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CAMBRIDGE AHEAD

The Infrastructure Gap

The future of sustainable energy in Greater Cambridge

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Contents

Executive summary

Purpose

Cambridge Ahead and the Global Sustainability Institute at Anglia Ruskin University jointly launched a Call for Evidence in 2024, seeking input from local researchers, employers and communities on how best to decarbonise energy production and distribution in the Greater Cambridge area. This report summarises the submissions we received as part of this research and establishes a bold, inclusive vision for meeting the region's future energy needs by 2050.

The 2050 Challenge

Energy demand across Greater Cambridge is expected to triple by 2050 (from a 2021 baseline).[1] Actual energy demand may be significantly higher than this, particularly in light of a higher level of ambition which has emerged partly as a result of national Government's focus on the region through the Cambridge Growth Company, which will lead to a higher level of residential and commercial development than is currently within Local Plans.

Meeting this higher level of ambition is essential to enabling Greater Cambridge to reach its full potential and support Government's Growth Mission, and the evidence submitted to our Call for Evidence suggests that energy has the potential to be a significant barrier to these aims. Challenges include grid capacity limitations, land scarcity, skills shortages, insufficient funding and policies which threaten the region's ability to support inclusive growth, renewable energy development, and the equitable transition to net zero.

The 2050 Vision

Drawing on evidence submitted to our Call for Evidence, we have developed a vision of how Greater Cambridge can overcome this challenge and become a 'living laboratory' of innovative infrastructure and sustainable energy. This vision requires harnessing the collective strengths of the region's universities, businesses, landowners, and local communities. The 'living laboratory' vision means leveraging the world-leading research, collaborative ecosystem and ability to attract investment so that we can test and demonstrate emerging technologies in local settings.

Respondents to our Call for Evidence shared current, scalable initiatives across energy generation, storage, distribution and demand management which could be adopted to make Greater Cambridge a world-leading hub of sustainable energy innovation. Specific initiatives include:

- Cambridge City Centre District Heating Network
- Cambridge East Thermal Energy Storage System
- Sustainable 'Living Laboratory' around the Hartree and Cambridge Business Park developments

- Microgeneration innovations, such as building mounted wind turbines and air/river source heat pumps, alongside rollout of air-source heat pumps
- Passivhaus standard for new buildings to set the highest expectations for efficiency and support demand management
- Vehicle-to-Grid and other smart domestic energy storage solutions

Enablers of the 2050 Vision

The submissions received from respondents to our Call for Evidence identified three areas where action is needed to achieve the 2050 Vision for Greater Cambridge.

2050 Vision

Greater Cambridge has leveraged world-leading research to become a living laboratory for innovative infrastructure and sustainable energy delivering against inclusivity goals

Enabler 1: Leadership | Enabler 2: Funding | Enabler 3: Inclusion

Leadership

To position Greater Cambridge as a leader in net-zero energy infrastructure and climate-tech innovation, it is crucial to establish a supportive policy and regulatory environment that incentivises clean energy investments and simplifies implementation. Key measures submitted to our Call for Evidence include streamlining planning processes, strengthening building regulations, adopting renewable energy procurement policies, and developing integrated energy and transport masterplans that align with local and national goals, ensuring all communities benefit from sustainable growth.

Funding

Achieving the vision requires innovative financing mechanisms to address the challenge of large-scale investment needs and attract diverse investors. Solutions submitted to our Call for Evidence include bundling smaller projects into aggregated funds, leveraging green bonds, community cooperatives, and public-private partnerships, and pioneering models like Energy as a Service.

Inclusion

Energy infrastructure can play a transformative role in reducing inequality across Greater Cambridge by generating jobs, reducing fuel poverty, and empowering disadvantaged communities through inclusive energy projects. Respondents to our Call for Evidence focused on the importance of a ‘just transition’ in Greater Cambridge, and proposed prioritising local participation, tailored skills development, and innovative ownership models to ensure that the green transition delivers economic, social, and health benefits equitably while fostering community cohesion and resilience.

Recommendations

Across the evidence submitted to us, respondents made proposals for changes across the public and private spheres and at the national and local level. These proposals have been developed into recommendations that would support the realisation of the 2050 Vision. These recommendations reflect the priorities of respondents and the scope of the Call for Evidence, and do not address every aspect of the sustainable energy transition.

To enable these recommendations, we call for the establishment of a multi-agency, cross-Government, working group on energy as part of the Cambridge 2050 project.

Private sector organisations should:

1. Share best practice examples of innovative funding models they have utilised to support retrofit, new energy generation infrastructure or high-quality development such as aggregated Power Purchase Agreements (PPAs).

2. Demonstrate leadership by establishing vision-led strategies to reduce carbon emissions, such as transport strategies to encourage modal shift among staff.

3. Use procurement as a tool for incentivising local investment, learning from forward procurement processes which have successfully driven innovation in the NHS.

Government at the local level should:

4. Continue to engage with regulators and national government departments to forward-fund local energy infrastructure.

5. Target grant funding to derisk innovative approaches, such as community-owned projects, and attract private investment, building on successful projects like the Swaffham Prior heat network.

6. Develop an Energy Masterplan including detailed strategies for energy storage, smart grids, demand-side management and energy efficiency which is integrated with planning and growth strategies for the region, including the Local Growth Plan, Local Area Energy Plan and future Local Power Plans.

7. Strengthen policy frameworks to capture the long-term and indirect costs of inaction to facilitate a shift towards Risk-Opportunity Analysis, which more accurately captures the uncertainties and opportunities involved with innovation and the process of transition.

8. Improve building efficiency locally, requiring new development to be brought forward to the highest possible standards.

9. Require energy investment to involve early and inclusive engagement with local communities, through financial routes such as cooperatives, shares, investments and non-financial routes such as procedural inclusion in decision making processes, and community-led projects.

Government at the national level should:

10. Engage proactively with local authorities and relevant private sector partners on planned development of residential and commercial space in Cambridge.

11. Put Local Area Energy Plans on a statutory footing so that they are prioritised for funding and positioned as implementation partners of national delivery vehicles such as GB Energy.

12. Support local economies with analysis and forecasting of local 'green' skills needs through Skills England, based on engagement with the Local Skills Improvement Plan, employers and devolved authorities, to support people to access new jobs created in the green economy.

Introduction

The Cambridge city region is one of the fastest-growing areas in the UK, fuelled by world-leading science and technology clusters. However, this rapid growth has not been matched by the necessary infrastructure investments. As a result, residents and businesses are increasingly confronted with a widening Infrastructure Gap. Key sectors such as transport, utilities, health, and housing are struggling to keep pace, limiting the region's economic potential and threatening quality of life for its residents. In addition, issues such as socioeconomic inequality, a lack of affordable housing, and water scarcity are well-documented in Cambridge. These challenges must be urgently addressed to ensure sustainable future growth.

To address these hurdles, Cambridge Ahead and the Global Sustainability Institute jointly launched a Call for Evidence in summer 2024, seeking input on how best to decarbonise energy production and distribution in the Greater Cambridge area. The goal is to establish a bold, inclusive vision for meeting the region's future energy needs in an equitable manner.

