

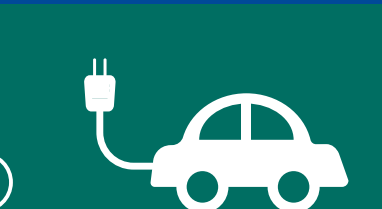
Cambridgeshire & Peterborough
Independent
Commission on
Climate



Global Challenge, Local Action



Initial Recommendations
March 2021





Preface

It is a pleasure to introduce the first report of the Cambridgeshire and Peterborough Independent Commission on Climate Change. The views and recommendations in this report are those of the Commission.

Climate change is a fundamental issue for all of us. It is already impacting on how we live our lives and if we don't reduce our greenhouse gas emissions to zero over the next 30 years, the impacts both here and globally will become very severe. If we look at the risks to the UK from climate change many are particularly acute in Cambridgeshire and Peterborough: the risk of flooding, very high summer temperatures, water shortages, and damage to the natural carbon stores in the deep peat of the Fens. We all need to act, and act now, to avoid the most damaging aspects of climate change. Our actions can also offer benefits and opportunities, including new jobs in low carbon industries, more energy efficient homes and premises, with lower energy bills, for residents and businesses, and better air quality and more greenspace improving our health and well-being

The work of the Commission comes at an important time. The Sixth Carbon Budget advice to Parliament from the national Climate Change Committee was published in December 2020, providing a detailed analysis of the requirements to decarbonise all sectors of our economy to meet the Government's legal commitment to a target of net zero emissions by 2050. We are in the midst of a global pandemic that is challenging how we live our lives. The Government is planning to publish its climate change strategy in the coming year and developing plans to achieve a green economic recovery as we emerge from the pandemic.

The Commission's mission is to provide independent advice to local government, the broader public sector and business in the area on both setting and meeting carbon reduction targets for Cambridgeshire and Peterborough and preparing for climate change. It is important that as well as tackling emissions we adapt to climate change impacts that are already happening. Tackling the climate crisis requires large changes across our societies and economies, from the local to the national to the global, and concrete actions from governments and businesses in particular. However, there are ways in which individuals, families and communities in the region can contribute positively to this change.

We have taken an evidence-based approach to the issues for Cambridgeshire and Peterborough. In this initial report we have concentrated our efforts on: transport, where local emissions are much higher than the UK average; buildings, where the planned growth in the region means that we need to ensure new homes are built to the highest standards of energy and water efficiency; peat, because the lowland peat in the fens could be responsible for as much as one third of our total emissions as it degrades; and energy, which underpins the decarbonisation of transport and heat. Our final report later in the year will pick up the important areas of business and industry; water; waste: and adapting to climate change.

The Commission has also been clear that it wants to take account of the different impacts of the required transformation on residents (and businesses) in different circumstances. This includes actions we recommend - not everyone has the same ability to invest in or take advantage of new measures. Some actions might benefit some more than others. As we have gone through the thinking on recommendations this has been at the forefront of our minds.

Our survey highlighted a strong desire amongst residents to get involved in responding to climate change, and wanting guidance on what they might do. We have included a chapter that is aimed at residents with advice on some simple changes everyone can make, and sources of more advice.

When invited by the Mayor of the Combined Authority to chair the Commission I was excited by the prospect of drawing on Cambridgeshire and Peterborough's outstanding academics, the practical expertise of our farmers and businesses, and our community's commitment to a sustainable future. This has proven to be the case. The work of the Commission has been greatly assisted by the response to our public call for evidence, and the support of businesses and other organisations in feeding in expertise.

I am very grateful to all of the Commissioners for their time, their input and their guidance. They have shown dedication in getting to the heart of the issues, and commitment to ensuring that our recommendations will both address climate change and deliver wider societal benefits. The Commissioners recognise that fairness must be at the core of our approach if it is to be acceptable to the people of Cambridgeshire and Peterborough. I thank them all for their efforts. Work by the University of Cambridge has given us an excellent insight in potential risks, and work by the University of Leeds has enabled us to consider the costs of different actions. The Management Board and Secretariat have provided support throughout. In addition, the work of Adrian Gault in supporting the Commissioners and pulling together the report has been tireless and invaluable. The whole team would like to thank the many people who have met us, who have made comments and have helped create this report.

This is the initial report of the Commission and I hope that the work of the Commission will continue to inform, inspire and assist Cambridgeshire and Peterborough's councillors, residents and businesses to ensure this area can deliver a net zero carbon future and become an even better, greener place to live and work.

Dame Julia King

Commission



Baroness Brown of Cambridge, Dame Julia King

Chair of the Cambridgeshire & Peterborough Independent Commission on Climate

Baroness Brown currently serves as Chair of the Carbon Trust; Vice Chair of the Committee on Climate Change and Chair of the Adaptation Sub-Committee; non-executive director of the Offshore Renewable Energy Catapult; and Council member of Innovate UK. She sits on the Government's Hydrogen Advisory Council. She was a non-executive director of the Green Investment Bank, she led the King Review on decarbonising transport (2008), and was the UK's Low Carbon Business Ambassador from 2008 – 2018.



Professor Laura Diaz Anadon

Professor Laura Diaz Anadon holds the chaired Professorship of Climate Change Policy at the University of Cambridge and is Director of the Centre for Environment, Energy and Natural Resource Governance (C-EENRG) and Bye-Fellow at Peterhouse.

Laura is also Research Associate at the Harvard Kennedy School at Harvard University. She is a Lead Author in the 6th Assessment Report of the Intergovernmental Panel on Climate Change Working Group III on Climate Change Mitigation and a member of the Carbon Trust Breakthrough Ideas Steering Group. In June 2018 she was awarded the XVII Fundacion Banco Sabadell Prize for Economic Research for the best young Spanish



Greg Archer

UK Director of the international environmental organisation Transport and Environment.

Greg is also chair of the environmental organisation ECOS; and runs a consultancy, Gaian Ltd. He has over 25 years' experience researching and developing solutions to the environmental impacts of transport. Since 2019, Greg has run the UK office of T&E working to secure the 2030 ban on sales of new conventional cars. From 2012, he was based in Brussels as T&E's Vehicles Director successfully campaigning for strong car CO2 regulations that have stimulated the shift to electric cars.



Richard Astle

Chairman of Natural Cambridgeshire.

Natural Cambridgeshire brings together businesses, local authorities, the health sector, farming, wildlife, and environmental organisations. Richard is also the Managing Director of Athene Communications, a provider of strategic advice on communication and engagement at board and senior management level. Richard is a former recipient of the Institute of Public Relations Sword of Excellence for Public Affairs. Before Athene, Richard has a career in the British Foreign Office, serving in the Moscow Embassy.



The Very Revd. Mark Bonney

Dean of Ely since 2012.

Mark Bonney was previously a Canon Residentiary and Treasurer of Salisbury Cathedral for eight years, after sixteen years of service in St. Albans diocese.



Dame Polly Courtice, DBE, LVO

Dame Polly Courtice is the Founder Director of the University of Cambridge Institute for Sustainability Leadership and Non-Executive Director of Anglian Water Services Ltd.

Polly is the Director of the Jupiter Green Investment Trust, and Board Advisor to BSI. She serves on a number of environmental and sustainability advisory boards of companies, including AstraZeneca and Nespresso, and is on the judging panel for the Queens Award for Sustainable Development.



Rhiannon Osborne

Rhiannon Osborne is a medical student at the University of Cambridge also working in global health, most recently as part of the Covid-19 response team at the British High Commission in Zambia.

Rhiannon is currently the Policy and Advocacy Director at Students for Global Health, a UK-based network of youth activists for health equity, with a particular focus on climate change and health. She has worked in grassroots organising, policy-influencing and campaigning on a number of issues including access to medicines, refugee rights and health inequalities.



Russell Picot

Russell is Chair of the Trustee board of the HSBC Bank (UK) Pension Fund and a director of Universities Superannuation Scheme Limited.

Russell was a co-chair of the FSB's Enhanced Disclosure Task Force and is a Special Advisor to the Financial Stability Board's Climate-related Financial Disclosures Task Force, chaired by Michael Bloomberg. He has supported the HRH The Prince of Wales Accounting for Sustainability project since its inception in 2004, and he is a Senior Associate at the Cambridge Institute of Sustainability Leadership. Russell holds an MA in Mathematics from Cambridge and is a chartered accountant.



John Shropshire OBE

John Shropshire OBE is the Chairman of G's Fresh, an international farming to marketing business with farms and production facilities located throughout the UK, Spain, Central Europe, USA and Senegal.

The global headquarters is in Barway, East Cambridgeshire. John was a Commissioner on the Cambridgeshire & Peterborough Independent Economic Review (CPIER).



Dr Emily Shuckburgh OBE

Dr Emily Shuckburgh is a Director of Cambridge Zero at the University of Cambridge and Reader in Environmental Data Science at the Department of Computer Science and Technology.

Emily is a mathematician and climate scientist and a Fellow of Darwin College, a Fellow of the Cambridge Institute for Sustainability Leadership, an Associate Fellow of the Centre of Science and Policy and a Fellow of the British Antarctic Survey. She also leads the UKRI Centre for Doctoral Training on the Application of AI to the study of Environmental Risks (AI4ER).



Lynne Sullivan OBE

An architect and member of the CLC Green Construction Board, Lynne Sullivan is the Chair of the Good Homes Alliance and Board member of the Passivhaus Trust and the Active Building Centre.

Lynne was RIBA's Ambassador on Climate Change, representing RIBA at COP21 in Paris and chairing their Sustainable Futures Group 2014-2017. Lynne has authored and chaired a number of policy review and research projects on building performance and sustainability for UK governments and others, including 'A Low Carbon Building Standards Strategy for Scotland'.



Ben Szreter

Ben Szreter is a Policy Advisor at the Behavioural Insights Team, where he applies behavioural insights to inform policy and improve public services.

Ben previously worked as the Chief Executive of Cambridge United Community Trust and as a parliamentary researcher in Westminster. He was also part of a team who jointly won the inaugural IPPR Economics Prize in 2019 with their contribution 'Incentivising an Ethical Economics.' He is on the Commission in a personal capacity.

Acknowledgements

Many people have contributed to the development of this report. The Commission would like to particularly acknowledge the support of the following people: Adrian Gault as our advisor and chief writer; Professor Ian Leslie, Paul Raynes, Steve Cox, Andrew Limb, Jane Paterson-Todd, as our management group; Adrian Cannard, Francesca Houston and colleagues from the Combined Authority; Dr Ethan D. Aines, Dr Charles Simpson, Dr Amy Munro-Faure for the Cambridge Zero Risk report; Louisa Pratt, Matthew Bullock, Brian Eversham, James Green, Catherine Weightman and Rob Wise for contributions to the development of chapter 6 on emissions from peat; Andrew Sudmant, Amelia Duncan, Professor Andy Gouldson, ESRC Place Based Climate Action Network, University of Leeds; Sheryl French, Professor David Newbery and Professor John Miles.

The Commission would also like to acknowledge the role of the Mayor and the Board of the Combined Authority in establishing the Commission, and all the people who have met us, who responded to our questions, made comments and have helped create this report.

Executive Summary

Greenhouse gas emissions in the Combined Authority region are high. In the Cambridgeshire and Peterborough Combined Authority (CPCA) area, emissions are approximately 25% higher per person than the UK average. At this level of emissions, we have only about 6 years remaining before we will have exhausted all of our 'allowed' share of emissions to 2050,¹ if we are to play an equal part in delivering the UK's critical Net Zero target.

The region is at high risk from the changing climate. Many of the risks to the UK from climate change are particularly acute in this region: flooding, high summer temperatures, water shortages, and damage to the natural carbon stores in the deep peat of the Fens. Heat wave summers like 2018 will be the norm by 2050 even if we are on a global path to Net Zero. If we are heading to a temperature rise closer to 3°C, by 2100 winter rainfall could be 50% higher and summer 60% lower by the end of the century. We would regularly see summer temperatures reaching 40°C. Sea level rise would reach 1m or more. These impacts² will affect homes, public buildings, businesses, towns and cities, and farming in the Fens. We need both to reduce our emissions to minimise the impacts and also to prepare for them.

Urgent action is needed – well before the six years is up. We need action both to get us on track to reducing emissions in line with UK targets and to prepare for the impacts of climate change, which will be significant even if we are on track globally for the Paris Agreement ambition of keeping close to 1.5°C and well below 2°C of warming by the end of the century. If we cannot deliver this ambition, the impacts of climate change become much more severe.

The scale of the task ahead is huge – and it must be delivered through a just transition, that does not leave marginalised communities behind. But if we are all part of the transformation: national government, local government, local communities, businesses and individuals, we can make the changes that are needed. In the CPCA area we have over 350,000 existing homes that will need to be converted to low carbon heating, and every new build (growing in number with developments like the Ox-Cam Arc) must be net zero. All the cars in the region (more than 500,000 currently) will need to be zero emissions by 2050.

The transformation will need significant investment. The Climate Change Committee estimates that investment in green infrastructure will need to rise from about £10bn to £50bn annually (an increase of about 10% in our national infrastructure spend) to deliver the decarbonisation of our electricity systems, our industries, our transport and our homes. Work for this report has estimated a requirement of around £700m annually through the 2020s in the CPCA area. Some of the funding will be public investment, much of it will be private and we will need to look at ways we can attract investment into the region to ensure we can deliver the changes required. The CPCA borrowing powers could be an important lever to support investment.

Addressing climate change can deliver multiple benefits. If we use that investment in the right way, addressing climate change can bring many benefits: more and better green space, a thriving natural world, better insulated and better ventilated homes, cleaner air, high quality job opportunities in the growing green economy, better public transport, improved health and well-being, and many others. How we deliver the investments and the changes that are needed, ensuring fairness is core to the approach, will be very important.

¹ This is based on current emissions in the CPCA area, including estimated emissions from peatlands. These are very uncertain, and if excluded the number of years remaining at current emissions levels is around 9 years rather than 6.

² CCC (2020), The Sixth Carbon Budget – The UK's path to Net Zero.

Local government and the CPCA has a key role to play. Whilst many of the levers, such as decarbonising the electricity system and introducing standards for emissions from new cars, are in the hands of the national Government, local government has a very important role. Local government powers in transport, planning and borrowing are critical in driving the transformation. Local action will be needed in areas such as home renovation, nature-based interventions, waste management, communication and engagement to support behaviour change, and ensuring that national schemes and support can be used to maximum effect and leveraged to accelerate the transition locally. To deliver this ambitious programme at the speed required, the CPCA will need an appropriate level of dedicated resources.

