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JUST-Systems project Case Study Profile

Reading: Heat Networks, Local Communities, and Energy Justice

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May 2026



1 Background and summary

The JUST-Systems project (2025-2030) was developed in response to the UKRI Net Zero Challenges call, which supports original research programmes advancing the UK's transition to net zero with stakeholder engagement at its core. Our interdisciplinary team includes researchers from six universities, five UK case study partners, and an expert advisory board. Together, we aim to better understand the contexts and challenges of local and regional transitions and co-develop pathways for action.

The Reading case study explores how heat networks and anchor institutions can help advance energy justice in communities. It builds on existing, discrete local initiatives and seeks to support the development of a more integrated proposal for a Reading heat network that considers community development.

Heat networks are a key component of the UK Government's industrial plan for Net Zero, with a target of 20% of total heat delivery [1]. Currently, Reading makes limited use of this technology. However, organisations such as the Reading Borough Council, the University of Reading, and the Royal Berkshire Hospital have modest plans to introduce or expand heat networks as part of their commitment to decarbonisation. These efforts faced funding challenges, prompting considerations of alternative financing and a more ambitious plan extending beyond specific organisational needs. A larger-scale plan could provide a 'critical mass' of demand, increasing investor certainty and enabling broader benefits.

This raises a number of questions around technical options, funding models, partnerships, and community impacts. The proposed intervention will engage a wide variety of stakeholders involved in initiating, developing and maintaining the heat network and network users. It will also consider those excluded from current proposals, ensuring that alternative designs are explored.

Anchor institutions have initiated activities around the development of heat networks. The next step is bringing together energy developers, distribution network operators, energy infrastructure firms, government, private funders and community (local and business) members to shape a commercially viable, deliverable plan. Key issues include network location and design, its readiness for end users (including local organisations and residents), integration of local waste and other industrial heat sources, and understanding current and future demand. JUST-Systems supports these efforts by amplifying community voices and embedding ethical considerations.

Reading is socio-economically diverse, with areas in the highest 10th and 20th percentiles of deprivation alongside affluent neighbourhoods. Current proposals for heat networks do not target the most deprived areas, suggesting that ethical reflections must extend beyond the direct impact of heat networks to a broader decarbonisation strategy.

This case study profile presents statistical evidence on Reading's social, business, and energy context, outlines its system challenges, and offers a policy snapshot relevant to heat network development. Data is at the local authority level; as proposals evolve, future versions will focus on specific areas, including those currently excluded as well as broader cross local authority initiatives. The goal is a staged approach whereby initial initiatives are expanded over time, benefitting local communities, businesses, and the town as a whole.