The climate crisis, coupled with increasing energy demand—especially in our city region—highlights the urgent need to transform how we produce and distribute electricity and heating to homes, businesses, and public buildings. This challenge is compounded by climate change and its consequences, such as overheating and the potential for urban heat islands. As such, this issue demands immediate and long-term attention.

This report draws on the submissions received through the Call for Evidence, as well as additional evidence submitted by respondents. The Call for Evidence was open to anyone, and respondents included individuals, community groups and employers. In line with the terms of the Call for Evidence, individual respondents are not named in this report.

Organisations that responded include:

AGR Power
All Seasons UK
Anglia Ruskin University
Arm
Brockton Everlast
Cambridge Ahead Young Advisory Committee
Cambridge City Council
Cambridge University Hospitals
Cambridgeshire County Council
Darwin College, University of Cambridge
Hughes Hall Centre for Climate Engagement
Jesus College, University of Cambridge
Marshall
Mott MacDonald
RG Carter
Rixon Architecture

Additionally, an evidence gathering roundtable was held with local public sector representatives from the Cambridgeshire and Peterborough Combined Authority, Greater Cambridge Shared Planning Service, Cambridgeshire County Council and Cambridge City Council. The research partners will be considering further routes to engage a wide range of voices, including community groups, in further stages of the Infrastructure Gap programme.

The 2050 Challenge:

Greater Cambridge's Energy and Sustainability Needs

Greater Cambridge plays a strategically crucial role in the UK economy, and significant residential and commercial growth is expected by 2050. However, respondents to our Call for Evidence raised challenges such as grid capacity limitations, land scarcity, skill shortages, insufficient funding and policies which threaten the region's ability to support inclusive growth, renewable energy development, and the equitable transition to a net-zero economy.

The current Greater Cambridge Local Plan estimates that 33,500 new homes are needed in the wider city region between 2011 and 2031,[2] including 15,000 affordable homes. The emerging Local Plan to 2041 has identified a need for 51,000 homes.[3] For industrial and commercial floor space, UK Power Networks (UKPN) predicts a 3% to 7% increase in demand between 2022 and 2032.[4] The Ministry for Housing, Communities & Local Government (MHCLG) has also stated that "Greater Cambridge has a vital role to play in this Government's mission to kickstart economic growth" and has committed to a high level of ambition for growth in the area, with a programme to unlock strategic development sites to be led by the Cambridge Growth Company.[5] Additionally, the next generation of data science, data processing, transport electrification, and manufacturing is expected to drive a significant rise in energy demand. Failing to meet this growing demand would result in missed economic opportunities.

At the same time, Cambridge must address its carbon emissions. If the region were to meet its statutory carbon reduction targets - 68% reduction by 2030, 77% by 2035, and net-zero by 2050 - any future growth must be underpinned by a commitment to sustainable energy and substantial investment in energy efficiency.[6] Current supplies of renewable electricity and zero-carbon heating are insufficient to meet future needs, with energy demand across Greater Cambridge expected to triple by 2050 (from a 2021 baseline).[7] This forecast for demand does not take account of potential development outside of current Local Plans, such as the work being undertaken by the Cambridge Growth Company – so it is likely that the true energy demand will be even higher.

3x

Energy demand across Greater Cambridge is forecast to triple by 2050

51,000

New homes - the need identified in the emerging Local Plan to 2041

2050

The target date for Net Zero

The growth of renewable energy (solar, wind, thermal) and energy efficiency will be driven by new legislation, changes in building regulations, and increasing user demand. However, the region faces limitations in the local energy network's capacity to transport power from production sites to areas of consumption. If Cambridge continues to rely solely on national infrastructure, it risks missing a critical opportunity to develop a sustainable, locally resilient energy system.

‘Clean-Tech’ investors and companies operate in a global market, and one of the key factors in their investment decisions is the presence of a credible and actionable sustainable energy strategy, with a clear route to net-zero that stakeholders can support. If Cambridge can meet its projected energy demand with zero-carbon solutions, it could become a prime location for technology investment. However, this growth could either exacerbate regional inequalities - creating political instability and driving investment away - or it could drive equitable, inclusive growth that benefits local communities.

To ensure that future energy needs are met in an equitable and inclusive way, a multifaceted approach is essential. Key considerations must include accessibility, affordability, equity, participation, and sustainability.

Grid capacity, timelines and costs

The electricity grid in Greater Cambridge is aging and lacks sufficient spare capacity, which discourages individuals and institutions from generating excess power on-site to support wider decarbonisation efforts. As a result, surplus energy cannot be fed back into the grid. The capacity of the Distribution Network Operator (DNO) to supply electricity for heating and transport needs is not aligned with national carbon reduction targets. Additionally, the local integration of renewable power sources (such as solar and wind) is misaligned with expected connection timelines beyond 2037, when new transmission overhead lines are scheduled to be completed and additional capacity will be added to the region. This misalignment creates a barrier to the local development of renewable energy generation and the deployment of technologies like heat pumps.

For example, if the North Angle Solar Farm in East Cambridgeshire, developed by Cambridgeshire County Council, had been delayed or placed lower in the connection queue, its connection would not have been possible until after 2028 due to necessary upgrades at the Burwell Local substation. Plans at Anglia Ruskin University (ARU) to decarbonise campus heating using air-source heat pumps (ASHP) would likely exceed the current electrical supply capacity. This issue is expected to affect many organisations across Greater Cambridge. To meet this rising electrical demand, substantial infrastructure upgrades are required.

The Greater Cambridge Partnership (GCP) has conducted an assessment to estimate future energy demand for residential and commercial developments in South Cambridge to 2031 (within the current Local Plan). This assessment aims to identify the electrical distribution infrastructure necessary to support housing and commercial growth. By analysing data from existing substations and factoring in housing trajectory and planning register data from the GCP, it is clear that significant investment in grid infrastructure is urgently needed. For example, the expected demand from planned residential and commercial development is estimated to require additional capacity of 41 Mega-Volt Amperes (MVA) from the Cambridge East Grid alone. The additional grid capacity at Cambridge East necessitated by housing development is demonstrated in the map below, submitted in evidence by Cambridge City Council.

Significant upgrades are now required across both the low and high voltage networks, as well as grid management systems, to ensure that supply and demand are efficiently balanced within the operational constraints of the electricity system. These upgrades demand substantial investment, with new assets bearing the cost of grid enhancements. However, this approach tends to disadvantage community-scale projects, retrofits (where assets are added), and small to medium-sized developments.

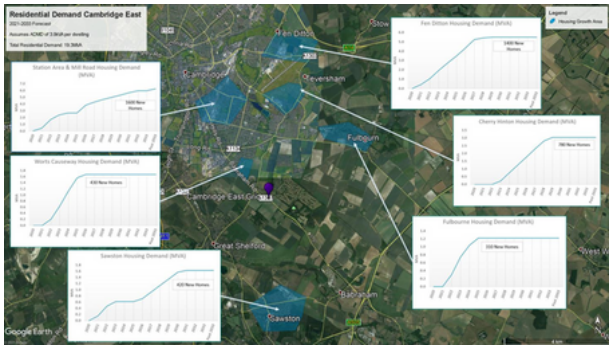

Figure 1: Cambridge East Demand Maps (Residential), based on estimates to 2031 (submitted in evidence by Cambridge City Council)

For large-scale projects, upgrade costs can typically be integrated into business cases, but for smaller projects, these costs can render initiatives financially unviable, halting progress. Given the geography of Greater Cambridge, where large-scale generation opportunities are limited, the financial burden of grid upgrades presents a significant challenge for medium and small-scale projects.