Our region can show leadership. Through coordination of the key stakeholders, we can grow our impact on a national and an international level by harnessing our world-leading intellectual assets. We have outstanding universities, research institutes and colleges which can be centres for low carbon innovation, new approaches to adapting to climate change, and training for the new skills required. We have a nationally important farming community in the Fens who can lead the way in showing how to manage lowland peat to reduce emissions, help double nature and produce healthy food. The region can be a focus for testing and demonstration of new technologies and new ways of doing things, something we can all be involved in, be proud of, and benefit from.

The region's residents are keen to play their part. We have conducted two surveys, one involving people choosing to respond, and one a paid for 'targeted' survey. The responses from both were consistent and strongly positive. The engagement of residents is particularly important: the Climate Change Committee estimates that almost 60% of the changes we need to reach net zero will involve people changing their behaviour to some extent and making positive decisions to support emissions reduction. Residents responding to both surveys wanted to see council leadership on climate change, nature prioritised, improved education and information to support behaviour change and a leading role for the area nationally. A strong engagement and listening programme will be needed to ensure residents are both keen and able to make the changes needed.

This is the first report of the Cambridgeshire and Peterborough Independent Commission on Climate, providing initial advice on what is needed to deliver change locally. The change that is needed will be transformative across all sectors of the economy. Much of what is needed is dependent on actions and frameworks provided from outside CPCA, particularly central Government. But there is much that we can do, within the CPCA area, with local benefits for health and well-being and opportunities for our communities as well.

The report provides an overview of sources and levels of emissions in the CPCA area and risks from climate change. This first report focusses on the areas of transport, buildings, energy, and peat. These are all areas of particular concern locally: transport because our emissions are well above the national average; housing because of the rapid projected growth in the region; energy because of the key role of electrification in decarbonising transport and buildings; and peat because of its importance both as a major contributor to local emissions (potentially making up about a third) and to our agricultural economy. Recommendations for action are included in all of these areas, directed at the CPCA and local councils, national government and other stakeholders (Table 1). Our final chapter covers the things we can all do as individuals to help address climate change.

Our final report, to be published later this year, will pick up other important areas including waste, water, business and industry, requirements for a just transition, and the role of nature in helping us to adapt and mitigate the impacts of climate change.

Table 1: Summary of Recommendations

Overarching

1. The CPCA should create:
 - a Climate Cabinet chaired by the Leader of the Combined Authority – including councils and key regional stakeholders
 - a funded delivery team in CPCA to coordinate, champion and facilitate action
 - a green investment team
 - a climate action plan, including a finance plan, with agreed targets for emissions, actions and monitoring
 - an independent monitor: maintaining the CPICC as an independent body to monitor and report on progress annually.
2. A climate change assessment should be undertaken and taken into account for every CPCA and Council policy, development, procurement, action.
3. All CPCA and Council operations should be net zero by 2030, underpinned by a regional Science Based Targets (SBTi)-type action plan.
4. The CPCA should rapidly assess the current sources and availability of funding for green opportunities (such as Green bonds or other instruments to accelerate housing retrofit, nature-based solutions and peat restoration) and develop an ambitious funding plan including the use of its borrowing powers.
5. The CPCA should develop and lead a plan for engagement and behaviour change with local people and businesses. This should cover the need for action and provide information on options and the choices that have to be made at local level.
6. The CPCA and its constituent Local Authorities should adopt a leadership role in accelerating the achievement of the Doubling Nature ambition, specifically to create or to conserve habitats such as woodland, grassland or wetlands that can store or absorb carbon; and setting an example on land that they own or control.
7. The CPCA should review training and upskilling plans to ensure that these are designed to support the scale and nature of the required transition, maximise high quality job opportunities in the region and contribute to reducing inequalities and deprivation.
8. The CPCA should commission work to understand the fitness of the innovation ecosystem across the region to support the emerging net-zero-aligned agritech and nascent clean tech sectors:

- Mapping the elements and processes that are in place that enable the region's success in biotech and information technology sectors in taking ideas to full commercially viable delivery, to see how these can be applied to support low carbon innovation, including:
 - generation and communication of ideas
 - the role of multiple paths of funding across the innovation process from different types of funders and investors
 - company evolution and scale up (including simple organic growth)
 - the roles of universities, networks, technical consultancies, incubators and accelerators, angel investors, institutional investors, regional and national policy and the regulatory environment
 - Understanding the differences in all of the above amongst the sectors, and indeed the wide spectrum within the clean tech sector
 - Articulating the gaps that exist within the regional innovation ecosystem that could impair the success of net-zero-aligned agritech and cleantech sectors, and making recommendations for filling them to unlock the potential of the subsectors in which the region has or can develop world leading know how and businesses.
9. The CPCA should actively broker, and where appropriate, invest in, the creation of demonstration projects for the decarbonisation and resilience of the built environment, both in residential and commercial buildings. These demonstrators will require working with businesses, developers, estate owners, universities, and the finance sector across the region. This should take a portfolio approach so that, ideally, there is a demonstrator for each distinct category of estate/built environment with significant presence in the region. The balance between the scale, number and type of project, and the funding and expertise available, should be driven by the objective to develop locally relevant know-how, learning, business models, and awareness.

For Central Government:

10. Central Government should provide greater clarity about how costs in the transition will be met, including increased devolved funding for local authorities, and over what time periods and under what terms and conditions.
11. Provide increased powers for local authorities to require higher standards in planning, buildings and transport.
12. Devolve more responsibility and funding to local authorities to deliver transport and buildings decarbonisation.

For Central Government and Ofwat

13. To provide for the investment to allow intercompany trading and water infrastructure improvements by 2025 to enhance water supply, including eliminating Cambridge's dependence on the ground water aquifer.

Transport

1. A complete phase-out of the use of cars running on fossil fuels by 2050 within the CPCA area
 - The CPCA, and constituent authorities, should by 2022 develop a plan for the rollout of charging infrastructure, with an initial focus on bringing the lowest district levels of provision up towards those of the best, and providing a 'right to charge' to residents, workers and visitors
 - All new residential and non-residential developments with parking provision (and those undergoing extensive refurbishment) should be equipped with charging points.

2. All buses and taxis operated within the CPCA area, and Council owned and contracted vehicles, should be zero emissions by 2030. Each Council should make its own commitments, reflecting the make-up and age of existing vehicles, but we recommend the following dates:
 - The bus fleet on routes subsidised or franchised by the CPCA should be zero emission by 2025, and the authority should work to facilitate such a shift on all routes by 2030
 - Target 30% of taxis to be zero emission by 2025 and 100% by 2030, achieved through license conditions
 - Council fleet to be 100% zero emission by 2030, with procurement rules used immediately to promote EV uptake.

3. Reduction in car miles driven by 15% to 2030 relative to baseline:
 - Major new developments (>1000 homes) should be connected to neighbouring towns and transport hubs through shared, public transport and/or safe cycling routes
 - 100% of homes and businesses to have access to superfast broadband by 2023
 - CPCA to undertake a trial of electric on-demand buses to increase accessibility and connectivity
 - Development and implementation of the Strategic Bus Review to prioritise affordability and reliability of services
 - CPCA to work with major employers, employment hubs and Liftshare to encourage car-sharing, public transport, walking and cycling for commuting, and Councils to take a lead in respect of their own employees
 - CPCA, with relevant authorities, to explore options to improve cycling infrastructure both within urban areas, and to encourage the use of e-bikes for longer trips to and from market towns and cities
 - Alternatives to road investment to be prioritised for appraisal and investment – from active travel and public transport options, to opportunities for light rail and bus rapid transit or options to enhance rail connections.

4. Diesel vans and trucks to be excluded from urban centres by 2030 and local zero emission options pursued:
 - At least 3 freight consolidation centres to be established outside of major urban areas with onward zero emission deliveries
 - Home deliveries should only be made by zero emission vehicles, including cargo bikes, by 2030
 - UK Power Networks to develop tools and fast-track services to assist companies wishing to convert fleets of vans and trucks to electric to rapidly ascertain grid connection upgrade requirements and costs for charging
 - CPCA to undertake a trial of electrification of short-haul freight from farm to warehouse.

Buildings

1. The CPCA and constituent authorities should support local area energy planning that identifies heat zones for buildings (e.g. suitability for heat pumps or district heating) and retrofit priorities.
 - Develop local energy plans, working with stakeholders, to have a key role in preparing for the decarbonisation of heat in buildings: identify which heat and energy efficiency options and national policies are particularly suitable in different areas; consider zoning areas for specific heating solutions; throughout the process, engage and communicate with the local communities to develop a good understanding of issues and foster awareness and willingness to take action.
2. All new buildings should be net zero ready by 2023 at the latest and designed for a changing climate.
 - Adopt a net zero ready standard for new homes (requiring “world-leading” energy efficiency and low-carbon heating in new homes) by 2023, and adopt a similar standard for non-domestic buildings;
 - All new residential and non-residential developments with parking provision should be equipped with charging points;
 - All planning applications to require over-heating calculations and mitigation measures, and testing against climate projections to 2050;
 - New buildings should meet tighter water efficiency standards of 110l/person/day, and below this when building regulations allow;
 - All new build must have effective ventilation in use and safeguard indoor air quality;
 - All new build to incorporate sustainable urban drainage systems;
 - Where appropriate, new build to incorporate property level flood resilience measures;

- The CPCA and constituent authorities should consider developing new build guidance to address embodied emissions (for example, a template for embodied emissions similar to the GLA), with targets strengthening over time).
3. New developments must be considered within a spatial strategy that prioritises sustainable development, low emissions and low risks from climate change.
 - New developments to be sited to minimise emissions implications, including through making them attractive for walking and cycling, and access to wider transport infrastructure;
 - All new build must have access to green space and nature;
 - Developers must identify biodiversity assets and potential to enhance these as part of the development and future management of the site.
 4. All existing buildings should achieve high energy efficiency standards, and be heated from low-carbon sources
 - Every building should, starting by 2025 with those below EPC "C", have a renovation plan (digital green passport, extended to include water efficiency, incorporating passive cooling measures and property level flood resilience measures where appropriate), setting out a clear pathway to full decarbonisation;
 - Home retrofit will need to be rolled out across the building stock, incorporating cooling measures as well as energy efficiency, water efficiency and heat decarbonisation. The CPCA should take a lead in encouraging home-owners to move towards net zero, including by finding innovative ways to encourage behaviour change and support financing;
 - The CPCA and constituent authorities should prioritise achievement of net zero emissions for social housing. Digital green passports could be piloted in social housing first;
 - Electric charging points required for buildings with parking provision undergoing extensive renovation;
 - Make full use, in the short-term to 2021-22, of Green Homes Grant funding, especially in relation to "no regrets" energy efficiency improvements, and in the medium-term of successor funding schemes available from central Government;
 5. Performance is actively monitored and standards fully enforced
 - Performance measurement must reflect real-world energy use;
 - Resources for enforcement of new build standards and minimum private rented standards must be prioritised.
 6. CPCA and local authority own estate is net zero by 2030 at the latest.
 - Public sector estate should by 2025 have a plan to achieve best practice energy use;
 - Energy use and emissions on public sector estate should be monitored and reported.

Energy

For CPCA and constituent authorities:

1. Develop a local area energy plan, in close collaboration with interested stakeholders, including distribution companies, consumers and large energy users.
2. To the extent than there is interest in options for hydrogen production within the CPCA area, prioritise consideration of potential for hydrogen production from surplus generation, for uses without more suitable and cost-effective low-carbon energy sources.

For Ofgem:

3. Urgently develop and make proposals on distribution network investment ahead of need.
4. Urgently provide clarity on revised arrangements for network access (connection charges) to facilitate local decarbonisation projects.

For Government:

5. Advise areas on where hydrogen is likely to be available in the gas grid as soon as possible.
6. Look to streamline, simplify and provide longer-term horizons for schemes funding local energy projects.

Peatlands

1. The CPCA should establish and provide funding, of the order of £50,000 a year, to support the operation of a CPICC Fenland Peat Committee, initially for a period of 5 years, with a remit to inform and develop 'whole farm' land use policies aimed at achieving climate change mitigation, adaptation and biodiversity enhancement in the Fens, and to help establish an agreed set of numbers for GHG emissions for deep, shallow and wasted peat soils.
2. Up-front funding should come from CPCA, but also be sought from Defra, NERC and other sources, to support the work of the Fenland Peat Committee but also more widely, for:
 - On the ground research to fill in the current gaps in the scientific evidence
 - Development of best practice guidance
 - Provision of farming advisers to support farmers in the transition.
3. Cambridgeshire County Council and Peterborough City Council should work to develop the role of County farms as leaders and exemplars in the transition.
4. The CPCA should establish a process to consult on and develop a vision and strategy for the Fens, which takes account of economic impact and goes beyond the single issue of peat emissions, taking a leadership role at the forefront of national action. This will need strong engagement with local communities, particularly farming.

The sources of emissions in CPCA

From the latest national data estimated at local authority level, total CO₂ emissions in the CPCA area in 2018 were 5521ktCO₂. This excludes peatland emissions which, though uncertain, could add a further 45% to this total. Even without this, emissions are around 6.46t per capita, almost 25% above the per capita figure across the UK as a whole (5.19).

We have given particular attention in this report to emissions from surface transport, buildings and peatland. Collectively these are responsible for most of our emissions.

- **Emissions from surface transport** (road and rail) make up around 44% of CO₂ emissions in CPCA, a significantly higher share than in the UK (37%). They have been rising in recent years, and are high across cars, vans and HGVs. Some of these emissions reflect through traffic, for example on the A14, A1(M) and M11, but this is not enough to explain the relatively high level of transport emissions overall:
 - there are differences across districts within CPCA, but overall car ownership is high and mileage is high;
 - the proportion of ultra-low emission vehicles is low, though similar to the UK as a whole;
 - emissions are low in the urban areas of Cambridge and Peterborough, which have better transport networks providing alternatives to the car and more compact geography with denser provision of services.
- **Emissions from buildings** are not particularly high relative to the UK, but they represent a high share of total emissions. Energy use in our homes accounts for 22% of overall emissions. Emissions from use of buildings in the commercial, industrial and public sectors are not separately estimated from other emissions in those sectors, but add to this total:
 - the quality of the building stock, measured by Energy Performance Certificate rating of energy efficiency, is slightly better than across the UK. Nevertheless, most residential buildings are rated “D” or below, indicating substantial potential for improvement;
 - most buildings are heated through the use of fossil fuels. The number of installations of low-carbon heating, under the Renewable Heat Incentive scheme, amounts to only around 0.5% of the housing stock;
 - with a projected increase in population in the region, and development on the Ox-Cam Arc, the amount of new build is also projected to be high. By 2050 new build could account for as much as 40% of the housing stock, which means that high standards for new construction will be particularly important.
- **Emissions from peatlands** are currently largely excluded from the UK emissions inventory, but are likely to be included very soon. The historical drainage of lowland soils in the Fens, for agricultural use, is associated with emissions as the drying out of peatland has resulted in the release of previously stored carbon to the atmosphere. Estimates are subject to considerable uncertainty, but a substantial area of UK lowland peatland is within the CPCA area. Inclusion in the UK inventory could add as much as 2.6 MtCO₂e to recorded CPCA emissions, an addition of around 45%.