2 Maps and images



Figure: Reading case situated in the UK

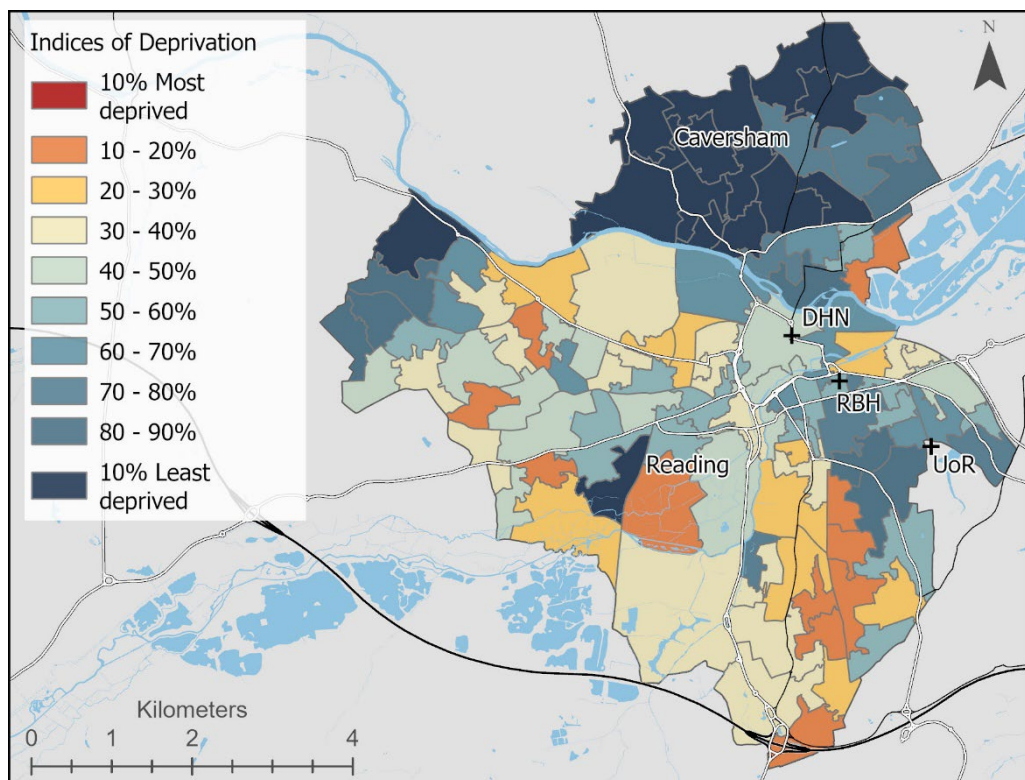
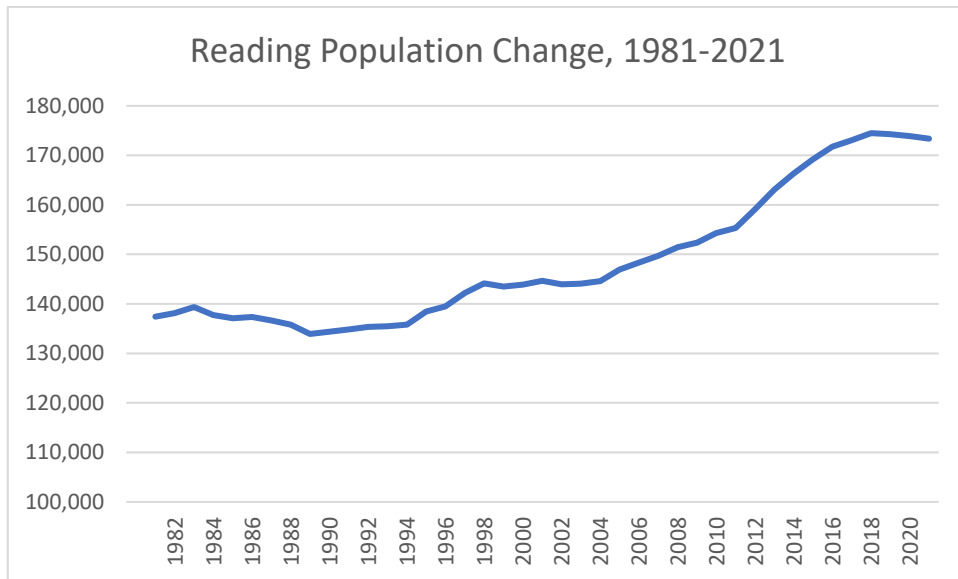