Access to affordable financing, combined with supportive government policies and incentives, is critical to enable businesses and communities to adopt sustainable energy solutions while maintaining long-term growth.

Land availability

Land scarcity presents a significant barrier to the expansion of renewable energy projects in Greater Cambridge. For example, generating 1 GWh/year of solar energy requires around 1.6 hectares of land for photovoltaic (PV) panels. This represents a considerable amount of land that developers are unlikely to secure locally for solar farms, with planning issues further complicating the process.

Photovoltaic systems have a low spatial energy density (MWp/m²), meaning they require substantial land area to generate significant power. As a result, many new PV projects are located in rural areas, often on productive agricultural land or other rural sites. This shift places the burden of visual impacts—such as concerns over aesthetics—on rural communities, even as the energy generated serves to decarbonise urban centres.

Land availability is highly competitive, with housing, agriculture, and the need to preserve biodiversity all vying for space alongside renewable energy projects. Additionally, Green Belt restrictions impose strict limits on development, including renewable energy projects.

Skills availability

Local skills needs are not being met, which is impacting regional growth, with two thirds of hard to fill jobs linked to a lack of skills nationally.[8] When these shortages are addressed by bringing in workers from outside the area, it places additional pressure on the transport infrastructure.[9] Looking ahead, future skills demands will include soft skills, such as systems thinking, to support a more holistic and integrated approach to the complex challenges of achieving net zero. By developing these skills locally, the region can better capitalise on the opportunities the transition presents, while also ensuring that the process is inclusive and equitable for all.

The rapid growth of the renewable energy sector has intensified the need for specialised skills. A shortage of qualified workers in areas such as installation, maintenance, and engineering can delay project timelines and increase costs. The demand for green skills is already rising: job postings requiring these specialist skills in Cambridgeshire and Peterborough[10] have more than doubled in the past five years.

The policy landscape

The Greater Cambridge area requires robust policies across multiple sectors, including water and utilities, that not only align with but exceed national goals. These policies should provide clarity and support for all stakeholders involved in the energy transition. While the emerging Local Plan will play a role, it is unlikely to be sufficient on its own. The plan will likely be limited to design principles, development boundaries, localised transport planning, reactive network reinforcement (including for water and energy), and capping energy consumption in buildings. The traditional planning system is too slow to keep pace with the rapid evolution of design and energy needs. While Cambridgeshire Local Authorities are working on Local Area Energy Planning, this remains a non-statutory role without dedicated funding, despite the significant benefits it could bring. What is needed is an overarching framework that offers investment certainty while ensuring environmental protection and delivering measurable social value. A more agile approach will be necessary to support the required delivery.

Currently, national policies, such as renewable tariffs, offer limited incentives for developing local solutions. Public sector organisations also face barriers due to Treasury rules that prevent them from directly linking their energy spend to renewable generation through long-term Power Purchase Agreements (PPAs). Utility providers are constrained to react to confirmed demand, which can lead to significant delays in housing and commercial developments. This reactive approach can render projects that contribute to net-zero goals—such as the electrification of transport and the deployment of renewables—financially unviable. Additionally, energy use intensity (EUI) remains a fundamental factor in sustainable energy, but the absence of a clear and effective standard for EUI further hinders progress.

What is a PPA?

A Power Purchase Agreement (PPA) is an agreement between an energy provider (typically responsible for generating the energy) and a customer. PPAs are typically longer-term agreements, lasting from 5 years to up to 20 years, giving energy providers longer-term revenue security. PPAs also offer price stability for buyers, mitigating the impact of energy market shocks, securing financial and carbon savings. PPAs also offer an opportunity for alternative financing of local energy generation infrastructure, making PPAs an attractive mechanism for encouraging sustainable energy generation.

Funding

The availability of development capital for projects and risk capital for innovation in the UK is essential to decarbonisation of energy supply and distribution. Some respondents to the Call for Evidence suggested that global trends in capital availability – including a reliance of UK technology firms on overseas capital from the USA and Asia – is limiting opportunities for UK companies and reducing the UK's ability to remain globally competitive in research and development. Consequently, the delivery of innovative solutions, including the investment and demonstration of new technologies for a net-zero energy transition, is becoming more difficult to achieve locally.

On a smaller scale, households face several barriers to accessing the benefits of net zero, including high upfront capital costs, a lack of awareness about available incentives and policies, and limited knowledge of what actions to take or where to seek help. For a fair and equitable transition from gas heating to low-carbon electricity supplies, it is essential that the cost of grid gas and electricity is "levelled." Currently, the switch from gas heating to heat-pump-driven electrical heating often creates a financial burden. With electricity prices typically five times higher than gas (well beyond the coefficient of performance for most heat pump systems), this transition can impose significant revenue cost pressures. Respondents to the Call for Evidence stated that specific heat decarbonisation projects they have been involved in have been hampered by these cost pressures.

However, the cost of inaction must also be considered in decision-making. Climate adaptation measures will be far more expensive if delayed. Currently, the long-term costs of inaction are not included in cost-benefit calculations, as these costs are often not borne by the organisation making the initial investment.

Energy poverty

The removal of green subsidies for renewables and zero-carbon home standards over the past decade is estimated to have added £22 billion to UK energy bills.[11] Therefore, action to grow the share of renewables is often seen as the most effective way to combat energy poverty. However, the risk that the green transition could disproportionately affect the most vulnerable in society needs to be carefully considered. The shift to a net-zero economy will likely be driven by electricity, especially given the expected decarbonisation of the electric grid in England, Wales, and Scotland by 2036. As gas and oil prices rise due to scarcity and geopolitical factors, and additional environmental costs are introduced to promote heat pumps and battery electric vehicles, it is crucial to ensure that these changes do not worsen energy poverty.

To help manage energy bills, improvements to building fabric and energy efficiency are essential. While homes in the southeast tend to have higher average EPC ratings,[12] there are still greater opportunities for reducing fuel poverty in owner-occupied and privately rented homes compared to social housing.[13]

The 2050 Vision:

Greater Cambridge as a Living Laboratory of Innovative Infrastructure

Drawing on evidence submitted to our Call for Evidence, a vision emerges of Greater Cambridge as a living laboratory of innovative infrastructure and sustainable energy delivering against inclusivity goals. Respondents shared current, scalable initiatives across energy generation, storage, distribution and demand management which could be adopted to make Greater Cambridge a world-leading hub of innovation.

Greater Cambridge has long been a hub of innovation and can play a leading role in the transition to net zero by harnessing the collective strengths of its universities, businesses, landowners, and local communities. Cambridge is already a globally recognised brand, and it is essential that we identify existing best practices, refine them, and simultaneously explore new solutions to accelerate progress.

By using the region as a living laboratory, we can test and demonstrate emerging technologies in local settings. The Cambridge innovation cluster is well placed to lead on developing technological advancements as it offers both a research and development cluster and test bed for trialling new solutions. While early-stage applications may not be immediately financially viable, they lay the groundwork for the mainstream technologies of the future, which will eventually become cost-effective and offer long-term value for the public. Living laboratory partnerships are vital for innovation because they provide the space to showcase new technologies, attract further investment, and lower costs through learning curves. These projects can serve as models for other regions, demonstrating the feasibility and advantages of innovative, sustainable energy solutions. For instance, creating net-zero energy neighbourhoods or retrofitting existing communities to achieve net-zero status can set benchmarks for nationwide adoption.