What must we do to reduce emissions?

Many of the levers to reduce emissions lie with national Government. In other areas, the CPCA and constituent authorities can only act within frameworks set by national policy (some important elements of which remain under development), and the limits of available funding.

Nevertheless, there is a lot that local authorities can do, though they should be further empowered to do more.

We make a number of recommendations, brought together in Table 1 above.

CPCA and local authority leadership will be particularly important. Substantial funding for the upfront investments that are required will also be needed (some of which will come from the private sector, including individuals and householders within CPCA, some from the public sector). To this end we recommend that:

- the CPCA should create:
 - a Climate Cabinet chaired by the Leader of the Combined Authority, including councils and other key regional stakeholders;
 - a funded delivery team within CPCA, to coordinate, champion and facilitate action;
 - a green investment team;
 - a climate action plan, including a financed plan, with agreed targets and monitoring.
- the CPCA should rapidly assess the current sources and availability of funding (such as Green bonds or other instruments to accelerate housing retrofit, nature-based solutions and peat restoration) and develop an ambitious funding plan.
- the CPCA and constituent authorities should commit immediately to (i) undertake a climate change assessment of new initiatives and policies, and (ii) ensure all procurement is compatible with delivering net zero and climate resilience by 2050;
- the CPCA and constituent authorities should develop a local area energy plan, identifying heat zones and retrofit priorities for buildings, and aligned with plans for transport that support electrification and zero carbon vehicles.
- the CPCA should develop and lead a plan for engagement and behaviour change with local people and businesses. This should cover the need for action and provide information on options and the choices that have to be made at local level.

Priorities for sectoral action include:

- Transport:
 - the rollout of electric vehicle charging infrastructure, which provides a 'right to charge' for residents, workers and visitors to the region. This should start with bringing those districts with low provision up towards the levels of the best;
 - a transition towards zero emission bus and taxi fleets by 2030;
 - measures to reduce car miles driven, including trials of on-demand electric buses and improvements in infrastructure for walking and cycling;
 - exclusion of diesel vans and trucks from urban centres by 2030.

- Buildings:
 - all new buildings to be net zero ready by 2023 and designed for a changing climate. This is an earlier date than proposed for implementation of the Government Future Homes Standard, but recognises the high level of new build in the area – if these buildings are not built to the highest standards now, they will require more expensive retrofit later on;
 - new developments must be sited in locations where land use is appropriate and resources are sufficient; where low-carbon transport infrastructure is available; to contribute to the doubling nature agenda; and be delivered with low emissions and low risks from climate change;
 - home retrofit will need to be rolled out across the building stock. Every building will need a renovation plan, starting, by 2025, with buildings currently below EPC “C”.
- Peatlands:
 - support should be provided for the establishment and operation of a Fenland Peat Committee, with a remit to inform and develop “whole farm” land use policies aimed at achieving climate change mitigation, adaptation and biodiversity enhancement in the Fens, and to help establish an agreed set of numbers for emissions from deep, shallow and wasted peat soils.
- Nature:
 - our surveys of public opinion clearly showed the priority that local people attach to the natural world. Nature recovery programmes, including tree planting and wetland creation/restoration have an important role to play in helping to address the impact of climate change and engaging communities and businesses. The CPCA has an opportunity to accelerate the doubling nature agenda, which will help deliver multiple benefits, not least in terms of health and wellbeing.

Benefits from these actions

If we take these actions, we can put ourselves on track to play our part in meeting the UK’s emission reduction targets, and help prepare for the impacts of climate change to which we are already committed.

But there is a wider set of benefits to our communities. Many of the measures we need to take for climate reasons also bring other benefits with them. Measures to reduce emissions in our urban areas will improve air quality and health. Measures to improve the energy efficiency of our homes and buildings, aside from reducing energy bills, can make our homes more comfortable, reducing risks of heat and cold related illness and deaths. Making sure our homes are prepared for increased risks of extreme weather and impacts of flooding will help keep our communities safe. Investing in high quality low carbon public transport that connects people to services, jobs and opportunities, will improve prosperity and well-being. Making active transport, including cycling and walking, more accessible will help to improve health. Investing in nature, including increasing biodiversity and green space, will take CO₂ out of the atmosphere as trees and plants grow, will help reduce heat in our urban areas, provide shade to our buildings, reduce risks of flooding and improve physical and mental wellbeing.

The CPCA area has been growing fast, and has ambitions for further sustainable growth as we recover from the COVID-19 pandemic. There are nevertheless big disparities in levels of income between and within districts. Investing in climate-friendly technology, revamping old and high-emitting infrastructure and greening our communities, will create opportunities for skills, training and employment to people living, working and studying in our region.

People have told us that the area should be a leader in taking action. And they attach high weights to the need to improve information and education on climate change; to measures to influence behaviour; and strong leadership from local government. We hope that the assessment in this report and the recommendations we provide can help guide our delivery on those ambitions.

Next steps

We will be publishing a full report later this year. We will aim in that to develop and extend the assessment we have made here: to provide further advice on the timing and prioritisation of measures within our recommended action plan; to look in more detail at the water sector and emissions from waste; to consider further the potential for low-carbon innovation clusters in the region; to build on our assessment of climate risks facing the region, to consider the adequacy of current adaptation plans; to further consider the requirements for public engagement.

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Overview

Introduction

Greenhouse gas emissions in the Combined Authority region are high. In the Cambridgeshire and Peterborough Combined Authority (CPCA) area, emissions are approximately 25% higher per person than the UK average. At this level of emissions, we have only about 6 years remaining before we will have exhausted all of our 'allowed' share of emissions to 2050, if we are to play an equal part in delivering the UK's critical Net Zero target.

Urgent action is needed - well before the six years is up. We need action both to get us on track to reducing emissions in line with UK targets and to prepare for the impacts of climate change, which will be significant even if we are on track globally for the Paris Agreement ambition of keeping close to 1.5 degrees C and well below 2 degrees C of warming by the end of the century. If we cannot deliver this ambition, the impacts of climate change become much more severe.

Of the 7 constituent authorities making up the Cambridgeshire and Peterborough Combined Authority (CPCA), (Figure 1.1), 5 have declared Climate Emergencies (Cambridgeshire County Council, Cambridge City Council, Peterborough City Council, South Cambridgeshire District Council and East Cambridgeshire District Council). Most are working towards net zero emissions by 2050, though with sub-targets along the way. Peterborough City Council has gone furthest in ambition – aiming for its own activities to be net zero by 2030, and to help Peterborough become a net zero city by 2030. All, whether or not they have declared a Climate Emergency, are working to reduce emissions.

The CPCA has committed to reaching net zero emissions across the area by 2050. Key to achieving this, and to preparing for the impacts of climate change, will be to put in place and follow through on a set of actions across the economy, and to communicate and influence others to change behaviour and take action.

The CPCA set up the Cambridgeshire and Peterborough Independent Commission on Climate (CPICC) to advise on these issues, specifically to:

“provide independent advice to business and the public sector in the area of setting and meeting carbon reduction targets for Cambridgeshire and Peterborough and preparing for climate change, and to make recommendations”¹

This is our first preliminary report towards meeting that remit. In the limited time available to us we have concentrated our efforts on particular sources of emissions, which are a priority for the area – transport, buildings and peatlands, and we include some recommendations on the energy system because of the critical role it plays in the decarbonisation of both heat and transport. We also draw out for the Combined Authority and constituent authorities some recommendations of a cross-cutting nature.

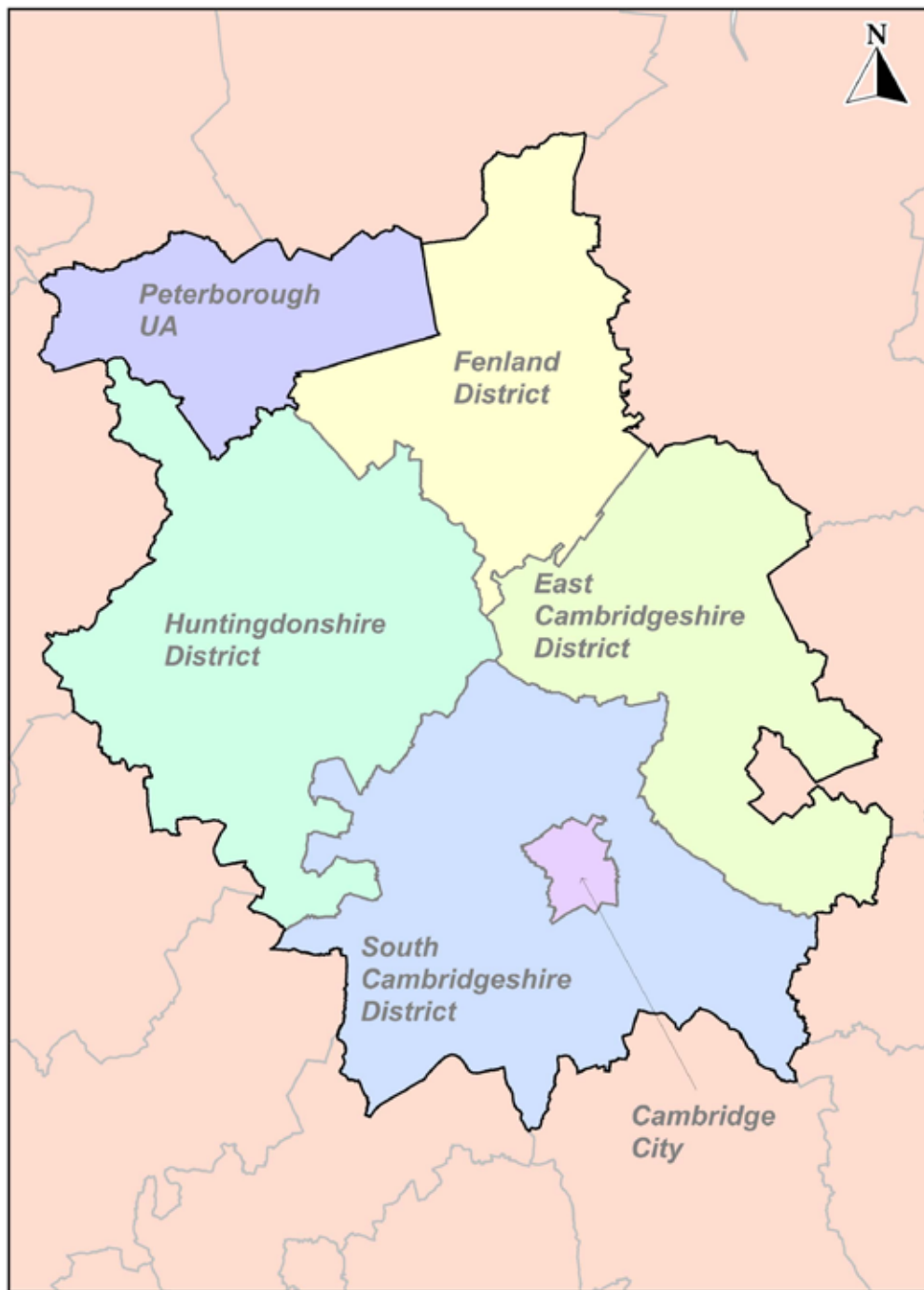
This is only the start of our work. We will expand our coverage, and provide a fuller set of recommendations, in a further report later this year.

In this chapter we set out in 5 sections the background to the climate change risks facing the region and the approach to the analysis which is set out more fully in later chapters:

¹ Full Commission terms of reference available at <http://cambridgeshirepeterborough-ca.gov.uk-6985942.hs-sites.com/cpicc-who-we-are>

- the climate risks facing the region;
- the sources of emissions in CPCA;
- the role of local authorities;
- our approach;
- the public engagement that has informed our work.

Figure 1.1 Cambridgeshire and Peterborough Combined Authority (CPCA)



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The climate risks facing the region

The UK climate is changing. Average annual temperature is over 1°C higher today than in the pre-industrial period. Hottest daytime temperature has been rising (Figure 1.2). The chances of experiencing a hot summer like that in 2018 have doubled in recent decades and are now around 10-20% a year. A 2018 summer will be typical by 2050.

Even with ambitious global action to reduce emissions and keep global temperature rise to 1.5-2°C above pre-industrial levels, further climate change is inevitable, with impacts for the UK. Without more concerted actions, global temperature could rise by 3°C or more, with more extreme impacts. Water demands, for example, will increasingly exceed available resource (Figure 1.3).

Climate change will be felt differently in different countries, but also in different parts of each country. In the UK we cannot assume that climate hazards are an issue only for others overseas. The nature and scale of the risks, even if we are on a global path to no more than 1.5°C of warming by the end of the century, indicate considerable impacts that will be experienced by local people. Climate change is having impacts today, and will have growing impacts in future (Box 1.1).

We commissioned work from Cambridge Zero, Cambridge University for this report,² to assess what kind of impacts we can expect in the Cambridgeshire and Peterborough area. This is a preliminary assessment, which we intend to expand on in the months ahead, but it highlights key impacts and risks if actions are not taken globally to reduce emissions. Overall, it finds that many of the risks to the UK identified in the most recent UK Climate Change Risk Assessment³ apply also to the region – risks to the natural environment, to infrastructure, to people and the built environment, to business and industry. But there are certain of these risks that are likely to be particularly severe in our region – from flooding, overheating in the summer months, water shortages, and damage to natural carbon stores in the deep peat of the Fens (Box 1.2).

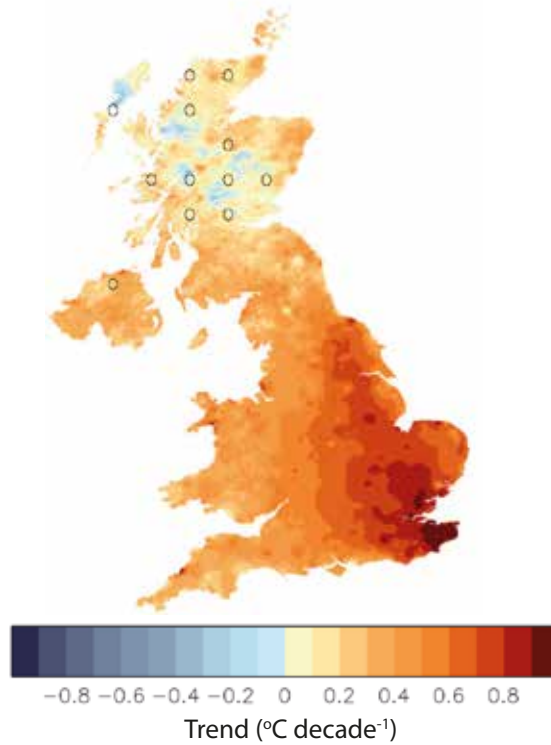
It is clear that we need to take local actions to prepare for further impacts, and also to play our part in reducing emissions and preventing the most severe impacts that would otherwise occur.