Figure: Indices of Deprivation for Reading

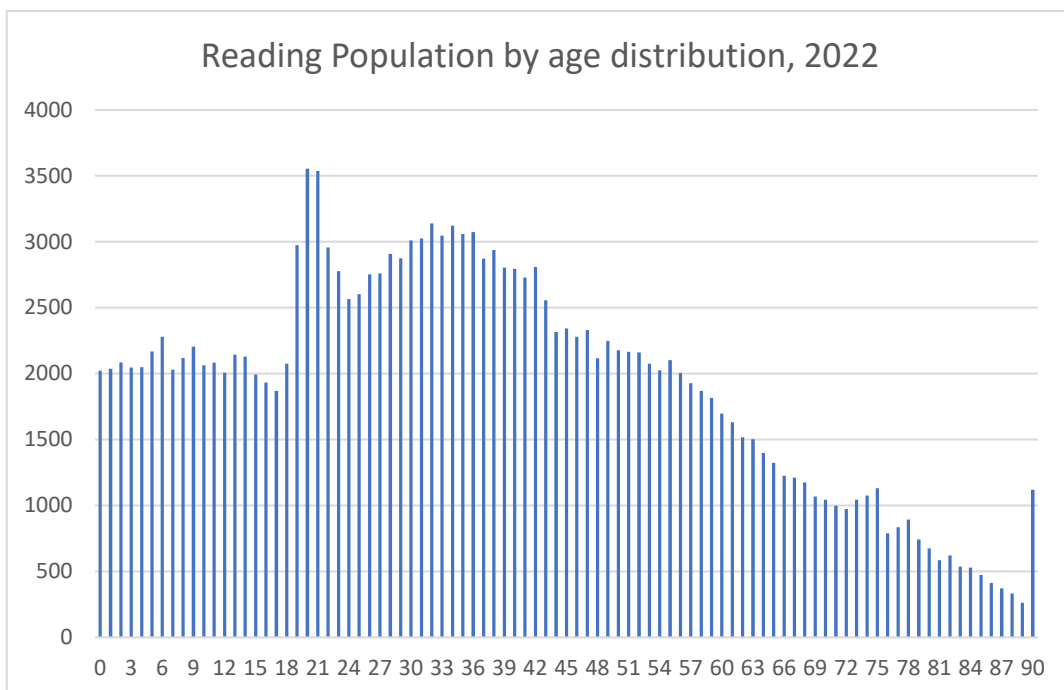
3 Reading – Data profile

3.1 Population Change and Age Distribution

Between 2011 and 2021 the population of Reading increased by 11.9%. This is more than the 7.5% increase for the SouthEast of England and 6.6% for England as a whole [2]. This overall increase in Reading masks seasonal fluctuations due to the student population. While this is not necessarily a problem, it will affect the demand density which, in turn, impacts on the commercial viability of proposed heat networks.



As the age distribution for Reading in 2022 suggests, 68.8% were of working age. This is roughly comparable to the proportion in England overall.

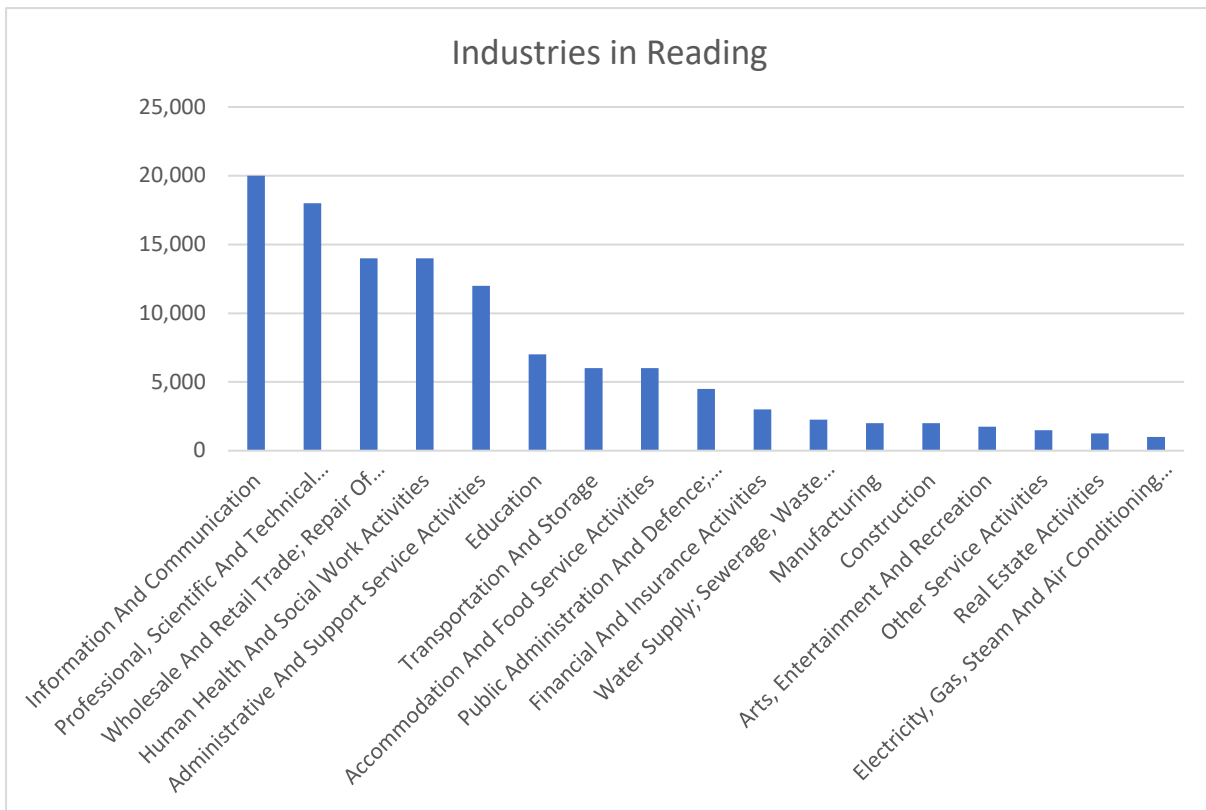


3.2 Information on industries in Reading

In 2022, 96.0% of the labour market was recorded as employed, only slightly below the 96.1% average rate for England. Of those employed, 13.2% are self-employed, and 86.8% are employees [3].