Encouraging collaborations between academia, industry, and government—and providing access to risk capital—will accelerate technology transfer, commercialisation, and the retention of top talent in the energy sector. Innovation hubs and development initiatives can drive technological breakthroughs through pre-commercialisation, commercialisation, and knowledge-sharing.
By leading the transition, Greater Cambridge can not only influence national policy but also create a positive feedback loop. Solutions developed here will drive further policy improvements, unlock new markets, and create new opportunities, reinforcing the region's leadership in the energy transition.

2050 Vision

Greater Cambridge has leveraged world-leading research to become a living laboratory for innovative infrastructure and sustainable energy delivering against inclusivity goals

At the core of this vision is a commitment to sustainable development and to build the innovative infrastructure that is essential for increasing Greater Cambridge's ability to produce energy renewably, store and distribute it intelligently, and reduce its consumption. Submissions to our Call for Evidence show that innovative and scalable examples are already in development across these three areas.

Generation

River Source Heat Pumps: Leveraging Cambridge's Natural Resources

The 2050 vision of Greater Cambridge as a living laboratory of sustainable energy entails a transition from fossil fuel-based forms of energy (such as natural gas) to renewable electricity (well-recognised examples of which include air source heat pumps). Across submissions we received, innovative renewable energy generation initiatives were shared, which may provide scalable alternatives to fossil-fuel energy generation. For example, at Darwin College, a £200,000 grant is being used to develop a low-carbon heating system to help the college achieve carbon neutrality by 2032.[14] As part of this plan, a River Source Heat Pump is being designed, incorporating heat pumps, circulation pumps, filtration systems, and thermal stores to provide renewable heating from the River Cam.

Building-Mounted Turbines: Urban Wind Power

Building-mounted wind turbines, such as the Katrick example (image right),[15] are a rapidly evolving technology that is not yet widely deployed in the UK. While PV systems have a relatively low spatial energy density, building-mounted wind turbines can generate more energy within a smaller footprint, making them a promising solution for urban areas. Demonstration projects on council buildings, coupled with financial incentives, could position Cambridge as a leader in this technology, further advancing its clean energy goals.

Figure 2: Katrick Technologies Building-Mounted Wind Turbine (image submitted in evidence by Mott MacDonald)

Solar Energy UK: Sustainable Energy that Enhances Biodiversity

The Greater Cambridge region has a unique opportunity to lead in the innovation of sustainable energy solutions which meet wider sustainability goals, particularly in the way ground-mounted solar PV is deployed. Solar Energy UK has been conducting ecological monitoring across PV sites nationwide to identify ways solar projects can enhance biodiversity.[16] As the tension between land use and energy generation continues, finding ways to create energy solutions that offer greater benefits to both society and the environment is essential.

Figure 3: Babraham Park & Ride solar panel installation (Phase 1). Credit: Cambridgeshire County Council.

Natural Energy Storage: Using Natural Assets to Reduce Waste and Meet Demand

Growth should be guided to areas with natural energy storage capabilities, such as aquifer thermal energy storage (ATES), or locations where waste energy—like wastewater or waste heat—can be harnessed for a positive energy outcome. This approach not only maximises local resources but also contributes to a more sustainable and efficient energy system.

Looking to the future, the redevelopment of Marshall's airport site, expected to begin around 2030, promises to create at least 7,000 homes and 9,000 jobs. Marshall aims to appoint a master developer to ensure that Cambridge East sets a new benchmark in sustainable development. This large-scale project presents a unique opportunity to implement cutting-edge solutions in transportation, energy, water management, and biodiversity. The proximity to the proposed Honey Hill Water Recycling Centre and an aquifer could provide an opportunity for a thermal energy storage system, further bolstering the region's renewable energy infrastructure. Similar opportunities exist with the ongoing development in Waterbeach and with the Crown Estate's Cambridge Business Park[17] development and surrounding Hartree community.[18]

Energy Centres and Heat Networks: A New Approach to Distribution

The Cambridge City Centre Heat Network (CCCHN) project aims to establish a zero-carbon heat network across multiple zones in the city centre by 2030. This initiative will allow organisations to reduce their electrical demand and manage the costs associated with transitioning to zero-carbon heating. By concentrating energy supply in a smaller number of energy centres rather than spreading upgrades across multiple sites, efficiency is maximised. Additionally, the proposed new sewage works present an opportunity to integrate a heat recovery system, turning waste into a valuable heat source.

The development and maintenance of industrial buildings, often located near more affordable housing, offer additional possibilities for energy sharing. By incorporating energy centres and heat networks, waste heat from industrial operations, such as large cold rooms or data centres, could be harnessed and reused to provide energy to local residents. A similar system is being implemented in London's Dovetail Building, where waste heat from office spaces is being transferred to the neighbouring Middlesex Street Housing Estate, demonstrating the potential for such energy-sharing solutions.

Digital Grids: Connectivity Facilitating Sustainability

To enable smarter demand management, robust digital connectivity is essential. Access to affordable, high-quality broadband will ensure that all households can fully benefit from smart grid technologies and energy management tools. As we deploy smart grid infrastructure, it is critical that we minimise digital disparities and ensure equitable access to the advantages these technologies offer. This will ensure that the benefits of a smarter, more resilient energy system are shared by all.

Passivhaus and BREEAM: the Highest Standard New Buildings

Respondents to the Call for Evidence raised various examples of new development intended to reach the highest level of sustainability standards. For example, ARU has set stringent sustainability requirements for all new buildings and refurbishments. These include Passivhaus and BREEAM Excellent standards for new constructions, with equivalent standards applied to major refurbishments.

Figure 4: Anglia Ruskin Cambridge Campus (image submitted in evidence by ARU)

Passivhaus refers to a way of designing buildings which maximises energy efficiency by following principles related to airtightness, window glazing, insulation and ventilation to minimise the need for heating and cooling.

These high standards will be the future of development in Greater Cambridge; the emerging Greater Cambridge Local Plan to 2041 includes a new requirement that all new developments should have a space heating demand of 15-20 KwH per m2 per year, which is close to Passivhaus standard.[19,20]

In 2013, ARU trialled Cool Phase passive cooling technology, which significantly reduced energy consumption compared to traditional air conditioning systems (which expel waste heat and raise local temperatures). The Cambridge campus also features several green roofs, which help moderate internal temperatures and reduce surface water runoff.

Another example coming forward is the Mount Pleasant project at St John's College. The project will develop communal living accommodation for 133 postgraduate students with external space for breakout and socialising, as well as associated cycle parking. The site will accommodate five new-build buildings, and a sixth, The Knott, will undergo significant refurbishment and an extension. The new-build villas will achieve Passivhaus certification, and the refurbishment of The Knott will be to Passivhaus Low Energy Building standard. The site will be fully landscaped to provide social spaces and more wild areas with planting and woodland, which will significantly enhance biodiversity there.