In future work we intend to look further at these risks and also consider what they imply for the adequacy of current adaptation plans across the region, and the need for further adaptation measures.

² CZ (2021), Aines, E.D., Simpson, C., Munro-Faure, A., Shuckburgh, E., Preliminary report on climate risk in the Cambridgeshire and Peterborough region, 2020-2099, Cambridge Zero, University of Cambridge.

³ CCRA (2017), UK Climate Change Risk Assessment 2017.

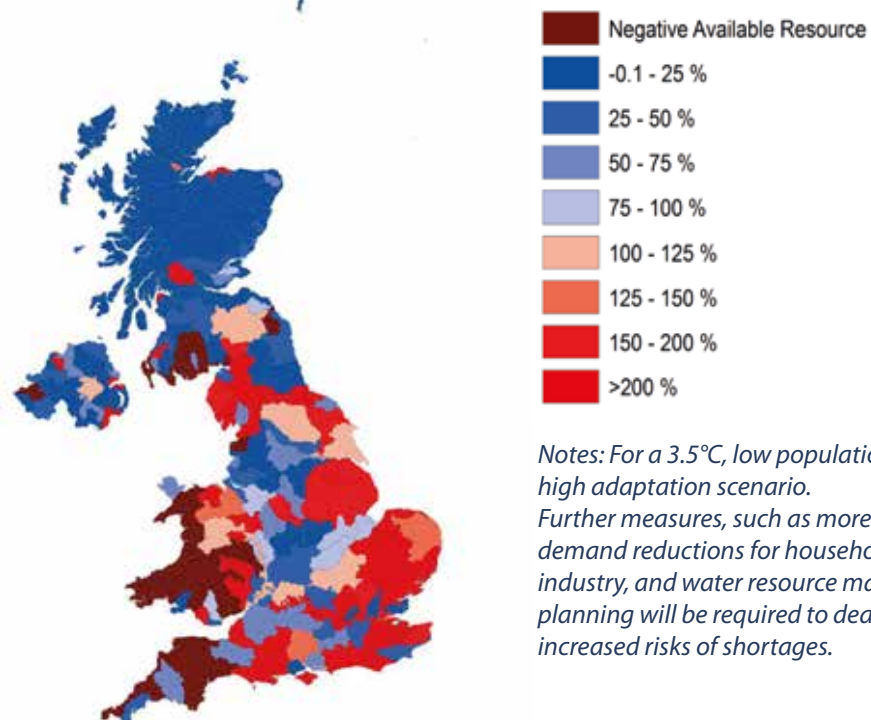
Figure 1.2: Increase in hottest daytime temperatures, 1960 - 2019



o: non-significant trends

Source: Christidis et al, Nature Communications (2020)

Figure 1.3: Projected water abstraction demand as % of available resource, 2080s



Source: HR Wallingford (2015), Updated projections of water availability in the UK, for the Adaptation sub-Committee of the CCC.

Box 1.1: Climate change risks for the UK under different global warming levels

The UK is experiencing climate change impacts today which are predicted to increase further under additional future global warming. The UK Climate Change Risk Assessment (CCRA) provides a regular assessment of the climate risks associated with different levels of global average warming:

- **Current warming level (~1.1°C above preindustrial levels):** The UK's average annual temperature has increased by around 1.2°C relative to pre-industrial levels, sea level has risen by ~16 cm since 1900, there is some evidence of increasing heavy rainfall depending on the metric used. The likelihood of summer heatwaves such as that in 2018 has doubled over the past few decades.
- **Less than 2°C above preindustrial levels:** The UK is predicted to experience increased average annual temperatures of around 0.6°C by 2050 (1.7 degrees C in total), heavy rainfall would see an estimated 10% increase, and hot summers like 2018 will occur every other year (central estimates). Sea levels around the UK would rise by a further 3-37 cm (by 2060) compared to today and due to the slow response of the ocean to climate warming continue to rise, reaching 5-67 cm above present levels by 2100. Water deficits could affect around 15% of water resource zones, but it is likely that if appropriate adaptation measures are implemented most of the increased risk from flooding and water scarcity in 2050 could be managed. However, the situation is likely to become more challenging by the end of the century.
- **3°C or more above preindustrial levels:** A global mean warming of around 3°C or more by the end of the century would result in a very large increase in seasonal changes and weather extremes in the UK. Winter rainfall could increase by up to 50% and summer rainfall decrease by 60% by 2100. Water deficits across England could rise to over 5.5 billion litres per day, and the number of people living in areas of significant flood risk would more than double. The UK would also experience sea level rise; with 1 metre or more becoming inevitable. Daily temperatures exceeding 40°C could occur every 3-4 years. At this level of warming, significant and systemic impacts are projected to occur, and acceptance of impacts might be the only viable adaptation strategy in some cases.

Source: adapted from CCC (2020), *The Sixth Carbon Budget – the UK's path to Net Zero*, Box 8.8, drawing on CCC (2017) *Climate Change Risk Assessment 2017 Evidence Report*.

Box 1.2: Climate change risks facing the Cambridgeshire and Peterborough region

Of 53 national risks identified by CCRA (2017) – to the natural environment, to infrastructure, to people and the built environment, and to business and industry – at least 42 are likely to be experienced locally.

Over the period to the end of the century, the most severe risks facing the region will relate to more extreme summer temperatures and changes on the character of seasonal and annual precipitation.

Changes to the climate

Even under a stringent emission reduction pathway (RCP 2.6), likely to keep global temperature rise below 2°C by 2100:

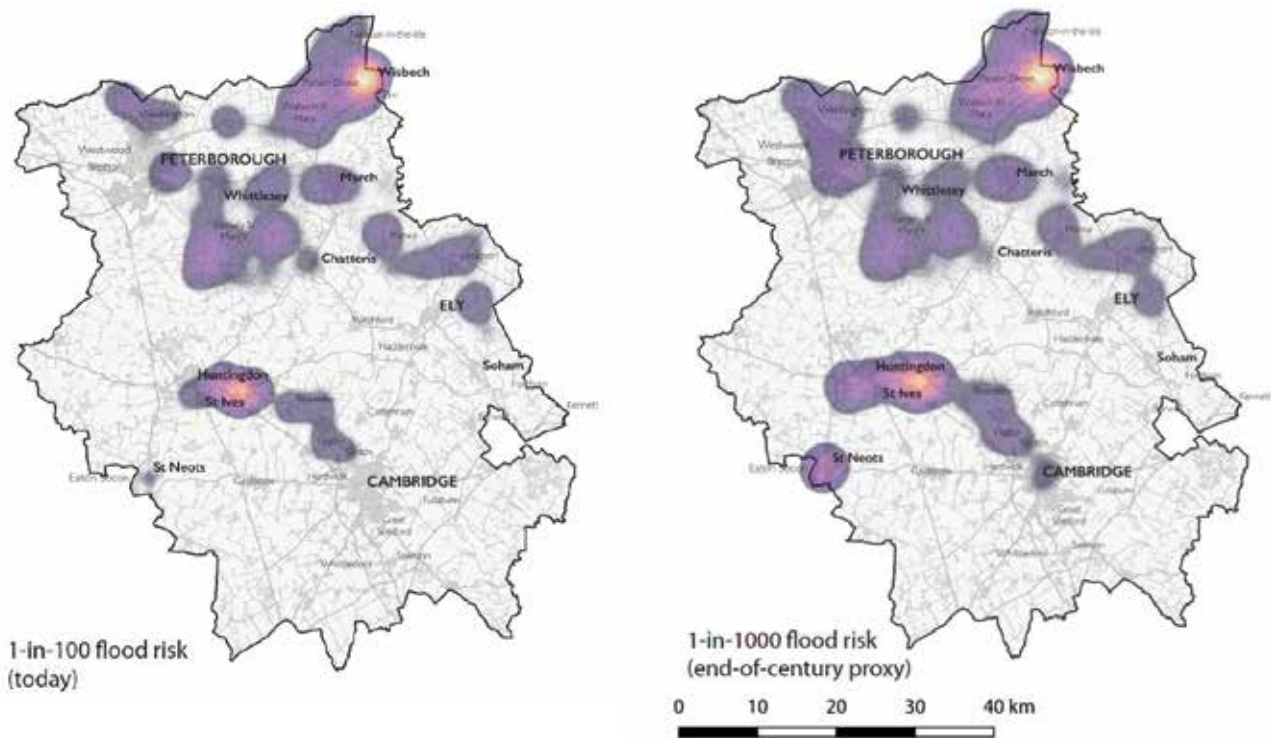
- *Maximum temperature across the region over the summer is likely to be above 36°C in 1 year out of 20 by mid-century. Temperatures in some locations will be higher than average: for example, in the record-breaking summer of 2019 when the Cambridge Botanical Gardens weather station recorded a temperature of 38.7°C, the maximum temperature averaged across the region was 34°C. Furthermore, there is uncertainty associated with these projections, and real temperatures may be significantly higher.*
- *Summers are likely to be drier and winters milder, with potential to be much wetter. In general, rainfall will be lower from May to September, but higher and more intense from November to March.*

These changes would be greater in higher emission pathways.

What does this mean for risks?

- *By the end of the century, based on current locations and not allowing for future development, nearly 1 in 10 homes and 1 in 4 agricultural and industrial production facilities could face river flooding. Communities, farms and industry in the areas of Wisbech, Whittlesey, Huntingdon, St Ives and the eastern edge of Peterborough face the highest risk (Figure B1.2).*
- *With an increase in short periods of intense rainfall, surface water flooding from runoff in urban and paved areas is also likely to impact a significantly higher proportion of the built environment.*
- *The region may face tidal flooding from storm surges, particularly at high tide if the Ouse and/or Nene rivers are already in flood.*
- *Risks to the health of the population from overheating in buildings, in the summer months in particular, will increase.*
- *Hotter and drier summers will increase the stress on water resources, impacting people, farming, industry, biodiversity and the quality of the natural environment.*
- *Lowland peat may degrade more quickly with warmer, drier summers. This would add to emissions and reduce the sustainability of some areas for agricultural use.*

Figure B1.2: Flood risk Cambridgeshire and Peterborough, today and 2100



Heat-map detailing 1-in-100 (1% annual chance) and 1-in-1000 (0.1% annual chance) risk of flooding for the Cambridgeshire & Peterborough region. Warmer colours indicate greater density of buildings with exposure to flood risk. End of century flood risk has been represented without recourse to further adaptation. Contains Ordnance Survey data ©Crown Copyright and database right 2020 (Digimap License). Contains public sector information licensed under the Open Government Licence v3.0 (Flood Map for Planning (Rivers and Sea) – Flood Zone 2 & Flood Zone 3 Nov. 2020) ©Environment Agency copyright and/or database right 2020. All rights reserved.

Notes: Representative Concentration Pathways (RCP) are pathways adopted by the Intergovernmental Panel on Climate change (IPCC) which describe possible climate futures based on different future atmospheric greenhouse gas concentrations.

Source: CZ (2021), Aines, E.D., Simpson, C., Munro-Faure, A., Shuckburgh, E., Preliminary report on climate change in the Cambridgeshire & Peterborough region, 2020-2099, Cambridge Zero, University of Cambridge.

The sources of emissions in CPCA

Emissions estimates at local authority level

From the latest national data estimated at local authority level, total CO₂ emissions in the CPCA area in 2018 were 5521ktCO₂. This excludes peatland emissions which, though uncertain, could add a further 45% to this total. Even without this, emissions are around 6.46t per capita, almost 25% above the per capita figure across the UK as a whole (5.19).

There are significant differences in the make-up of emissions as between CPCA and the UK (Figure 1.4). But the main reasons that emissions are relatively higher in CPCA, per capita, are:

- Emissions from surface transport are high (2.9tCO₂ per capita in CPCA as against 1.9tCO₂ per capita for the UK) (Chapter 3);
- Land use, land use change and forestry (LULUCF) is a net source of emissions in CPCA, but a growing net sink in the UK. This is largely explained by an increasing store attached to forestry (tree planting) in the UK, which is not replicated in CPCA.

Emissions from peat, once they are included, will make the excess per capita emissions in the region even higher.

