may be lower than urban levels, although there are also significant regional variations. The questionnaire survey, therefore, provided some valuable insights into water use practices and attitudes to water conservation, revealing both strong support for water saving and widespread criticism of water companies, particularly with respect to leakage/pollution control and infrastructural investments.

Across both energy and water, the survey revealed a complex mix of motivations, practices and technologies being drawn into consumptive activities. Climate change was clearly an important motivational stimulus in the adoption of domestic renewable energy production and conservation technologies, although economic considerations were also important motivational and constraining influences. Many respondents clearly combined technological investments, practice change and tariff or purchasing strategies to manage energy and water costs and consumption levels, although it was also clear that capital costs of 'green' technologies often led to a reliance on more practice-based adaptations, which, as shown in the last quote in the preceding section of the report, often took multiple forms.

The Government's recently published *Warm Homes Plan* (DESNZ, 2026) clearly recognises the constraining significance of capital costs in the adoption of domestic renewable energy production and decarbonised domestic heating systems, as well as the disruptions their installations may cause. Government support is promised to reduce householder capital costs via the provision of grants and loans, while reductions in levels of disruption to households are viewed as one consequence of establishing a *Warm Homes Agency* that will both provide a source of advice and make it easier to access governmental support by consolidating its delivery into one institution. There is also clear recognition in the *Warm Homes Plan* of the need to include rural households within energy conservation and domestic renewable energy production transitions, and also that rural areas may have different housing characteristics than urban areas, as well as higher proportions of off-gas-grid properties, which may mean that a range of different technologies will need to be employed in different areas. However, the Plan does not provide any indication as to how the provision of the most appropriate technologies in particular areas will actually be delivered. This research has illustrated that even householders who are clear on the potential value of changing their energy and/or water use, currently struggle to enact the installation of many available technologies.

The report also highlighted the significance of multiple forms of justice. Material challenges and inequalities were clearly evident in some of the responses to the questionnaire, especially with respect to the experiences of some older residents and people with health conditions, but also in some cases linked to the physical and material construction of properties and locations. Concerns about energy and water costs and security of supply were clearly evident, and the report presented some examples of where people had actively sought to incorporate green technologies into their homes, but were unable to assemble the required resources or felt the physical and/or emotional disruption to their homes was too high a cost to bear, even given their concerns about their levels of energy and/or water consumption. The report also highlighted how expressions of concern about access to energy and water were often laced with claims about injustices in decision-making and failures in recognition of people's everyday needs and challenges. A previous report for Rural England (Stonebridge et al, 2025: 36), has highlighted how discussions of energy transformations that often appear focused around seemingly quite technical and practical issues, such as the value or not of particular incentives, can be seen to have deeper currents of concern, linked to issues "of control" and a "sense of influence". This report reinforces such arguments.

The findings of the report have at least three important policy implications. First, the study has highlighted the value of examining energy and water consumption issues in rural areas. It has not only highlighted the presence of both rural-urban and intra-rural differentiations in levels and forms of energy and water consumption, but also indicated that many rural residents have been actively pursuing change in their consumption levels through the adoption of quite diverse mixes of technologies and practices. There appears to be widespread recognition amongst these residents that multiple 'fixes' will need to be adopted in combination to effect workable change, rather than looking to find one-size-fits-all solutions. It was also evident that some rural residents had experienced significant challenges in installing some technologies due to localised conditions, such as the physical character or location of buildings or the presence of restrictive planning regulations related to, for example, listed buildings or conservation areas. It was, however, also evident that alternative technologies and practices were being adopted by residents when they found a particular solution was inappropriate or too costly. Developing mechanisms to better recognise and build on existing practices of change and adaptation to constraints would be one lesson that policymakers could take from this study.

Developing such recognition is potentially quite difficult, particularly given that these processes of change and adaptation are occurring in domestic and rural contexts, which often remain quite hidden from view. The present study was clearly limited by the number of respondents it was able to recruit, and a second policy lesson might be to foster the development of more extensive and detailed studies. Extensive datasets on energy consumption are now being produced, although these are often georeferenced at LLSOAs, which whilst useful, are still spatially quite extensive in rural contexts. The lack of publicly available georeferenced data on water consumption is especially striking, particularly given the likely impacts of climate change. At present, there clearly is a lack of public evidence related to water consumption that could be used to inform policy making, a feature that is all the more notable given the evidence shown in this study about the levels of criticism and distrust of water companies.

The absence of publicly accessible and spatially detailed information on water consumption clearly not only limits the ability of policymakers and regulators to design targeted interventions or to evaluate progress towards consumption reduction targets, but also appears to be creating some legitimacy challenges for water conservation initiatives. At a time when there are clearly widespread concerns about water leakages, pollution and relationships between profits, prices and investment, calls for individuals to reduce consumption levels may well struggle to gain broad public support. The Government's recently published '*A New Vision for Wate*r' (Defra, 2026: 17) explicitly highlights a loss of public trust in water companies and the regulators' ability to hold them "to account and ensure they are acting in the public interest", presenting plans to address these issues through reforming the regulatory system. However, a third lesson policymakers might take from this study is that this loss of trust means that many people respond to water initiatives, and to a degree energy consumption ones, through drawing on wider normative assessments of the performance of water companies, and other institutional actors, with respect to a range of other criteria. This suggests that addressing and communicating information on other issues of concern, such as leakage reduction or water quality, might actually be quite central to the success of future consumption reduction initiatives.