Figure 5: Mount Pleasant Project
Credit: bb+c architects

Smart Connections and Domestic Storage Solutions

Our ongoing reliance on expanding physical infrastructure—bigger pipes and more wires—is neither sustainable nor affordable in the long term. To meet both new and existing demand, we must shift consumption away from peak periods through smart energy connections. Rather than continuously upgrading infrastructure, we can avoid these costs by investing in smart grids, networks, and distributed energy solutions, including aggregated micro-generation, as discussed above, and storage systems.

One innovative storage solution shared in evidence submitted to us is Vehicle-to-Grid (V2G). V2G allows for electricity to flow either way between an Electric Vehicle and the grid and means that the vehicle owner can charge their EV when demand is lowest, and electricity is cheapest, while selling energy stored in the vehicle battery back to the grid during periods of highest demand. With 10,000 public EV Charging Points expected to be needed across Cambridgeshire by 2030, and ongoing electrification of private vehicles and public fleets, V2G represents an opportunity to ensure this transition feeds into an integrated local energy network.[21]

“Solar Together”: Retrofitting at Scale

For homes occupied by low-income residents, building retrofits—such as fabric improvements (insulation, ventilation, draught-proofing, glazing) and the potential electrification of heating through heat pumps, solar PV, and battery storage—are supported by Council housing programmes and government-funded private sector housing schemes. However, the current pace of retrofitting is insufficient to meet the city’s 2050 carbon reduction targets. At present, around £10 million is allocated for retrofitting low-income homes in Cambridge, but this funding is not enough to achieve the scale of change required.

Vital work is being conducted by Cambridge City Council, the Cambridge Institute for Sustainability Leadership and other partners to understand the market barriers and opportunities to retrofit at scale. Innovative solutions to scaling retrofit were shared in evidence submitted to us. For example, in Greater Cambridge, there is an ongoing programme to install PV systems in strategic public spaces such as carports and bus stops, as well as to support community-owned renewable energy initiatives. One potential model for expansion could be a "Solar Together” style scheme targeting large housing estates.[22] This would enable fabric improvements and solar installations at scale, particularly for terraced houses or clusters of homes with similar architectural designs. By assessing entire neighbourhoods, conducting a sampling of homes, and using local contractors for larger projects, costs could be reduced significantly compared to retrofitting homes individually.

The 2050 Enablers

How can Greater Cambridge achieve this vision by 2050?

The submissions received from respondents to our Call for Evidence identified three areas where action is needed in order to achieve the 2050 vision for Greater Cambridge.

2050 Vision

Greater Cambridge has leveraged world-leading research to become a living laboratory for innovative infrastructure and sustainable energy delivering against inclusivity goals

Enabler 1: Leadership | Enabler 2: Funding | Enabler 3: Inclusion

Enabler 1: Leadership

To position Greater Cambridge as a leader in net-zero energy infrastructure and climate-tech innovation, it is crucial to establish a supportive policy and regulatory environment that incentivises clean energy investments and simplifies implementation. Key measures submitted to our Call for Evidence include streamlining planning processes, strengthening building regulations, adopting renewable energy procurement policies, and developing integrated energy and transport masterplans that align with local and national goals, ensuring all communities benefit from sustainable growth.

A clear vision and comprehensive local energy delivery strategy, encompassing all stakeholders, is essential to ensure a coordinated approach to achieving net zero while simultaneously addressing inequalities. The transition to a sustainable energy system must be carefully planned and managed to ensure local opportunities are captured.

Evidence from one submission to our Call for Evidence which would contribute to such a strategy relates to a regional Locally Determined Contributions (LDCs) implementation plan, which requires a standardised approach to target setting, reporting, and delivery methods to ensure alignment with national goals. A framework to support the LDC for Cambridgeshire and Peterborough is currently under development. This framework will align local climate action plans with national targets and reporting obligations, turning local efforts into meaningful building blocks for national progress. The LDC (see Figure below) will map out governance responsibilities and powers across various levels of local government, as well as between local and national governments and the private sector. It could also serve as a blueprint for community and stakeholder consultation, ensuring that local plans are developed with full input from the people and organisations directly affected.

Other overarching frameworks were also submitted. For example, the Cambridge Ahead Young Advisory Committee has proposed a vision for Cambridge as a "City of Quarters,"[23] where every neighbourhood has the opportunity to flourish and be celebrated. At the heart of this vision is the belief that the city's economic growth should benefit all its diverse communities. This vision aligns the necessity for the region to decarbonise with its ability to offer good quality of life – such as access to green spaces – and to continue attracting and retaining the talented workforce essential to both the public and private sectors.

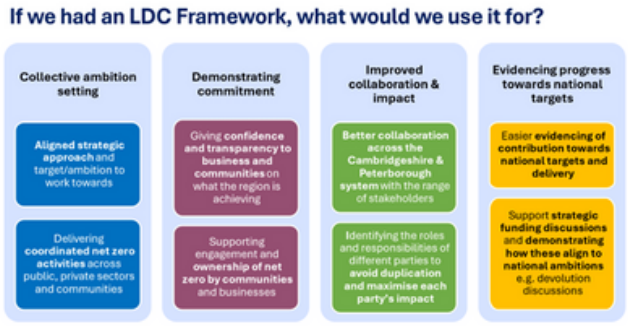

Figure 6: Locally Determined Contributions framework. (submitted in evidence by the Hughes Hall Climate Engagement Centre).

Respondents to the Call for Evidence highlighted a number of ways in leadership on governance reforms across the Greater Cambridge ecosystem could foster investment in clean energy projects while simplifying the path to implementation. Key measures suggested in submissions include creating a regulatory framework that incentivises clean energy investments, streamlining the permitting and planning processes for renewable energy projects and infrastructure, and implementing financial incentives such as grants, tax breaks, and subsidies. Strengthening building regulations to require higher standards of energy efficiency and renewable energy integration would also be crucial. One respondent suggested that a specific policy on renewable energy procurement for businesses, aligned with the UK Green Building Council's (UKGBC) guidance, could be established.

Another respondent suggested that by leading the way in the transition to net zero and deploying innovative technological solutions that address energy inequality, Greater Cambridge would be well-positioned to advocate for systemic changes in the energy market nationally. For example, a shift in the way wholesale energy prices are set, decoupling them from volatile international gas prices, could help local communities benefit from cheaper, cleaner renewable energy.

The need for strategic leadership is not limited to the public sector, and examples submitted in evidence suggest that private sector organisations are able to make a meaningful impact through ambitious sustainability strategies. For example, ARU has successfully implemented a comprehensive, award-winning travel plan that has reduced the proportion of staff and students commuting by car to less than 1 in 10, by prioritising active travel and public transportation options. This model demonstrates how effective planning can support sustainable mobility while reducing the environmental impact of transport.