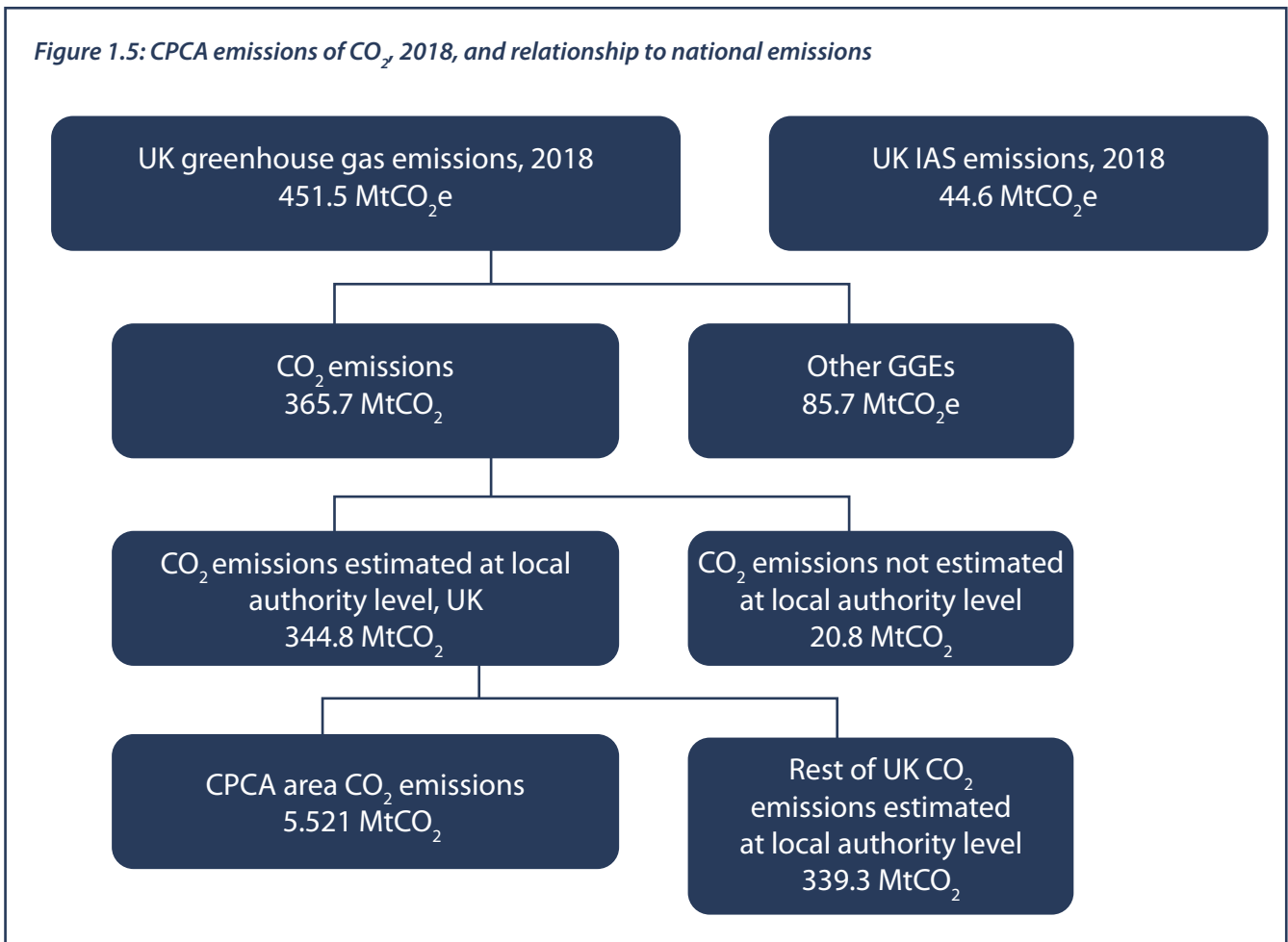


Not all emissions at national level are estimated at local level (Figure 1.5). Principal exclusions from the local dataset are:

- CO₂ emissions from domestic shipping, domestic aviation and military transport. Overall, alongside a few small methodological differences, this means that around 6% of UK CO₂ emissions are not allocated to local areas;
- CO₂ emissions from international aviation and shipping (44.6MtCO₂e) are reported as a memo item to the UNFCCC, but excluded from these figures;
- Non-CO₂ greenhouse gases are not broken down to local authority level. These totalled 85.7MtCO₂e in 2018, 19.0% of total UK emissions.

Emissions from peatlands are also largely excluded from the above estimates, at local and national level.

Figure 1.5: CPCA emissions of CO₂, 2018, and relationship to national emissions



Significance of exclusions for CPCA

The most significant exclusion for CPCA reflects that emissions from peatlands are, in large part, not currently reported in the UK inventory:

- It is expected that around an estimated 17-21 MtCO₂e emissions from peatlands will shortly be added to the UK inventory. This will increase overall UK emissions in the inventory by around 4%;
- A substantial area of UK lowland peatland is within the CPCA. Estimates are subject to considerable uncertainty, but inclusion in the UK inventory could add as much as 2.6 MtCO₂e to recorded CPCA emissions, an addition of around 45 %.

Abatement potential for emissions from peatland in CPCA, and maintenance of the peatlands carbon store, is therefore very important. We give this detailed attention in Chapter 6.

Other significant issues for CPCA relate to non-CO₂ emissions:

- Agriculture accounts for around 46% of non-CO₂ emissions at UK level. Most of this is for livestock, which is probably a relatively small share of agricultural emissions in CPCA. But almost one third reflects N₂O emissions from use of fertilisers and is likely to be significant in CPCA;

- Waste management is responsible for around 24% of non-CO₂ emissions nationally, and likely to be significant in CPCA.

There will be scope to influence these emissions through local actions. We intend to consider these in further work.

In the rest of this report, unless we directly specify otherwise, the emissions we focus on are the 5521kCO₂ estimated in national statistics for CPCA. (i.e. excluding peat and non-CO₂ emissions).

Consumption emissions

Our assessment is also largely on the basis of emissions estimates on a “production” basis – that is emissions that occur within the region. This is the basis of available data and consistent with the approach to emissions accounting internationally.

There are other ways that emissions can be looked at – that is to give responsibility for emissions caused during the production of goods and services, wherever they occur, to the final consumer – in this case to consumers within CPCA. On this basis, for example, emissions in the generation of electricity brought into the region for consumption, or the production of manufacturing goods such as cars, would be assigned to CPCA. Estimation of emissions on this basis is more difficult, and we have not attempted it here. The ability of CPCA and constituent authorities to influence these emissions from production elsewhere is likely to be much reduced compared to emissions within CPCA. This is not to say that this is not an important area for further exploration, particularly where there are things that local consumers may wish to do to alter consumption habits with potential to reduce emissions – buying locally made products for example, and we pick up on some of this potential in Chapter 7.

The role of local authorities

Much of the emission reduction achieved in the UK to date has been through central Government policy, working through a relatively small number of actors. This has been the case, for example, with the continuing switch away from fossil fuels towards renewables for the generation of electricity.

Increasingly, however, emission reduction will need to be achieved from the decisions and actions of a range of people, communities, civil society actors and businesses. The CCC estimates that almost 60% of required emissions cuts now depend on decisions taken at local and individual level.

Local authorities have direct control – through their operations and buildings – of only a small proportion of emissions in their area, typically a few percent. As trusted sources of information and advice, however, through their control of local planning and other policies, and their powers to borrow and raise income, they have influence on much more.

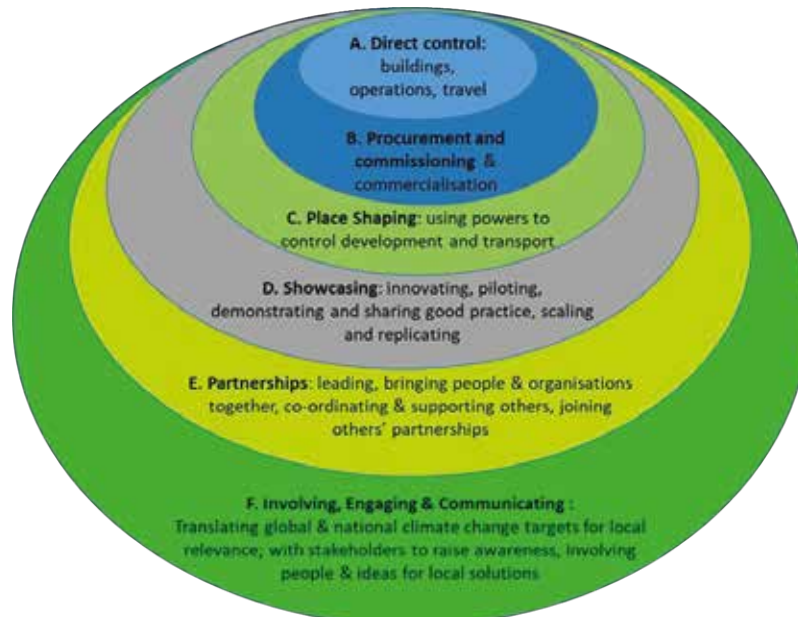
The layers of local authority influence and control are described and illustrated in the CCC’s recent sixth carbon budget advice (Box 1.3). These powers of place-shaping, engagement and bringing people together will be crucial to decisions on how we decarbonise our buildings (through energy efficiency and low-carbon heat), how we travel and provide infrastructure for electrification of transport. Indeed, local authorities have a wide range of functions (over 700), many of which are set out by law. These are split depending on type of council or the Combined Authority.

Box 1.3: Local authority control and influence over emissions and preparing for a changing climate

Key local authority powers and duties relate to:

- an overarching role to support the economic, health and social wellbeing of communities;
- planning powers over buildings and transport;
- enforcement of building regulations;
- powers to ensure that buildings meet basic energy efficiency standards;
- duties to prevent homelessness and prevent hazards in housing;
- duties to manage risks including climate change risks such as flooding;
- duties and powers to protect the environment, wildlife and heritage;
- duties to collect and dispose of waste;
- borrowing and investment powers.

Figure B1.3: How local authorities control and influence emissions



Source: CCC (2020), *Local Authorities and the Sixth Carbon Budget*.

In some cases different types of authorities can undertake similar things (for example looking after street lights), or might own and manage similar sites (for example recreational space or car parks). These functions are funded through a mix of Council Tax, government grants and income raised.

The Cambridgeshire and Peterborough Combined Authority is made up of eight partners (the seven councils and the Business Board), along with the directed elected Mayor of the Combined Authority. Through the Combined Authority Cambridgeshire and Peterborough is receiving additional funding to deliver new affordable, rented and shared-ownership homes over a five-year period, plus infrastructure funding over 30 years to boost growth in the region, and annual funding to support adult skills training. The CPCA is the Transport Authority (setting strategic transport policy and a multi-year transport budget). It is also the accountable body for the Business Board, which provides a business perspective and manages government funds to support economic growth.

Cambridgeshire County Council and Peterborough City Council have key responsibilities for social care, public health, highways, schools, libraries, waste management, and flood risk plans.

The District Councils (including Peterborough) have key responsibilities for planning, housing, environmental health, leisure, and waste collection. Some areas might also have a Parish/Town Council who look after a range of local matters, including community buildings, allotments, some street lights, bus shelters (they can also receive a proportion of the Council Tax).

There are a range of other public or regulated organisations that also have a great influence on our area. These include Highways England (motorways and major highways), the rail industry, the NHS, the energy and water companies, and standards setting bodies.

Our approach

The focus of our work is to consider the actions that need to be taken to reduce emissions and to prepare for the impacts of climate change. But in taking this forward we have from the outset recognised both that this is a systems problem with many interacting parts, and the need to incorporate wider social and environmental issues in our work, and consider how we can improve the lives of our communities through climate action.⁴ There are particular challenges attached to recovery from COVID-19, but these issues – of biodiversity loss, economic opportunity, health and inequality – are long-standing. Unless we take account of the requirement for a “just transition”, our climate recommendations are unlikely to gain the acceptance they need to succeed.

Our thinking is illustrated (Figure 1.6) by consideration of a range of factors which can be positively impacted by measures to reduce emissions and improve resilience:

- **Clean and plentiful water:** by managing our water systems in a more sustainable way that recognises the need to adapt to the changing climate we can continue to supply clean and plentiful water in the region;
- **Clean energy:** by changing the way we heat our homes and power our transport, as well as generate electricity, so that this is done from renewable and zero carbon sources, we can reduce greenhouse gas emissions, improve air quality and reduce dependence on imported fossil fuels;

⁴ Indeed, it is included in our terms of reference that we should “take account of a long-term vision of sustainable development. [Its] recommendations will therefore consider the interrelated impacts on society, the economy, and the natural environment (including water and soils). It will examine how existing inequalities can be reduced, and assess whether its recommendations have differential impacts”.

- **Safe and comfortable homes:** aside from reducing energy bills, improving the thermal efficiency of our homes and buildings can reduce overheating and indoor air quality issues that lead to risks of heat and cold related illness and deaths. Making sure our homes are prepared for increased risks of extreme weather and impacts of flooding will help keep our communities safe;
- **Skills, jobs and growth:** investing in climate-friendly technology, revamping old and high-emitting infrastructure and greening our communities, will create opportunities for skills, training and employment to people living, working and studying in our region;
- **Clean, integrated transport:** investing in high quality low carbon public transport that connects people to services, jobs and opportunities, will improve prosperity and well-being. Making active transport, including cycling and walking, more accessible will help to improve health and reduce risks of cardiovascular disease, obesity and diabetes;
- **Inclusive and resilient communities:** by improving air quality, ensuring provision of low-cost renewables and healthy food, providing access to green spaces and better public transport, improving the safety and comfort of our homes, and linking to transport infrastructure, we can create more inclusive and resilient communities, and contribute to a reduction in regional inequalities;
- **Physical and mental health:** many of the measures we take can improve our physical and mental health. Improved air quality reduces coronary heart disease, strokes, asthma and lung cancer; green spaces are increasingly appreciated for their health benefits (physical and mental); there is evidence that active travel can reduce type 2 diabetes, dementia, heart disease and cancer;
- **Thriving nature, growing greenspaces:** investing in nature, including increasing biodiversity and green space, will help reduce heat in our urban areas, provide shade to our buildings, reduce risks of flooding and improve physical and mental wellbeing.
- **Clean air:** through switching away from fossil fuels for our cars and vans and reducing the demand for car and van use, and reducing fossil fuel use for heating buildings, we can significantly reduce air pollution in our region, with benefits for health, including reduced asthma in children;
- **Healthy food:** supporting farming to produce lower emission foods, such as fruits and vegetables, that are grown locally will help ensure availability and affordability of healthy foods, whilst reducing food miles and associated emissions .

Figure 1.6: Climate stability in a thriving and resilient region

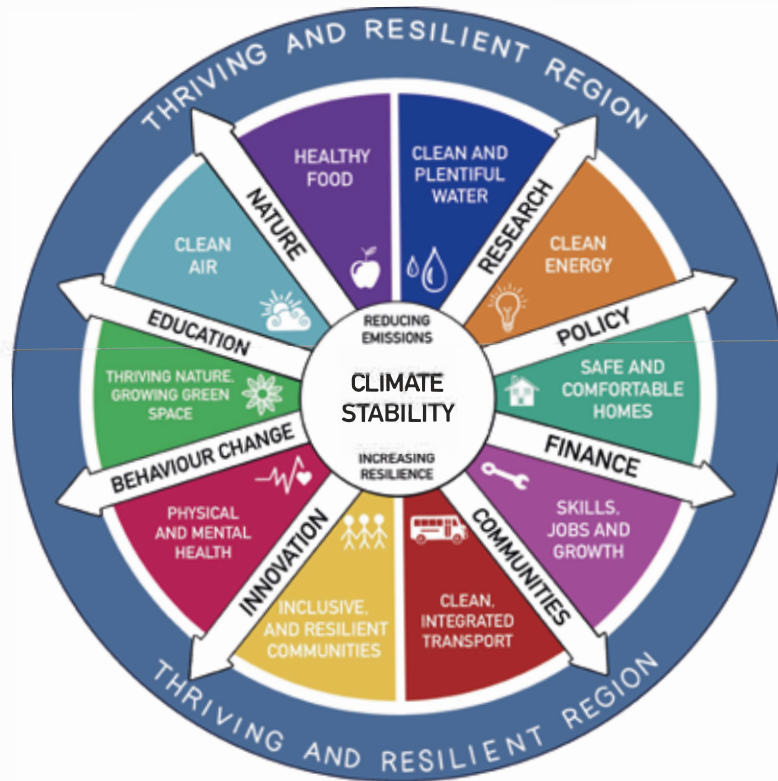


Image Credit: Anais Osborne

CCC assessment confirms that there are significant co-benefits in these areas.⁵ They can be difficult to quantify, but undoubtedly offset some, if not all, the costs of achieving emission reduction targets. Just how and to what extent these co-benefits accrue depends on how climate policies are designed and put into effect. An expert advisory group to the CCC on health issues advises that the biggest driver of health outcomes in the UK is economic inequality – it is essential, therefore, that policies to reduce emissions and prepare for climate change embed fairness and do not place burdens on those least able to pay.