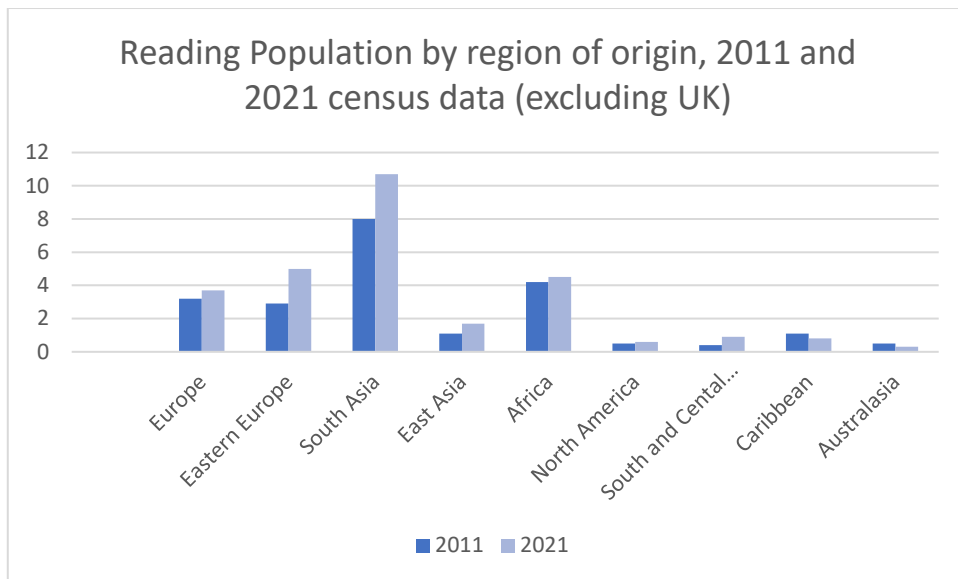
Like the overall population, the significance of these numbers for the introduction of heat networks is primarily around the issue of demand density. The Reading labour market includes a number of industries which support flexible working and working from home, which potentially increases domestic energy demand during the day.

In terms of numbers employed, the largest industry is Information and Communication with 20,000 employees. This represents 17% of the total jobs in Reading and more than the 5% of the total jobs in England. This is followed closely by Professional, Scientific and Technical jobs with 18,000. In addition, financial and insurance companies employ 3,000 people. These, alongside some other industries, provide greatest opportunity for flexibility in work location – particularly supporting working from home. This has implication for profiles of heat demand as well as the amount of heat demanded by residences.