This approach echoes findings from other strands of the Cambridge Ahead Infrastructure Gap programme, which propose that a shift towards a vision-led approach to infrastructure planning and sustainability can help to manage uncertainty and realise opportunities. This involves moving away from a 'predict and provide' model of decision making towards a 'decide and provide' approach, which involves laying out a preferred future scenario and ensuring that the framework and leadership structures are in place to realise it.[24]

Case Study: Peterborough Local Area Energy Plan (LAEP)

Following its declaration of a climate emergency in 2019, Peterborough City Council (PCC) developed a comprehensive, data-driven and cost-effective Local Area Energy Plan (LAEP). The plan set out a bold vision for decarbonisation to reach PCC's net zero ambitions by 2040 with specific actions across its key themes including: buildings, heating, local generation, networks and storage, and transport. The implementation of the plan involved significant engagement with stakeholders and the Plan has estimated that £8.8 billion of investment is needed to deliver the plan.[25] Following this, PCC has secured £2.7 million in funding from Innovate UK's Net Zero Living programme for Peterborough Accelerated Net Zero (PANZ), this scheme will enable the Council to work with partners and communities on the development of Net Zero delivery plans.[26]

Recommendations:

Private sector organisations should:

- **Demonstrate leadership by establishing vision-led strategies to reduce carbon emissions**: Examples submitted in evidence show that organisations can play an important role in providing support to staff to reduce emissions, for example supporting modal shift as part of transport strategies, as well as directly embedding decarbonisation goals into strategic decision making.

Government at the local level should:

- **Develop an integrated Energy Masterplan**: This plan should include detailed strategies for energy storage, smart grids, demand-side management, and energy efficiency. It should be developed in parallel with planning and growth strategies for the region, including the Local Growth Plan, and build on existing work, such as the development of the Local Area Energy Plan and future Local Power Plans. The Energy Masterplan should put collaboration at the centre to align local net zero strategies, such as Locally Determined Contributions, and set the parameters for individual energy masterplans for larger developments. It should follow the principles of 'decide and provide' as opposed to 'predict and provide'.

- **Strengthen policy frameworks**: The long-term and indirect costs of inaction, as well as the economic opportunities inherent in innovation investment, across domains from public health, transport, and renewables, are not included in cost-benefit calculations. Instead, a Risk-Opportunity Analysis[27] should be adopted as it allows for a better understanding of the process of transition, including more uncertainty in quantifying opportunities and risks associated with innovation, and allows for the relative value of different outcomes to be considered such as energy security, job creation, income distribution and health outcomes.

- **Improve building efficiency locally**: Strengthening local building regulations to require higher standards of energy efficiency and renewable energy integration is essential for reducing demand in the long-term. Local Authorities should require new developments to meet the lowest carbon standards, incorporating energy efficiency and local renewable energy generation, such as Passivhaus standards. A strategic approach to retrofit, such as the Solar Together scheme, would help to enable fabric improvements and renewable installations at scale at a lower cost than individual assessments.

Government at the national level should:

- **Put Local Area Energy Plans on a statutory footing**: As part of an integrated Energy Masterplan, Local Area Energy Plans (LAEPs) or regional visions should be put on a statutory footing so that they are a priority for funding. These statutory regional visions should be seen as the implementation partners of, and be integrated into, national delivery vehicles such as GB Energy and the National Energy System Operator. This is necessary to truly deliver on their ambition.

Enabler 2: Funding

Achieving the 2050 vision requires innovative financing mechanisms to address the challenge of large-scale investment needs and attract diverse investors. Solutions submitted to our Call for Evidence include bundling smaller projects into aggregated funds, leveraging green bonds, community cooperatives, and public-private partnerships, and pioneering models like Energy as a Service.

One of the key challenges for net-zero projects is the large scale of investment required. In fact, the first phase of Cambridgeshire County Council's CANFFUND (Cambridgeshire Net Zero Financing Framework for Whole System Change) project highlighted finance as one of the key barriers to achieving net zero. Evidence submitted in our Call for Evidence suggested that Institutional investors typically seek large-scale projects with a low cost of capital, while individual renewable energy projects are often smaller in scale. To bridge this gap, bundling smaller projects into larger net-zero investment funds is essential. These funds can take various forms and should be designed to ensure benefits for all stakeholders, including local communities.

Across the submission to our Call for Evidence, respondents shared broad categories of investment vehicle and some specific examples of innovative funding models currently in use, either in the Greater Cambridge area or in other parts of the UK.

Green Bonds: Green bonds attract investors seeking steady, long-term returns. These bonds can be issued to fund renewable energy projects, providing a stable investment opportunity.

One example raised in evidence submitted to us is Community Municipal Investments (CMIs). CMIs are bonds issued by local councils, which local residents and investors can purchase to fund community-based infrastructure projects. These bonds are typically managed by regulated crowdfunding platforms like Abundance Investment.[28]

Another example is the Solar for Schools initiative, a Community Benefit Society which has issued bonds to finance solar PV installations on school rooftops. Their goal is to raise £800,000, with a forecasted return of 5.5% for investors.[29] They have partnered with organisations like Community Energy England[30] to boost participation, demonstrating a community-driven approach to renewable energy funding.

Community-Owned Energy Cooperatives and Companies: Community energy projects, including Solar for Schools (above), allow local stakeholders—such as residents, landlords, landowners, or developers—to invest in and own renewable energy systems. These projects can offer financial returns to participants and may be funded through local shares, crowdfunding, or grants.

Reach in Cambridgeshire raised £340k from 112 people to build a community solar farm. This solar farm has now been in operation for almost a decade providing returns on investment back to the community as well as local green electricity.[31] In Gamlingay a community wind turbine raised £900k and is owned by local residents and businesses. A portion of the return on investment for the wind turbine goes into a community fund for local environmental projects. [32]

Octopus Energy's 'Fan Club' is an example of delivering more direct benefits to local communities from sustainable infrastructure. The 'Fan Club' wind tariff offers discounted electricity to residents living near offshore wind farms, with 50% off their energy bills when the turbines are operational. [33] This approach could provide learnings for the communities of Greater Cambridge that live in close proximity to new energy infrastructure of all kinds.

Crowdfunding and Peer-to-Peer Lending: Transparent, well-structured platforms can connect renewable energy project developers with individual investors, allowing local communities to get involved in funding energy projects. Ripple is one platform raised as by a respondent to our Call for Evidence. This platform enables households and businesses to invest in renewable energy projects, allowing them to earn a financial return while simultaneously supporting new renewable energy developments in the UK.[34]

Local Government Funding and Incentives: Local authorities can establish funding mechanisms and incentives, such as Salix, the Green Heat Network Fund, and the London Energy Efficiency Fund (LEEF), to support the development of net-zero energy infrastructure. In the Cambridgeshire region, Swaffham Prior was the first village in the UK to develop a rural heat network thanks in part to grant funding from Cambridgeshire and Peterborough Combined Authority, amongst others.

Energy Partnerships: Private-sector investors, public sector bodies and others are increasingly partnering with community and energy service companies, landlords, and developers to fund solar, battery storage, and smart energy management systems. These partnerships can help reduce the financial burden on public budgets, and the risk associated with investments, while driving innovation in energy infrastructure.

For example, Anglia Ruskin University (ARU) participated in an aggregated Power Purchase Agreement in 2019, partnering with 20 other UK universities to establish a 10-year contract for the purchase of 20% of its baseload power from UK based wind farms. The power demand of even the largest UK universities is usually too small to enable their participation in PPA markets and so aggregating the demand of 20 universities enabled them to secure the significant financial and carbon savings associated with this contract. Aggregated PPAs like this may offer an alternative option for financing local energy generation infrastructure and provide certainty over the long term to power purchasers.