There are related issues as to how these benefits are affected by COVID-19. The response to the pandemic has led to changes in behaviour, some of which are potentially beneficial for climate change – the potential for more home-working to reduce travel for example. There have also been negative impacts, such as reduced use of public transport and significantly increased domestic water use. Survey evidence also indicates a high value placed on nature and greenspace that may be long-lasting, and certainly people say that they want higher value to be placed on these benefits post-pandemic.

Just how much of the observed change will prove to be permanent is impossible to say. But there is potential for policy to build on the positive behaviour changes that have been observed and to work with communities to consider how they would like to rebuild from the pandemic sustainably.

There is also now considerable spare capacity in the economy, and evidence that many measures consistent with a green recovery, such as work to retrofit our homes or restore peatlands, would be good for the UK economic recovery as well.

⁵ There are potential negative impacts as well. Switching to electric vehicles, for example, could increase congestion if per mile costs of travel are reduced. But the CCC concludes that co-benefits overwhelmingly outweigh the negatives.

Public engagement

As part of our efforts to engage with the public we launched an on-line survey, open to residents and businesses in the CPCA area. We had 890 responses direct from members of the public, and we supplemented this with a further 331 responses secured through a survey company, making a total of 1221 respondents.⁶

There were 34 survey questions in total – some providing for multiple-choice answers, some allowing for qualitative responses. A full set of results is published alongside this report.

We expected some differences between the two sets of respondents, and this is confirmed by examination of the answers. The direct respondents had their own motivations to respond to the survey – we might expect them to be more environmentally conscious and possibly more likely to have already taken actions of their own and to support further actions to limit climate change. The responses recruited through the survey company (the “targeted” responses) received a small fee for participation – they are possibly more reflective of the attitudes of the general population, although we hesitate to say that either set of responses are representative of the general population.⁷

In relation to general or cross-cutting issues raised in the survey:

- a high proportion of respondents said that they understood the impacts of climate change on Cambridgeshire and Peterborough (83% of the direct respondents; 64% of the targeted respondents; and 78% overall);⁸
- a high proportion felt that the area should be a leader in taking further action (92% of the direct respondents; 81% of the targeted respondents 89% overall);
- most agreed with the topics identified by the Commission as areas to focus on (e.g. transport, air quality, energy supply, planning of homes, offices and infrastructure) But the single issue receiving the highest score for consideration from both types of respondent was “nature”;
- in relation to taking personal action, a high proportion of respondents said they were likely to change the things they buy to take climate change into account (83% of direct respondents; 70% of targeted respondents; and 79% overall);
- in terms of activities identified as priorities for the Commission to focus on, the highest weight was given to improving information and education on climate change; influencing behaviour; and strong leadership from local government. On this issue, the targeted group placed even more emphasis on the need for more education and information than the direct respondents – perhaps recognising that more of the direct respondents have been reached already.

⁶ We chose to use a survey company, which made a small payment to respondents, to try to ensure a wider sample of people and to understand differences to those who would proactively respond to our online survey.

⁷ We picked up very few older respondents in the “paid for” survey – only 4% were retired; 16% were in full-time or part-time education.

⁸ Note that this was self-reported and real knowledge was not tested in the survey.

These are interesting findings. In relation to education, there are good examples within CPCA currently (Box 1.4), but it seems important to review what more can be done.

The responses have similarities to results that have been received nationally when views have been sought – whether through public surveys or climate assemblies: strong support for national leadership; for more information provision and education; and a willingness to engage on the issues and to consider personal actions.

We pick up on responses relating to specific areas of action – transport and buildings – in those chapters below.

More generally, we should have liked to engaged in a fuller series of participation activities feeding into this report. Potential to do this has been constrained by COVID-19 and the timescales for our initial recommendations. This is a preliminary report, and we hope to use it as the basis for further engagement in the months ahead, informing the report we are due to make later this year.

Box 1.4: The Business Sustainability Challenge

Opportunity Peterborough's Skills Service, in partnership with Peterborough Environment City Trust, have launched a Business Sustainability Challenge for schools within Peterborough and the East of England.

The Business Sustainability Challenge is a "Solve the Problem" activity, using situations from real businesses that relate to reducing carbon footprints. In an "Apprentice style" bid, students will be given a choice of several different challenges to address. They are then given an opportunity to go away, research the issue, and prepare a solution, which they pitch back.

The winning idea/concept will be chosen by a panel comprising experts from the business sector and field of sustainability.

More information, and an invitation to participate, can be found at <https://theinspireseries.net/inspire-sustainability/>

Next steps

In further work, we will extend our assessment to cover a number of issues:

- We have made recommendations to the CPCA about the need to develop an action plan, with indicators to be monitored for progress, and a linked finance plan. It is important that the CPCA and constituent authorities should own these plans, but we expect to be able to provide further advice, including on timing and prioritisation of actions and financing options.
- We have prioritised the transport and buildings sectors in this report, as well as emissions from peatland. We will look in more detail at the water sector, emissions from waste and the business sector.
- We have recommended that the CPCA should look further at the potential to develop low-carbon innovation clusters in the region. There should be scope, given the businesses we have and university resources and expertise, for leadership in innovation and demonstration.
- Building on our assessment of climate risks facing the region, we will look further at the adequacy of current adaptation plans.
- The scale of the climate challenge facing us is huge. Engagement with the public on the issues and in provision of advice, is a critical task - nationally and in the area. We will consider the requirements here further.

Overarching

Recommendations

We make the following recommendations.

1. The CPCA should create:
 - A Climate Cabinet chaired by the Leader of the Combined Authority – including councils and key regional stakeholders, such as the water and energy sectors, the Environment Agency, education, healthcare and local employers
 - A funded delivery team in CPCA to coordinate, champion and facilitate action
 - A green investment team
 - A climate action plan, including a finance plan, with agreed targets for emissions, actions and monitoring
 - An independent monitor: maintaining the CPICC as an independent body to monitor and report on progress annually.
2. A climate change assessment should be undertaken and taken into account for every CPCA and Council policy, development, procurement, action.
3. All CPCA and Council operations should be net zero by 2030, underpinned by a regional Science Based Targets (SBTi)-type action plan.
4. The CPCA should rapidly assess the current sources and availability of funding for green opportunities (such as Green bonds or other instruments to accelerate housing retrofit, nature-based solutions and peat restoration) and develop an ambitious funding plan, including the use of its borrowing powers
5. The CPCA should develop and lead a plan for engagement with local people and businesses. This should cover the need for action and provide information on options and the choices that have to be made at local level.
6. The CPCA and its constituent Local Authorities and public sector partners should adopt a leadership role in accelerating the achievement of the Doubling Nature ambition, specifically to create or to conserve habitats such as woodland, grassland or wetlands that can store or absorb carbon; and setting an example on land that they own or control.
7. The CPCA should review training and upskilling plans to ensure that these are designed to support the scale and nature of the required transition, maximise high quality job opportunities in the region and contribute to reducing inequalities and deprivation.

- Mapping the elements and processes that are in place that enable the region's success in biotech and information technology sectors in taking ideas to full commercially viable delivery, to see how these can be applied to support low carbon innovation, including:
 - generation and communication of ideas
 - the role of multiple paths of funding across the innovation process from
 - different types of funders and investors
 - company evolution and scale up (including simple organic growth)
 - the roles of universities, networks, technical consultancies, incubators and accelerators, angel investors, institutional investors, regional and national policy and the regulatory environment
- Understanding the differences in all of the above amongst the sectors, and indeed the wide spectrum within the clean tech sector
- Articulating the gaps that exist within the regional innovation ecosystem that could impair the success of net-zero-aligned agritech and cleantech sectors, and making recommendations for filling them to unlock the potential of the subsectors in which the region has or can develop world leading know how and businesses.

9. The CPCA should actively broker, and where appropriate, invest in, the creation of demonstration projects for the decarbonisation and resilience of the built environment, both in residential and commercial buildings. These demonstrators will require working with businesses, developers, estate owners, universities, and the finance sector across the region. This should take a portfolio approach so that, ideally, there is a demonstrator for each distinct category of estate/built environment with significant presence in the region. The balance between the scale, number and type of project, and the funding and expertise available, should be driven by the objective to develop locally relevant know-how, learning, business models, and awareness.

For Central Government:

10. Central Government should provide greater clarity about how costs in the transition will be met, including increased devolved funding for local authorities, and over what time periods and under what terms and conditions.
11. Provide increased powers for local authorities to require higher standards in planning, buildings and transport.
12. Devolve more responsibility and funding to local authorities to deliver transport and buildings decarbonisation.

For Central Government and Ofwat

13. To provide for the investment to allow intercompany trading and water infrastructure improvements by 2025 to enhance water supply, including eliminating Cambridge's dependence on the ground water aquifer

Introduction

Delivering net zero across the CPCA area and adapting to climate change, will require changes across the economy. Mapping out what is required inevitably means getting into detail for different sectors, and is the focus of the sector chapters which follow. But pulling this together into a coherent strategy overall also needs cross-cutting actions. These are the focus of this chapter.

Regional coordination and facilitation

Wider research¹ shows that capacity to tackle emissions reduction and increase resilience, apply for funding, and manage schemes is very limited in most local authorities. It is clear, however, that for local authorities to make progress, there is a need to embed climate actions across all functions, policies and service areas.



¹ For example, by the Climate Change Committee feeding into its sixth carbon budget recommendations.

Whilst we have seen examples of good practice in individual authorities in the region, we see opportunities for learning across the authorities and for more effective action with support and coordination from the CPCA.

Delivering the actions required, at the scale and urgency needed, will require regional coordination and facilitation, in order to:

- Develop an action plan, with indicators of progress and monitoring against these indicators, allowing for adjustment of plans where necessary.
- Support local area energy and water planning that: identifies heat zones for buildings and building retrofit priorities; is aligned with plans for transport that support electrification and zero carbon vehicles, as well as modal shift and integrated public transport; is developed in collaboration with local network providers. Such planning requires robust methodologies to model future demand, as well as processes for the involvement of local people and businesses to obtain local acceptance and delivery.
- Allow planning of new developments to be properly informed by criteria for site selection (including connectivity, land suitability and natural capital), made transparent with local people in the consultation process.
- Maximise participation in national schemes. There have been and are a large number of funding pots made available from central Government for various schemes. We should like to see these streamlined and made available on timetables that provide more time for local development of applications and implementation over more strategic periods (that support, for example, the development of supply chains). However, for the opportunities that do arise, a central team to help coordinate bids and delivery would increase the likelihood of success and provide support for smaller authorities.
- Provide specialist support in relation to procurement issues and policy design, drawing on schemes that have worked well elsewhere, for example, region-wide procurement of low carbon waste and recycling services to get better value and provide more consistent messages to the local population.
- Promote wider communications and engagement, with the public and business. A national effort is required, but local support will allow this to be tailored for local circumstances and in support of delivery.
- Local funding mechanisms will also be needed. But each local authority in the region is unlikely on their own to be able to develop, or afford, the specialist finance expertise increasingly required, for example to issue bonds. The CPCA borrowing powers could also be used to great effect to leverage additional funds.
- Implement regional education and training initiatives to develop local skills for the needs and opportunities from delivering net zero and increasing resilience, for example in building management and retrofit.

We therefore recommend the creation of:

- **A Climate Cabinet chaired by the Leader of the Combined Authority – including councils and key regional stakeholders such as the water, energy sectors and the Environment Agency, education, healthcare and local employers**

¹ For example, by the Climate Change Committee feeding into its sixth carbon budget recommendations.

- **A funded delivery team in CPCA to coordinate, facilitate and support action**
- **A green investment team**
- **A climate action plan, including a finance plan (which we return to below), with agreed targets and monitoring**
- **An independent monitor: maintaining the CPICC as an independent body to monitor and report on progress annually.**

This is not a one size fits all recommendation. There are different conditions within the constituent authorities of the CPCA, which require flexibility in response. Some of these areas work well together currently on specific issues. There are other local bodies, such as the Greater Cambridge Partnership or Peterborough Ahead, that have responsibilities and interests for specific areas. But a clustering of support and expertise should reduce duplication of effort across authorities, improve coordination and allow for more effective delivery.

Delivering a CPCA-wide contribution to net zero also requires that the CPCA and constituent authorities demonstrate leadership in their own policy and procurement decisions.

In the same way as national level guidance (e.g. Green Book appraisal guidance) needs to focus more strongly on carbon reduction and co-benefits of climate actions, so local appraisal and business cases must be net zero consistent and take account of current and projected climate impacts. Again, there are examples of emerging good practice - Cambridgeshire County Council is, we understand, developing an approach to incorporate carbon costs into appraisal by use of a "shadow" carbon price. Such approaches need to be consistently and widely applied.

We therefore consider that a climate change assessment should be undertaken and taken into account for every CPCA and Council policy, development, procurement, action.

Clearly, the CPCA and local authorities must also take responsibility for their own emissions – covering areas including the energy efficiency and heat sources of public buildings; use of public buildings as anchor loads for low carbon heat networks; procurement of renewable electricity; upgrading street lighting to LEDs; switching vehicle fleets to EVs. Existing plans must be updated to ensure consistency with achievement of net zero.

All CPCA and Council operations should be net zero by 2030, underpinned by a Science Based Target (SBTi)-type action plan.

Procurement can also be an important power. Procured goods and services can make up 70-80% of a council's total carbon footprint, due to use of contractors for waste collection, construction, social services and facilities management. Procurement rules should therefore be used to minimise the environmental impact of goods, services and works procured, including the reduction of greenhouse gas emissions. Regional coordination or negotiation of procurement contracts can bring better value and more consistent net zero compatible services.

Finance

Achieving net zero will entail significant up-front costs, whether incurred by the public sector, private sector or by individuals, even though much of this cost will be offset by ongoing savings in fuel costs, and other benefits. There is also an opportunity, in the immediate term, for required investment to support economic recovery from COVID-19.