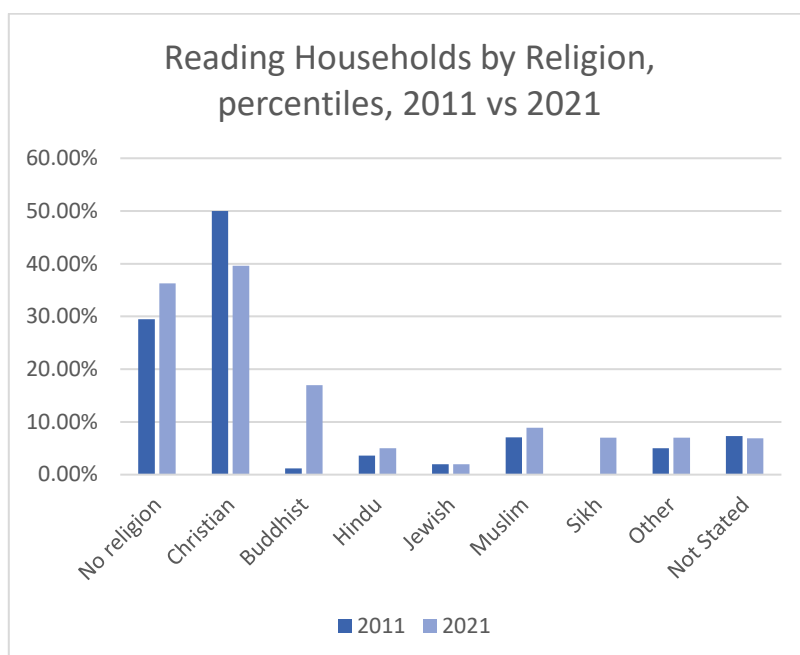


3.3 Diversity in Reading

Reading has a very diverse population. The census records over 65 distinct countries or regions of origin in Reading's population. As the table below indicates, people in Reading come from every part of the globe, with the highest proportions coming from South Asia, followed by Eastern Europe, Africa, and Europe. The most commonly spoken languages, after English, in order of importance, are Polish, Nepalese, Romanian, Urdu, Portuguese, Spanish, Italian, Arabic and Panjabi [4]. In terms of the research, this suggests that a special effort will need to be made to communicate with local stakeholders in their native languages. Similarly, cultural differences may directly affect energy demand, through variations in what counts as thermal comfort and in the way in which people use their homes.

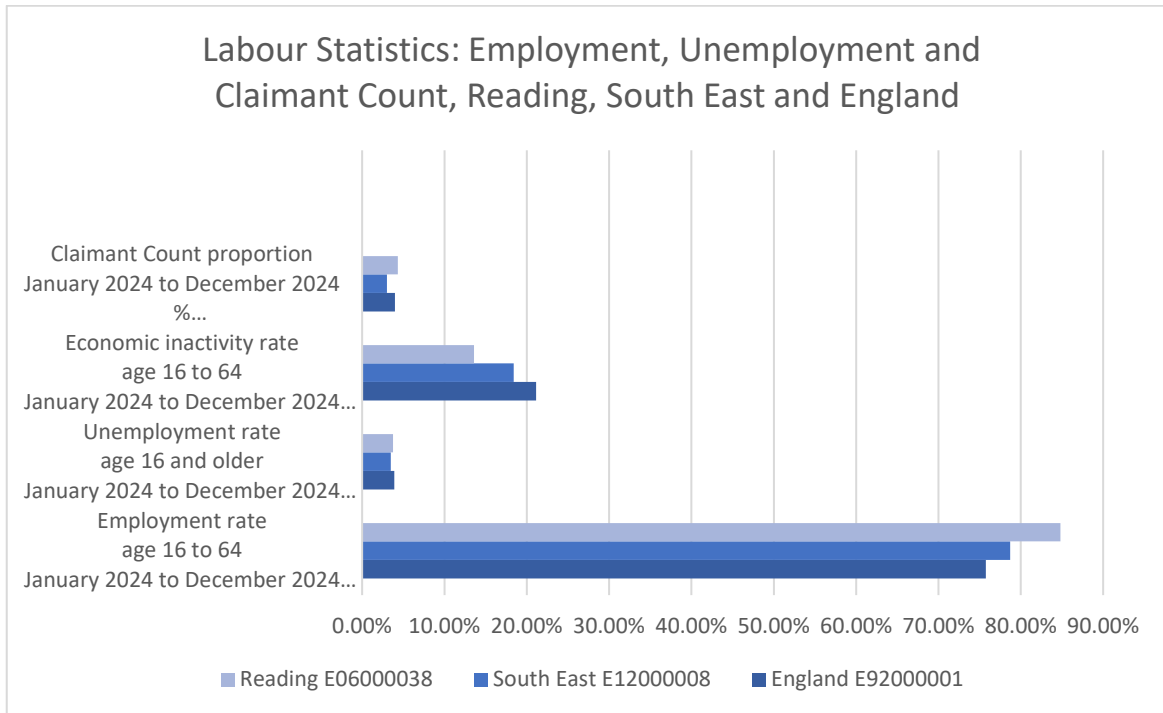


The heterogeneity of the population is similarly reflected in the distribution of households by religion. This diversity poses a challenge and an opportunity as many of these communities have active religious centres and places of worship, some of which are actively involved in protecting and improving the environment and in fighting the effects of climate change.



3.4 Hardship in Reading

As a local authority, Reading contains pockets of considerable wealth and of significant deprivation. Overall, the claimant count is higher than in the SouthEast in general, but comparable to the national average. The unemployment rate for the population over 16 is similarly close to the national average, of these 26.5% are students and just over 10% are people looking after family, long-term sick, retired and other [3].