Energy Performance Contracts are another example of how partnership between public and private can support investment. For example, ARU has used an Energy Performance Contract (EPC) through the RE: FIT programme for public bodies, which has successfully delivered three phases of decarbonisation projects totalling £2.6 million since 2020 including solar panels, LED lighting, building controls and cooling optimisation. EPCs can be attracted because they come with a performance guarantee whereby the energy and financial savings are underwritten by the supplier and verified by an International Performance Measurement and Verification Protocol (IPMVP)-compliant monitoring and verification process. The certainty provided by this guarantee reduces the risk associated with the investment, and is possible through the contractual framework provided by the RE: FIT programme.[35]

Energy as a Service (EaaS) is a model through which companies like Tomato Energy and E. ON are pioneering new approaches where consumers can access rooftop solar, battery storage, or low-carbon heating systems with no upfront costs. Instead, the cost is recovered through fixed long-term energy bills or repayments,[36,37] providing an affordable route to energy transition.
E.ON's Ectogrid district heat network at Silvertown in London was also raised in a submission to our Call for Evidence as an example of infrastructure where the energy provider covers the capital costs. This model ensures that energy networks can be rolled out at scale, reducing the financial burden on local authorities and residents.[38]

Carbon Offset Funds can finance net-zero projects, and incentivise decarbonisation, by requiring companies to offset their carbon emissions. This can provide a dedicated revenue stream to fund renewable energy infrastructure and other decarbonisation efforts. The Cambridge Ahead Young Advisory Committee has explored their use across diverse industries in the Cambridge city region and emphasised important considerations such as verifiable analysis of a company's emissions, benchmarking of carbon prices and transparency about the impact on decision making.[39]

In addition to these investment vehicles, funding should be pursued through grants or direct investment from local organisations. For example, securing grants from innovation and research programs like Innovate UK, or funding initiatives such as the Heat Network Development Unit and Heat Network Investment Project, can support the development and deployment of new energy technologies. Grants can also help communities implement energy projects through community action plans, or develop business cases for key infrastructure investments, such as the Greater Cambridge Partnership's work on grid capacity upgrades.

These models reflect the region's commitment to pioneering financial solutions that facilitate the transition to a sustainable, low-carbon future. By harnessing a diverse range of funding mechanisms, Greater Cambridge is paving the way for others to follow in achieving a green economy.

Case Study: Greater Cambridge Partnership Grid Capacity Project – Unlocking investment in infrastructure ahead of development

The Greater Cambridge region faces significant grid capacity constraints, which have the potential to impede the development of housing and commercial space. These limitations stem in part from a regulatory framework that prevents network operators from investing in infrastructure ahead of confirmed demand, creating prohibitive risks and costs for developers. In response to these limitations, the Greater Cambridge Partnership has proactively intervened to increase grid capacity in the Greater Cambridge area. The GCP initially planned to forward-fund infrastructure improvements by UK Power Networks (UKPN) using its devolved City Deal funding, enabling necessary grid upgrades to be undertaken ahead of demand confirmation. However, having successfully engaged with regulatory authorities (Ofgem and BEIS) to allow UKPN to recoup costs through customer charges, the upgrades were eventually funded by UKPN directly. This eliminated the need for direct GCP funding, saving approximately £20 million. The GCP then worked closely with UKPN and planning authorities to coordinate project delivery and manage logistics, such as cable routing and site assessments.

The GCP's intervention was critical in addressing this barrier to growth by ensuring that essential energy infrastructure could be built to support the region's development needs. The intervention resulted in a new Cambridge East substation, with 6km of circuit cables, a new Trumpington Primary substation with connections to both Cambridge East and the Bourn ring. Altogether grid capacity was expanded by 69-114 MVA, unlocking development potential of 5,700 new homes and 270,000sqm of commercial space.

Recommendations:

Funding availability is a barrier to the development of innovative infrastructure and the uptake of innovative technologies, which are the foundation of the 2050 vision. A collaborative approach across public and private, local and national is needed to make sure Greater Cambridge can adopt a range of innovative funding models to make capital more available.

Private sector organisations should:

- **Share best practice examples of innovative funding models they have utilised to support retrofit, new energy generation infrastructure or high-quality development:** There are already powerful local examples of the impact that aggregated Power Purchase Agreements and Energy Performance Contracts can have on accelerating sustainability projects. Providing transparent examples of approaches taken, and the benefits of these, are essential to scaling them across the region. Anglia Ruskin's webpage on its carbon reduction investments,[40] for example, contains detailed information about the approach taken, the associated cost savings and contact details. Local networks like the Cambridge City Leaders Climate Change Group or the Cambridge Ahead ESG Network can provide platforms for sharing challenges, insights and opportunities and taking positive action.

Government at the local level should:

- **Continue to engage with regulators and national government departments to forward-fund local energy infrastructure**: The Greater Cambridge Partnership's project to increase grid capacity demonstrates the powerful effect that this kind of engagement between local and national bodies can have on provision of sustainable infrastructure. This engagement will be absolutely essential in the context of development in Greater Cambridge via the Cambridge Growth Company which may go significantly beyond existing Local Plans and must be effectively planned for. The business-as-usual approach, whereby infrastructure is brought forward in response to confirmed demand, is not responsive enough and places an unfair burden on the first developers on site. Scaling the approach piloted by the GCP will help new development to be brought forward sustainably.

- **Target grant funding to derisk innovative approaches, such as community-owned projects, and attract private investment**: Community groups need grant funding to establish the structures and partnerships to participate in energy schemes. Finance is one of the greatest barriers to reaching net zero, but positive examples exist of community energy projects, such as Swaffham Prior heat network, that were supported with grant funding to take the initial step towards community energy before being backed by private finance. Local authority investment, such as the Cambridgeshire and Peterborough Combined Authority's Climate Change Opportunity Fund, should consider this in deploying its grant funding.

Government at the national level should:

- **Engage proactively with local authorities and relevant private sector partners on planned development of residential and commercial space in Cambridge**: Engagement between different levels of government is necessary to ensure that there is the required forward-funding for sustainable energy infrastructure, with national Government providing the flexibility to Ofgem and UKPN to support this infrastructure as necessary as well as delivering on the reforms to planning that will help underpin future innovative solutions to delivering net zero infrastructure at a local level.

Enabler 3: Inclusion

Energy infrastructure can play a transformative role in reducing inequality across Greater Cambridge by generating jobs, reducing fuel poverty, and empowering disadvantaged communities through inclusive energy projects. Respondents to our Call for Evidence focused on the importance of a 'just transition' in Greater Cambridge, and proposed prioritising local participation, tailored skills development, and innovative ownership models to ensure that the green transition delivers economic, social, and health benefits equitably while fostering community cohesion and resilience.

Our 2050 vision for Greater Cambridge involves significant new energy infrastructure, which in turn has the potential to create new jobs, particularly in construction, maintenance, and operations. The investment necessary for this transition can also support the growth of local green energy businesses, further stimulating economic opportunities and job creation. Prioritising these opportunities for disadvantaged communities can help reduce unemployment and raise income levels. Within a Just Transition Framework, social equity in the shift to a low-carbon economy can be prioritised, including supporting communities that may be adversely affected by the transition.