For the UK as a whole, the CCC estimates net costs of the transition at less than 1% of GDP over the period 2020-2050. It suggests that annual UK low-carbon investment will have to increase from around £10bn in 2020 to around £50bn by 2030. The roadmap work by PCAN for this report (Box 2.1) suggests annual investment of perhaps £0.7bn in the CPCA area through the 2020s.² Not all of this is additional to spend required in the baseline, and some (an estimated £0.5bn annually by 2030) will be offset by reduced energy bills. Nevertheless, there is a significant up-front cost.

Much of the investment cost will be met by the private sector, both business and households. Good policy design, at national and local level, can help that happen. But a funding gap remains.

One of the biggest areas for which funding will be required relates to retrofit of the housing stock, covering energy efficiency measures and the decarbonisation of heat. The CCC estimates an average retrofit cost per home of around £10,000. For a housing stock of around 370,000 that would imply a total cost in CPCA around £3.7bn (£185-370m annually, spread over 10-20 years).³ Some industry modelling suggests higher average costs.

In aggregate, for the UK on a path to net zero, the CCC estimates annual housing investment costs around £9bn annually in 2028. A substantial part of that cost, around £6-7.5bn, is potentially met through existing and developing policy (offsetting energy savings, continuation and assumed development of existing Government programmes, and pass through of some costs to the private sector through regulatory requirements). Even on these assumptions, however, there is an up-front cost and a funding gap (£1.5-3bn in 2028, and rising in the 2030s as heat decarbonisation extends further).

The NAO has recently identified⁴ that the Government needs to clarify the role of local authorities in achieving net zero, including ensuring that they have the skills and capacity required.

A first requirement, therefore, is that central Government provides greater clarity about how costs in the transition will be met, and over what time periods and under what terms and conditions. This will undoubtedly need to include increased funding for local authorities. The final report of the Treasury Net Zero Review, due later this year, is an opportunity to address this.

² This excludes consideration of the agriculture sector and peatlands.

³ The PCAN (2021) report has a rather higher estimate of investment cost, for the housing sector, rising to £5.4bn, but this includes additional costs for new build and there are likely to be other definitional differences.

⁴ NAO (2020), Achieving net zero.

Box 2.1: A net zero roadmap for Cambridgeshire and Peterborough

We commissioned work for this report from the ESRC Place Based Climate Action Network, at the University of Leeds, to build a roadmap of emission reduction measures across Cambridgeshire and Peterborough, moving towards net zero emissions by 2050.

The approach applies a methodology that has been used for a number of local authorities across the UK – including Leeds, Belfast, and Edinburgh – to identify and evaluate, taking account of local circumstances and opportunities, the wide range of carbon reduction options that are available. It draws on national and local data, for example to take account of local variation in the building or vehicle stock, and structure of the economy. The costs and carbon saving potential of around 130 measures are assessed, against a baseline projection of emissions to 2050, allowing for economic and population growth, and some continued emission reduction reflecting Government commitments (particularly for decarbonisation of electricity) and continuation of current energy efficiency trends.

On this basis, the assessment provides rank orderings of measures in terms of cost effectiveness (cost per tonne of CO₂ saved) and absolute amount of emissions saved. Further outputs relate to the investment requirements to implement these measures and employment opportunities attached to deployment of measures. How the cost might be met, and who by, is dependent on policy as to how measures are implemented, and how behaviour change is induced, and is a further step which is not considered within the report.

Measures are aggregated over 3 combinations:

- *Cost effective measures: these are measures that more than pay for themselves through the energy cost reductions that they generate. Overall, the adoption of these measures can close the gap between projected emissions in 2050 and net-zero emissions by 61%.*
- *Cost neutral package: this is a portfolio of measures, building on the cost-effective measures, that overall has near-zero net cost. This set of measures closes the gap between projected emissions in 2050 and net-zero emissions by 74%.*
- *All technical potential: this adds in further measures to reduce emissions, with costs greater than the energy savings they generate. Overall, this closes the gap between projected 2050 emissions and net zero by 83%.*

On the measures included in the assessment, therefore, there would remain a gap to achieving net zero. There are, however, a number of further innovative or “stretch” measures which might contribute to closing the gap, but which are not currently well enough understood to be clear about their costs or emission-reduction potential. Further afforestation, for example, or greater decarbonisation of heating than in the options included in the assessment, might plug some of the gap.

The assessment suggests profiles for implementation of measures over time, and associated investment costs (and energy savings). We include related summary information in respect of the particular sectors in Chapters 3 (transport) and 4 (buildings).

To be consistent with progress towards meeting net-zero by 2050, the assessment suggests interim targets for emission reduction (as against 2000 levels) of 49% by 2025, 75% by 2030, 87% by 2035, 94% by 2040, and 97% by 2045. There is a substantial need for delivery of emission savings over the next 10 years.

Source: PCAN (2021), A Net Zero Carbon Roadmap for Cambridgeshire and Peterborough, ESRC Place Based Climate Action Network, University of Leeds.

The CPCA also needs to develop its own financing plan. We will develop our advice on this over the coming months, but our initial assessment suggests a need to develop thinking in two different areas, relating to specific, smaller-scale project finance, and to bigger financial vehicles:

- Project finance: for smaller-scale projects finance may be available through a variety of routes:
 - Various pots of funding may be made available from Central Government, for bidding into. Currently, for example, there is the Green Homes Grant Local Authority Delivery Scheme⁵ and the Heat Network Delivery Unit, although at least the former should be reformed to be better aligned with the timescales involved in delivering such projects.
 - More innovative options are emerging. West Berkshire Council recently became the first to issue a Community Municipal Investment Bond, raising £1m from around 600 investors, around 20% from the local area. This will finance projects including solar, LED lighting and cycling routes. Other Councils are looking to issue Bonds;
 - Greater Manchester has established an Environment Fund, aiming to blend public and private sector funding through a charitable vehicle. It envisages leveraged private funding from corporate organisations and institutions that either wish or are required to address their negative environmental impacts. An anticipated £5m annual turnover, growing over time, should be available to finance new habitats, tree planting and peat restoration.
- Bigger financial vehicles: More substantial investment programmes are beginning to develop. The Green Finance Institute is working with the GLA on a London Futures Fund. The Bristol City LEAP (Chapter 4, Box 4.6) will establish a joint venture between the City Council and a strategic partner to deliver an investment programme of more than £1bn covering smart energy, energy efficiency, heat pumps, and district heating. These programmes may allow some economies of scale in project design and management.

The Public Works Loans Board, operated by the UK Debt Management Office on behalf of HM Treasury, provides loans to local authorities for capital projects. Concessionary rates are available for lending to support high value for money infrastructure projects, or (the Certainty Rate) loans to principal local authorities (which has been used by CPCA in the past) providing information on their plans for long-term borrowing and associated capital spending;

CPCA should seek to understand the range of possible sources of finance, including private placement and the public debt markets, the terms on which it could access these sources, and the processes required (which could include the need, for example, to have a credit rating, with its attendant costs and resourcing implications). This is particularly important given how new the authority is and that it currently has neither a significant balance sheet nor income streams to directly support the acquisition of large amounts of new debt.

The UK Government has recently announced the formation of a new UK Infrastructure Bank, to co-invest alongside the private sector and to provide local and mayoral authorities with advice on developing and funding infrastructure projects. The CPCA should monitor progress in establishing the bank with a view to engaging with it at an early stage to understand how it may provide support.

⁵ Cambridge City Council, Cambridge County Council, East Cambridgeshire, Fenland and South Cambridgeshire have successfully applied for funds under Phase 1B of this scheme.

Local authorities have a much bigger role than public investment. It will be crucial to catalyse private sector investment, through promotion of new and emerging financing routes, and public engagement activities. For example:

- Group-buying schemes have developed in recent years. Solar Together, for example, which has been used by Cambridgeshire County Council, offers a route for homeowners and SMEs to purchase solar panels or battery storage. The greater buying-power from bringing purchasers together allows procurement at lower cost.
- New bundling packages from energy suppliers can be expected to come to market. Tariffs rewarding householders and businesses for surplus energy exported back to the grid are available. Wider packages supporting installation of heat pumps, or electric vehicle charging, are beginning to develop. There are expectations that the greater scale of renovation associated with “whole-house” packages for energy efficiency and heat decarbonisation (linked to digital green passports) will further allow new financing mechanisms to emerge. Companies like Octopus Energy are currently in the lead in this kind of thinking.
- A recent Scottish Government consultation⁶ has also referenced the Danish "Heat as a Service" model, where consumers adopt heat pumps as part of a subscription model.
- The Government is seeking to develop new vehicles for private funding through the recently launched Natural Environment Investment Readiness Fund (NEIRF). Delivered through the Environment Agency, this will provide grants of up to £10,000 to environmental groups, local authorities, businesses and other organisations to help develop nature projects to a point where they can attract private investment. Projects aimed at provision of new woodlands, restoration of peatlands, provision of habitats for wildlife and green space for the public and carbon sequestration are eligible. The aim is to develop new funding models, for a pipeline of projects for the private sector to invest in. The CPCA and constituent authorities should explore what use might be made of this fund, which could promote wider learning and opportunity.

These developments are at early stages. There will be learning from the process. But in the immediate term there is a need for local authorities to build understanding of the options and of the finance sector, and consider how best to accelerate the transition – in part through investments for which local authorities are in the lead (such as social housing), in part through enabling and encouraging finance from other sources.

⁶ SG (2021), Heat in buildings strategy - achieving net zero emissions consultation, February 2021, Scottish Government.

There would be considerable duplication and inefficiencies in each of the constituent local authorities of the CPCA doing all of this, so the **CPCA should rapidly assess the current sources and availability of funding for green opportunities (such as Green bonds or other instruments to accelerate housing retrofit, nature-based solutions and peat restoration) and develop an ambitious funding plan, including the use of its borrowing powers.** One of the prime considerations in developing this plan should be to consider fairness, to ensure that decarbonisation is taken forward across all communities, but that finance is secured most from those who can afford to pay.

The financing plan will need to be comprehensive and include a clear articulation of the business model at each phase of development, particularly if private sector funding is being sought. Given the wide-ranging nature of the net-zero programme, this is a complex technical task and will require dedicated resources and suitably knowledgeable specialist input. As a first step, we recommend that a brain-storming session is held with external input from a technical consultant and senior institutional investor with deep experience of both the practical and financial aspects of such projects. This should accelerate the pace and efficiency of delivery and potentially open up areas where the CPCA could pioneer new approaches.

One of the attractions of the Community Municipal Investment Bond route pioneered in West Berkshire, is the potential to generate local engagement and buy-in. There may be other ways to do this.

The Cambridge University Science and Policy Exchange (CUSPE) has been looking at the potential to develop a carbon offsetting initiative within Cambridgeshire (a Cambridgeshire Decarbonisation Fund). The intention would be that businesses that have set, or are interested in setting, long-term Carbon-neutral (or Carbon negative) targets would be provided opportunities to invest in local emission reducing projects in the transition to achieving their targets. They would thereby “offset” some of their emissions and potentially improve their own image with the local community.

The project is currently engaging with local businesses to gauge their interest and whether this would be tied to investment in the Fund overall or to specific projects. Those projects might range from “Avoidance” (e.g. a zero emission housing development), to “Reduction” (e.g. buildings retrofit), to “Sequestration” (e.g. tree-planting).

There is a question about whether local authorities should support this kind of initiative. It would not have to be limited to business – potentially contributions to such a fund could be open to householders, who might also wish to offset their own emissions and contribute to local emission reduction schemes (with potential for benefits beyond carbon emission reduction).

Key to this is (and CUSPE does recognise the concern) is that emission reductions achieved through this route must be additional to what would otherwise be achieved, and must not disincentivise actions by the contributors to reduce their own emissions. It is for this reason that the CCC has recommended that the UK should aim to meet net zero and the sixth carbon budget without the use of carbon emissions credits. Longer term it has indicated that should also be the goal for local authorities:

- Credits might have some value in the transition provided this is in addition to taking all possible actions to reduce emissions.
- Local authorities should prioritise emissions reductions over offsets so that by 2030, offsets are only used for areas where emissions are unavoidable due to the lack of technical alternatives.

- Beyond 2030, offsets should transition to permanent removals, which must demonstrate additionality and promote sustainable development.

These are essential principles should CPCA be interested in further developing the offset proposal.

Nature at the heart of the agenda

Nature-based solutions will play a key role in adapting to and mitigating climate change. The use of nature-based interventions is not an alternative to major systemic reduction of emissions across all sectors. As advised by the Natural Capital Committee⁷, however, when delivered effectively these interventions can deliver carbon reductions at lower cost than engineered solutions, whilst enhancing the stock of natural assets and the ecosystem services they provide – making nature more resilient and making life better for people.

Consistent with the requirements of net zero, building back from the COVID-19 pandemic also requires a focus on nature. CCC advice⁸ has recommended a focus on tree planting, peatland restoration and green infrastructure.

There is considerable public support for such measures:

- The importance of green space has been highlighted by COVID-19. A majority of the public now say that they appreciate green space more since social distancing (53%) and that protecting local green spaces should be a higher priority when lockdown ends (63%). A report for the RSPB found that 89% of the public agreed that increasing the amount of accessible nature-rich green space will help improve people's general health, wellbeing and happiness.
- There is evidence of high levels of support in our own area. Respondents to our public survey indicated that nature should be given the highest priority as an area for the Commission to focus on. In a Natural Cambridgeshire Survey in the summer of 2020, 67% of respondents said that investment in nature recovery should be a priority post COVID-19, and 95% agreed that local authorities in Cambridgeshire and Peterborough should actively work to increase the number and area of accessible nature rich areas.

There is a clear case for CPCA to prioritise actions to maintain and increase tree cover; maintain and increase soil carbon (including through peatland restoration); improve wildlife/diversity; manage freshwaters and wetlands; and increase public access to nature. It should also be recognised that Cambridgeshire and Peterborough are amongst the most nature depleted areas of the country, so the opportunities to make a difference are very real. The evolving regime of environmental subsidies for landowners and tenant farmers also offers potential to accelerate delivery of these ambitions.

In terms of what this means for CPCA, Natural Cambridgeshire has set out an ambition to "Double Nature" across the region – a doubling in the area of rich wildlife and greenspace. In pursuit of this ambition it has described 6 landscape scale projects – as yet not fully funded - to promote nature recovery (Box 2.2), delivering wetland restoration, creation of grasslands and tree planting.

There are also many actions that individuals and communities can take to play their own part and to seek to incorporate doubling nature in local plans. The partners within Natural Cambridgeshire have already launched one pilot local-led nature recovery programme, in the countryside west of

⁷ NCC (2020), Advice on using nature based interventions to reach net zero greenhouse gas emissions by 2050.

⁸ CCC(2020), Building a resilient recovery from the COVID-19 crisis, letter to Prime Minister, May 2020; CCC(2020), Progress Report.