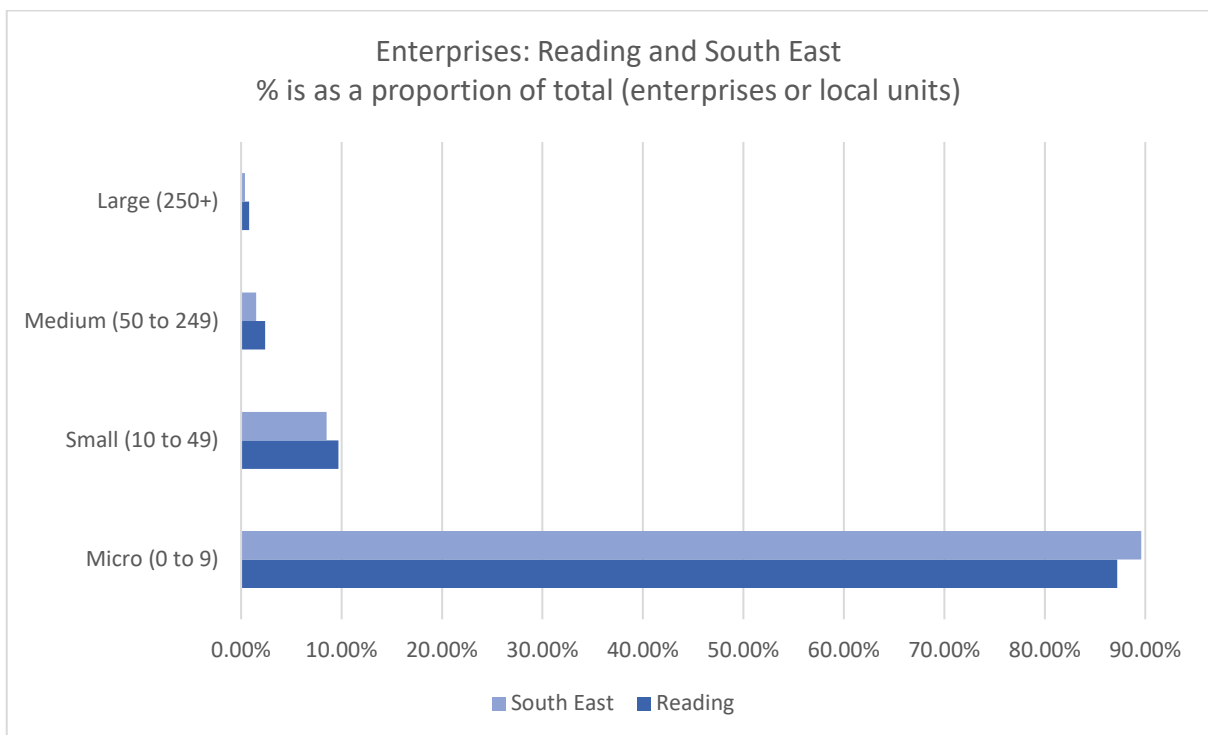


Within Reading, four of the smallest census units (Lower Layer Super Output Areas or LSOAs) are in the 10th decile on the index of multiple deprivation and another four are in the 20th decile. Within the Reading constituency, 10.7% of households are deemed to be in fuel poverty [5]. At the time of writing, none of the currently proposed district heat networks pass through these areas. Moving forward, the research will need to reflect on how concerns for fuel poverty and deprivation can be incorporated into planning around the proposed heat network and decarbonisation more generally.

3.5 Business and Property in Reading

As the chart below indicates, Reading has a mix of large (>250 employees), medium (50-249 employees) and small businesses (10-49 employees), with somewhat more large enterprises (0.8%) than the rest of the South East (0.4%) and slightly more medium and small enterprises (2.4% and 9.7%) than the South East (1.5% and 8.5%).

When it comes to district heat networks, businesses offer both the opportunity for heat generation and consumption. Large businesses such as data centres and large supermarkets generate additional heat which can be added to the heat network, while small and medium businesses that are on the route of the heat network can benefit from the service (and must be added into calculations of demand density). To realise this potential, it is essential that businesses along the route of the heat network plan ahead, making sure that any changes to their assets anticipate the need to be heat network ready when the technology is eventually installed.



Moving forward it is essential to identify how businesses may contribute to and benefit from planned investments and to support them in becoming heat network ready.