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Appendix 1: Respondent Details

Respondent Number	Summary Details of Respondent
1	20-25 years old; living in terraced house built between 1925-1974, with solid stone/brick walls; in full-time employment, lower supervisory and technical occupation.
4	51-65 years old; living in detached house built between 1925-1974, with insulated cavity walls and double-glazed windows; currently not in or looking for paid employment; formerly worked in semi-routine/routine occupation.
7	26-50 years old; living in detached house, built between 1975-1999 with solid stone/brick walls and double-glazed windows; in full-time unspecified employment.
9	66-80 years old; living in terraced house built between 1975-1999, with solid stone/brick walls, double-glazed windows, in full-time unspecified employment.
15	66-80 years old; living in detached house built between 1975-1999, with solid stone/brick walls, cavity walls (with and without insulation and double-glazed windows; retired; formerly in higher managerial, administrative or professional occupation);
16	66-80 years old; living in bungalow built between 1975-199, with insulated cavity walls; retired, formerly in an intermediate occupation.
17	51-65 years old; living in detached house, built between 1825-1924, with solid stone/brick and uninsulated cavity walls and double-glazed windows; in full-time employment, higher managerial, administrative or professional occupation
21	51-65 years old; living in terraced house, over 200 years old, with solid stone/brick walls and double-glazed windows; in full-time employment, higher managerial, administrative or professional occupation);

23	51-65 years old; living in detached house built between 1825-1924, with solid stone/brick walls and double-glazed windows; in full-time employment, higher managerial, administrative or professional occupation).
28	66-80 years old; living in detached house built before 1825, with solid stone/brick walls and double-glazed windows; retired, but doing some part time farming).
30	66-80 years old; living in detached house built between 1975-1999, with solid stone/brick walls, insulated cavity walls and double-glazed windows; retired, formerly worked in local government.
34	51-65 years old; living in semi-detached house built before 1825, with solid stone/brick walls, insulated cavity walls but single-glazed windows; in full-time unspecified employment).
42	66-80 years old; living in bungalow built between 1975-1999, with solid stone/brick walls, insulated cavity walls and double-glazed windows; retired, formerly working in an intermediate occupation.
45	66-80 years old; living in detached house built between 1975-1999, with insulated cavity walls and double-glazed windows; retired, former occupation unspecified.
46	66-80 years old; living in bungalow built between 1925-1974, with insulated cavity walls and double-glazed windows; retired, formerly working in NHS.
47	Over 80, living in bungalow built between 1975-1999, with solid stone/brick walls, insulated cavity walls and double-glazed windows; retired, formerly working in lower supervisory or technical occupation.
50	Over 80 years old; living in bungalow built between 1925-197, with solid stone/brick walls and insulated cavity walls, plus double-glazed windows; retired, formerly working in teaching.
51	51-65 years old; living in detached house built before 1825, with solid stone/brick walls, insulated cavity walls, double-glazed windows; retired, formerly higher managerial, administrative or professional occupation.
52	Over 80 years old; living in bungalow, built between 1975-1999; cavity walls (with insulation) and double-glazed windows; retired, former occupation unspecified.

54	Over 80 years old; living in detached house built before 1825, with solid stone/brick walls and double- and single- glazed windows; in part-time employment in an Intermediate occupation).
55	66-80 years old; living in detached house built before 1825, with solid stone/brick walls and single-glazed windows; in part-time employment, working for police service);
57	51-65 years old; detached house, built between 1825-1924, with solid stone/brick walls and double-glazed windows; retired, formerly ran own (unspecified) business.
64	66-80 years old; detached house, built between 1825-1924, with insulated cavity walls and double-glazed windows; retired, former occupation unspecified.
66	51-65 years old; semi-detached house built before 1825 with solid stone/brick walls and double-glazed windows, running a business part-time, higher managerial, administrative and professional occupation.
67	51-65 years old; living in detached house built between 1975-1999, with solid stone/brick walls, cavity walls (with insulation) and double-glazed windows; running a business part-time; higher managerial, administrative or professional occupations);
69	66-80 years old; living in bungalow built between 1925-1974, with insulated cavity walls and double-glazed windows; retired (former occupation unspecified).
71	66-80 years old; living in semi-detached house built between 1925-1974, with double glazed windows; retired, formerly working in higher managerial, administrative & professional occupation.
75	51-65 years old; living in detached house built between 2000-2011, with solid stone/brick walls, insulated cavity walls and double-glazed windows; running full-time manufacturing business.

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