By offering training programs tailored to local residents—particularly underrepresented groups—these investments can help reduce unemployment and underemployment, especially in disadvantaged communities. Specific training and job placement assistance will also be needed to help workers transition from traditional roles, such as gas and oil boiler installations, to jobs in low-carbon heating technologies.

Procurement policies can play a key role in ensuring these opportunities benefit local communities. Directing contracts to local tradespeople will help capture economic benefits locally. Traditional approaches, which assume that large-scale projects like PV array installations in rural areas will automatically create local jobs, often fall short, as contractors typically bring in their own workforce.

In addition to job-specific training, broader community skills development is essential. Education and outreach programs should raise awareness about the benefits of sustainable energy and provide guidance on accessing available resources. Tailored initiatives can target specific community groups, ensuring everyone has the knowledge and tools to participate in the energy transition. Behaviour change programs can also help educate consumers on energy-saving practices, providing incentives and support for adopting sustainable habits.

Access to affordable, reliable energy is essential in reducing fuel poverty. By investing in local energy networks, energy efficiency measures (particularly in social housing), and community-owned energy projects, we can lower energy costs, alleviate fuel poverty, and improve living conditions.

Targeted energy assistance programs could support low-income households with their bills, while tailored initiatives for vulnerable groups—such as the elderly, people with disabilities, and minority communities—can help address inequalities. Supporting the development of social enterprises focused on energy-related services can further create jobs while delivering essential services to the community, driving local economic growth and social value.

Innovative funding models that overcome the high upfront capital barrier will be crucial to enabling broad participation in the green transition. Community energy projects, in particular, can act as catalysts for local development, empowering communities to own and benefit from renewable energy assets. Ensuring that these projects are accessible to all, including disadvantaged groups, will foster greater inclusivity and community cohesion. For example, revenues from renewable energy projects could fund vital services such as education, healthcare, green spaces, and recreational opportunities—improving overall quality of life.

In addition to the social benefits, many of these energy infrastructure upgrades will also improve air quality, leading to better health outcomes, especially for residents in pollution-affected areas.
It is essential that energy policies reflect the needs of all community members, particularly marginalised and low-income populations. Engaging diverse stakeholders through public consultations, workshops, and advisory panels will ensure that policies are inclusive and aligned with the priorities of all residents.

It is important to note that investment alone will not be enough to achieve a more inclusive transition. Investment needs to occur alongside early, inclusive, and transparent community engagement that enables procedural impact on decision making processes. This is to ensure that energy developments in the city are aligned with the needs, values, and priorities of the communities that will be interacting with, and living alongside, these projects.

It is therefore essential that energy policies reflect the needs of all community members, particularly marginalised and low-income populations with limited efficacy. It is crucial that diverse stakeholders are engaged by the public and private sectors where communities already are, to avoid the pervasive view of communities being ‘hard to reach’, and to ensure that communities and individuals are given the best opportunity to engage. This should be enabled through a wide variety of mechanisms including public consultations, workshops, regular attendance at existing community events, and time spent establishing reputation and a social contract.

Case Study: Swaffham Prior Energy Scheme

Swaffham Prior is the first village in the UK to develop a rural heat network. Using a mix of air source and ground source heat pumps it provides the heat to 300 homes. The Swaffham Prior Heat Network[41] project was started by Swaffham Prior Community Land Trust, to address fuel poverty and local environmental issues caused by the village's reliance on oil heating. The Community Land Trust received grant funding from Cambridgeshire and Peterborough Combined Authority, BEIS Heat Network Development Unit (HNDU) and Heat Network Investment Project (HNIP) and strategic investment from Cambridgeshire County Council.

Recommendations:

Private sector organisations should:

- **Use procurement as a tool for incentivising local investment**: Procurement practices across the private and public sector can shape future planning and have a significant impact, not only by directly mandating clean energy procurement but also by creating jobs locally to support efforts to reduce inequality and directing funding into communities. Forward and joint procurement practices should be adopted whereby organisations can work together to set standards for the technologies and services that they wish to purchase over the lifetime of the local energy plan period providing the certainty needed for local innovation investment. Forward procurement has been used successfully to drive technology innovation in the supply chains of a range of sectors from HM Prisons to NHS energy.[42]

Government at the local level should:

- **Require energy investment in Cambridge to involve early and inclusive engagement with local communities:** Energy planning should ensure community groups can participate through non-financial routes designed to increase procedural involvement in decision making and deliver projects that align with local priorities and needs, as well as financial investments through such routes as cooperatives, shares, direct investment or other financial returns. Involvement of local communities should be fully participatory and future Local Power Plans should recognise the role of communities as active participants in energy planning. It should be noted that this Call for Evidence was not able to effectively capture a full picture of the perspective of local communities, demonstrating the need to explore this further to ensure the community voice is truly involved in energy planning.

Government at the national level should:

- **Support local economies with analysis and forecasting of local 'green' skills needs**: Skills England has been established with a key aspect of its role being to provide data-driven analysis of local skills needs; this should include development of a 'green skills' taxonomy and forecasting of the skills needs associated with the transition to a net zero economy. Engagement with the Local Skills Improvement Plan, local employers and devolved authorities should be central to this, to support local people to access new jobs created in the green economy.

Conclusion

Cambridge's success as a city, and the resulting momentum for further investment, is remarkable. This growth is driving research and innovation aimed at addressing energy challenges. However, without a coordinated approach to strategic planning - spanning landowners, developers, communities and local authorities - there is a genuine risk that the full potential of this growth will not be realised. It is crucial that we focus not only on ensuring an adequate energy supply for new buildings but also on encouraging existing communities to reduce their energy consumption.

Currently, there is no clear, unified strategy. How we approach development in the next decade will be the defining factor in determining whether this region thrives or falters. The Cambridge region is already a global leader in science, data science, and life sciences. As the world faces the growing threats of climate change and rising inequalities, harnessing this innovation power to drive solutions has never been more crucial.

With the UK and other developed nations legally committed to achieving net zero emissions, the transition presents a unique opportunity for societal and technological innovation. For this shift to succeed, leaders must show what is possible through real-world "living laboratories" that demonstrate the transformative changes needed. Crucially, the region will only be recognised as a leader in the transition if it focuses on delivering genuine, zero-emission solutions locally, rather than relying on offsetting emissions elsewhere.

Energy infrastructure is not just about generation, transmission, storage, and distribution; it also hinges on efficiency, demand-side response, and increasingly sophisticated "smart" technologies. These technologies enable demand to respond dynamically to clean energy supply, facilitate waste harvesting, and support the aggregation of micro-generation at the neighbourhood or district level. As global commitments to net zero accelerate, investment in these energy infrastructures will grow exponentially, and it is essential that the returns from these investments are distributed equitably.

This is where Cambridge can truly lead the world. We should embrace a vision for a net zero energy infrastructure that prioritises local community benefits at its core. This document outlines some of the context and the ambition behind that vision. Now, it is up to the region's stakeholders to come together and create a platform for Cambridge to become a world-leading living laboratory of innovative, equitable, scalable solutions.

Importantly, to enable our 12 recommendations in this report **we call for the establishment of a multi-agency, cross-Government, working group on energy as part of the Cambridge 2050 project:** taking positive learning from the impact of the Water Scarcity Working Group, this group should help to develop a clear strategy for how energy will act as a facilitator of the sustainable growth that will unlock the area's full potential.

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