4 Policy and Regional Energy Plan in Reading

The transition to Net Zero requires coherence between national ambition and local delivery mechanisms and across sub-systems, such as heating and retrofitting. Thus, while national strategies prioritise heat decarbonisation, the regulatory framework is still emerging, and there is no clarity on how to implement proposed heat networks, while integrating them into broader decarbonisation and local planning strategies, including pressing issues of fuel poverty

In February 2019, Reading Borough Council declared a Climate Emergency and set out on a journey to achieve a carbon neutral borough by 2030 [6]. A key element of this vision was that the Council would lead by example to bring about the changes needed. The vision for the Council in this Carbon Plan is therefore to lead by example and work in partnership towards achieving Net Zero carbon operations by 2030 [6]. The Council further highlights both the need to improve buildings to reduce heat demand and decarbonise the heating systems.

A feasibility study [7] was carried out in Reading providing the detail of a prospective cluster to the 'North of Station' area selected from the four clusters outlined in the Heatmapping and Master Planning [8]. Reading's proposal for heat network centres around the use of its rivers and aquifers to source heat for its buildings RBC [9].

As heating is responsible for about 20% of the UK's greenhouse gas emissions, meeting Net Zero target will require the decarbonisation of heat as a key part of the Government's strategy [10]. Heat networks are an essential part of the path towards decarbonising heat, enhancing energy security and achieving net zero by 2050 [10]. However, they currently provide about 3% of total UK heat. The Government intends that around 20% of UK heat will be supplied using Heat Networks by 2050 and is bringing forward heat network zoning regulations to ensure that buildings connect [10].

Despite the importance of heat networks for Net Zero goals, their regulation remained very limited until the introduction of the relevant provisions in the Energy Act 2023. Following that, the UK Government and Ofgem are developing new heat network regulations, anticipating new legislation to be enacted in 2026. This will include minimum technical standards, authorisation conditions, consumer protections, and mitigating the risk and impact of financial failure.

Addressing fuel poverty is a key priority for the UK Government. The Fuel Poverty (England) Regulations 2014 set to ensure that "as many as is reasonably practicable of the homes in which such persons live have a minimum energy efficiency rating of Band C" by the end of 2030. Because of this definition of fuel poverty in England, in 2024 3.1 million households were in the lowest two income deciles (10% groups) but were not deemed to be in fuel poverty because their property had a rating of C or better [11]. The efforts to reduce fuel poverty should target both the homes' energy efficiency, household expenditure on energy bills, and household income.

5 Reading heat networks: System challenges for a just transition to net zero

The proposed Reading District Heat Network poses a number of whole system challenges for a just transition to net zero. These include fragmentation and overlay of major systems:

1. Technical systems for heat network cooling, including technical design and integration with existing infrastructure;
2. Governance, social and economic systems, including commercial viability and financing, measuring and targeting multiple deprivation and fuel poverty as well as policy, regulation and local management.;
3. Built environment systems, including retrofit of housing, infrastructure development (and in particular renewal of underground utilities), rendering existing stock heat network ready and additional heating sources, such as waste facilities, supermarkets and ICT centres.

At the centre of this systems' overlap and tying them together are issues of the geographical placement of the network, demand density, network readiness (be it to contribute to network heating in the case of specific large industries or to benefit from the availability of heating).

Current plans for heat networks understandably support the organisations that are involved in their design and implementation, most notably the Reading Borough Council, University of Reading, and Royal Berkshire Hospital. However, their implemented potentially impacts on the distribution of access to clean and less expensive heat. There is also a concern that, whatever design is chosen, potentially 'freezes' ongoing efforts to lower heating costs through retrofit and insulation, in an interest of maintaining the commercial case for the heat network. This concern can be seen in the tendency of feasibility studies to focus on connections with new build areas, bypassing existing assets that could benefits from retrofit and insulation.

At the moment, planning for the heat network is going ahead, with the thought that community engagement will come after the technical and commercial issues are already set (to get buy-in). JUST-Systems aims to reverse this sequence, involving communities early in the design of the proposed intervention. This requires identifying relevant communities, exploring the fit between retrofit strategies and proposed heat networks, and developing governance mechanisms that will include all stakeholders.

A further objective is to move beyond isolated interventions by supporting the development of a long-term, scaled approach to the design of heat networks, taking into account systemic effects on communities, local businesses, and the local authority more generally.

As an initial step, JUST-Systems team will work to identify neighbourhoods that are potentially on the path of the proposed heat networks. At the same time, our aim is to support the development of a Reading-wide heat and decarbonisation strategy, which takes into account the potential for long-term scaling up of the heat network and addresses current issues of fuel poverty and heating needs, domestic, public and commercial as part of a more holistic strategy.

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