Peterborough, and would like to roll out similar projects across the CPCA area in 2021 and 2022, including in urban areas. These initiatives have the potential to engage residents in a positive and “hands-on” way, helping them to recognise the urgency of the climate change agenda and to take actions themselves (Box 2.3).

Box 2.2: Landscape scale projects promoted by Natural Cambridgeshire

Natural Cambridgeshire has identified 6 landscapes that it believes should be prioritised for nature recovery, working with landowners, tenant farmers and local communities. These have been chosen because of the potential for the creation of significant areas of new woodland, wetland and meadows, as well as the opportunity to enhance access to nature for recreation and health purposes. They are:

- John Clare Countryside
- Connected Fens
- Cambridge Nature Network
- Ouse Valley
- Nene Valley
- Cambridgeshire West Hundreds.

More detail can be found at <https://naturalcambridgeshire.org.uk/docs/doubling-nature-landscape-led-approach.pdf>

Box 2.3: Community nature recovery programmes

A community led nature recovery programme is already underway in the John Clare Countryside, <https://langdyke.org.uk/projects/john-clare-vision/> where 16 parishes are working together to develop resident-led plans for creating new habitats for nature. Over forty projects have been identified, including pond and wildflower meadows creation, and tree and hedgerow planting. Through a combination of grants and parish council contributions, £26,000 has been allocated for their delivery. This pilot is attracting attention due to its success in engaging communities in actions that will in aggregate create significant habitats for nature, improve public access and help capture carbon.

Natural Cambridgeshire would like to roll out similar schemes across the CPCA area and is actively seeking funding to enable this.

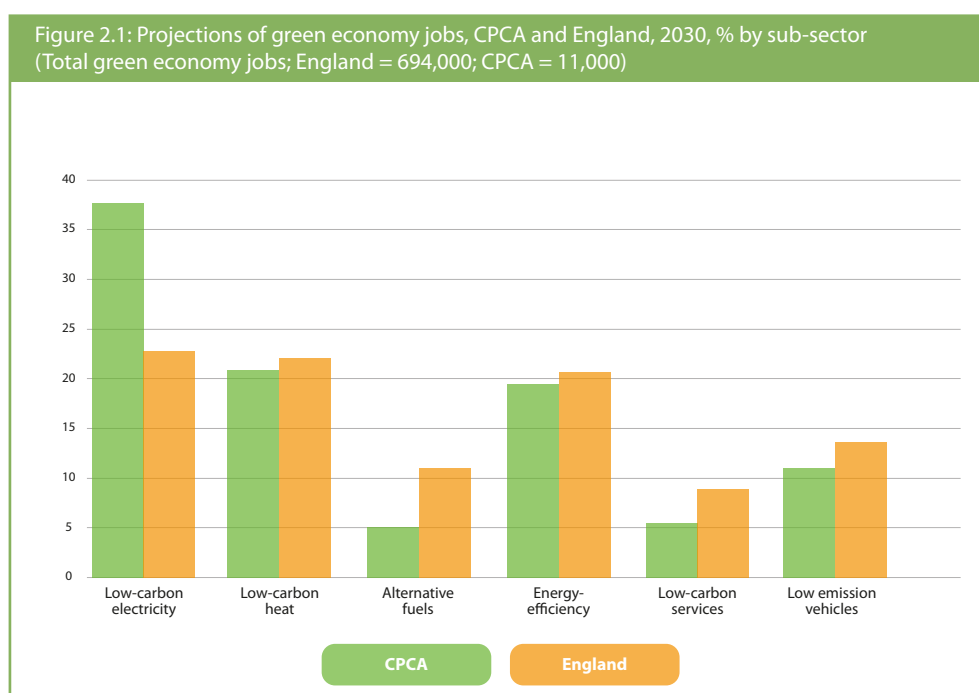
Within the CPCA area, large amounts of land that could be instrumental in helping take forward these initiatives are in public ownership. This includes land belonging to the Forestry Commission, Environment Agency, Drainage Boards, Homes England, schools, local authorities and health bodies. There is also a number of large-scale infrastructure schemes, including road building, railways and housing developments, that should be required to deliver significant biodiversity gains and support carbon capture. The CPCA should create a partnership of public sector bodies to develop and take forward recommendations for how these areas of land and infrastructure projects could help deliver the doubling nature ambition through land-management programmes that help in climate change adaptation and mitigation.

We recommend that the CPCA and its constituent Local Authorities and public sector partners should adopt a leadership role in accelerating the achievement of the Doubling Nature ambition, specifically to create or to conserve habitats such as woodland, grassland or wetlands that can store or absorb carbon; and setting an example on land that they own or control.

Education and skills

Consistent with a move towards a low-carbon economy, Government projections suggest that employment and GVA growth will be faster in the low-carbon and renewable energy sector (LCRES) than for the economy as a whole.

A recent report by Ecuity Consulting for the Local Government Association⁹ has looked at where these jobs might be located. For England as a whole it projects growth in LCRES jobs from 185,000 whole-time equivalent (WTE) in 2018 to 694,000 in 2030 and 1.18m in 2050. Of these, it suggests that 11,000 might be in CPCA in 2030 (Figure 2.1) and 20,000 in 2050. Of course, these are not precise forecasts. They are subject to a high degree of uncertainty, but they are indicative of the potential for substantial growth if demand materialises and if regions are geared up to the provision of education and skills that underpin these jobs.



*Note: these are direct jobs, not including jobs in other sectors supported by the LCRES.
Source: Ecuity (2020)*

For CPCA many of these jobs are likely to be in installation and maintenance rather than manufacturing. But there is potential also to build on sectors of relative industrial strength, which may also link in to the low-carbon agenda. The Cambridgeshire and Peterborough Independent Economic Review (CPIER)¹⁰, for example, has identified advanced manufacturing and materials, life sciences, IT and digital services, education, and professional services as areas of strength. Agritech and the skills to underpin sustainable farming is another. There is a small but growing Cleantech sector in Cambridge.

⁹ Ecuity (2020), Local green jobs – accelerating a sustainable economic recovery, Ecuity Consulting report for the Local Government Association.

¹⁰ CPIER (2018), Cambridgeshire and Peterborough Independent Economic Review.

An assessment by the Centre for Economic Performance at LSE¹¹ has focused on where short-term areas of strength might be for jobs growth, typically in construction and installation, as the economy recovers from the COVID-19 pandemic. It finds that energy efficiency in buildings, renewables and EV infrastructure are potential high growth areas for at least parts of the CPCA area.

There are likely to be areas of low-carbon growth market beyond those immediately identified above – requirements for adaptation or in application of digital skills, for example.

An earlier review of the evidence base relating to skills has identified key specialisms important (as contributors to employment) in the local authorities within CPCA. Some of these are areas with potential for low-carbon jobs: for example, IT and life sciences in Cambridge; advanced manufacturing in East Cambridgeshire; life sciences in South Cambridgeshire; Construction and utilities in Fenland and Huntingdonshire; Advanced manufacturing, transport and travel in Peterborough.

Much of what is required for the development of skills should be delivered by the private sector. But recent surveys have indicated that many perceive skills gaps for decarbonisation in their occupation or profession. The CPCA and local authorities have considerable roles in promoting and enabling the shift:

- identifying the broad areas of sectoral growth, liaising with and bringing together local employers, supply chains and providers of education to ensure that plans for necessary upskilling and reskilling are in place;
- identifying sources of funding for skills and retraining from public sources, such as the UK Shared Prosperity Fund, and private investment;
- ensuring that training programmes provide routes to recognised skills with certification that provides confidence to industry and consumers;
- leading by example, in investments and purchasing that help develop low-carbon supply chains and champion low-carbon technologies, and defining standards – for example in relation to new build – that provide certainty about what is required.

There are major opportunities in relation to building retrofit, EV technologies and other low-carbon areas. The new Peterborough University is to be employment-focused, with a curriculum designed to meet local employment needs. That suggests a strong focus on the demands of the growing low-carbon sector.

There is also potential to link a low-carbon skills and training strategy to local deprivation and to the distinctive labour markets within CPCA. Deprivation is most pronounced in northern areas of CPCA – Peterborough, Wisbech and parts of Fenland. Peterborough and the surrounding area has a relatively high unemployment rate. Fenland has a poorer labour market performance related to accessibility to jobs and training. Both Peterborough and Fenland rank poorly, across England, on indicators of educational, skills and training, which are key factors contributing to deprivation.

The CPCA should review training and upskilling plans to ensure that these are designed to support the scale and nature of the required transition.

¹¹ CEP (2020), Jobs for a Strong and Sustainable Recovery from Covid-19 – Sam Unsworth et al, CEP, Grantham Research Institute, LSE, October 2020.

Innovation and demonstration

As identified above, businesses in CPCA area have strengths in agritech, advanced manufacturing and materials, life sciences, IT and digital services, education, and professional services. There is a small but growing Cleantech sector in Cambridge.

The CPIER also identifies Cambridge as a centre for innovation – the highest number of patent applications relative to population of any city in the UK. Peterborough also ranks very high on this measure (13th in the UK).

Low-carbon markets, in the UK and globally, should grow rapidly given the commitment to net zero. The academic and business strengths in the area ought to mean that the CPCA area has the potential to be a substantial leader in development of the new technologies required in the transition. But it is not clear to us that the early-stage innovation evident in CPCA area is translating to substantial businesses (in terms of market or employment) within CPCA area.

The CPCA should commission work to understand the fitness of the innovation ecosystem across the region to support the emerging net-zero-aligned agritech and nascent clean tech sectors:

- Mapping the elements and processes that are in place that enable the region's success in biotech and information technology sectors in taking ideas to full commercially viable delivery, to see how these can work for net zero technologies, including:
 - generation and communication of ideas
 - the role of multiple paths of funding across the innovation process from different types of funders and investors
 - company evolution and scale up (including simple organic growth)
 - the roles of universities, networks, technical consultancies, incubators and accelerators, angel investors, institutional investors, regional and national policy and the regulatory environment
- Understanding the differences in all of the above amongst the sectors, and indeed the wide spectrum within the clean tech sector
- Articulating the gaps that exist within the regional innovation ecosystem that could impair the success of net-zero-aligned agritech and cleantech sectors, and making recommendations for filling them to unlock the potential of the subsectors in which the region has or can develop world leading know how and businesses.

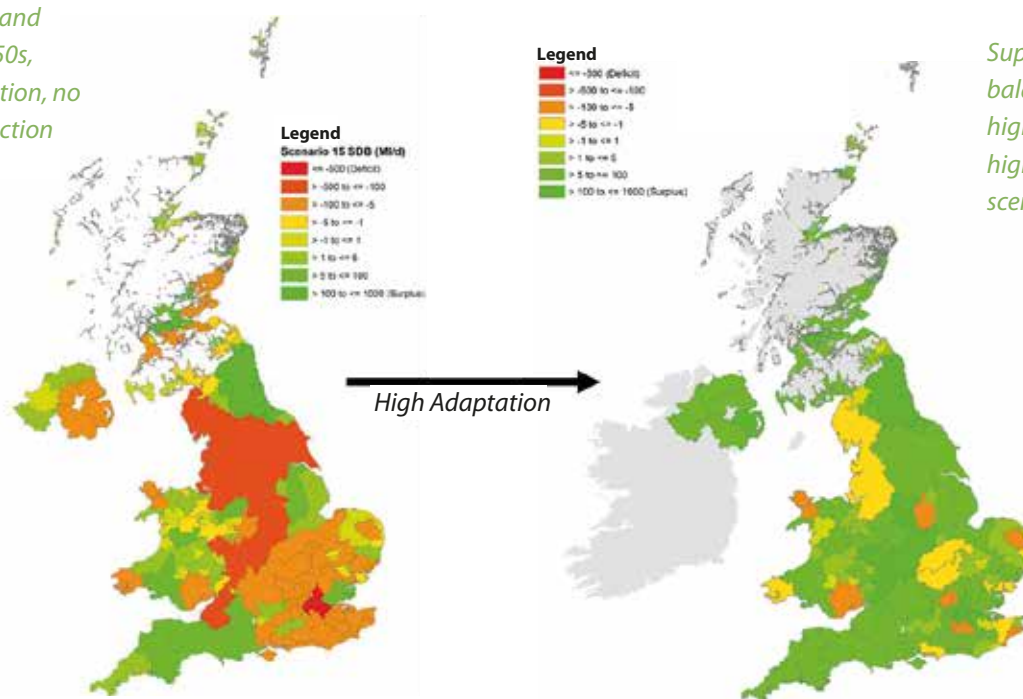
The CPCA should actively broker, and where appropriate, invest in, the creation of demonstration projects for the decarbonisation and resilience of the built environment, both in residential and commercial buildings. These demonstrators will require working with businesses, developers, estate owners, universities, and the finance sector across the region. This should take a portfolio approach so that, ideally, there is a demonstrator for each distinct category of estate/built environment with significant presence in the region. The balance between the scale, number and type of project, and the funding and expertise available, should be driven by the objective to develop locally relevant know-how, learning, business models, and awareness.

Water

The preceding chapter set out the risks of climate change in relation to water. The supply-demand balance shows water deficits by 2050 if no action is taken (left graphic Figure 2.2). However, the Climate Change Committee considers that, provided appropriate adaptation measures are implemented, most of the increased risk from flooding and water scarcity in the 2050's could be managed in a scenario of 2°C warming (right graphic Figure 2.2).

Figure 2.2: Water supply-demand balance, 2050s, with and without high adaptation measures

Supply-demand balance, 2050s, high population, no additional action scenario



Supply-demand balance, 2050s, high population, high adaptation scenario

Source: Updated projections for water availability for the UK, HR Wallingford

The Commission will look at water issues in more detail in our report later this year.

However, the region is particularly affected by the risks of flooding, overheating in the summer months, potential water deficits, and pressures on river quality and the natural carbon stores in the deep peat of the Fens. It is important that adaptation measures are identified and brought forward as soon as possible. As well as tackling leakage and encouraging more efficient use of water, the water companies are already working towards supply side solutions, as highlighted in their 2019 investment plans.¹² This includes the possibility of transfers of water through new connections and sources of supply such as reservoirs. This would improve the resilience of the system and reduce impacts on sensitive locations (like the chalk streams in the south of the area). The water companies new investment plans will be consulted on in 2022 for approval by the regulator Ofwat in 2024. However, the way in which water investment is regulated means that these measures can take significant time to be developed. The Commission recommends that the Government and Ofwat provide for the investment to allow intercompany trading and water infrastructure improvements by 2025 to enhance water supply, including eliminating Cambridge's dependence on the ground water aquifer. including eliminating Cambridge's dependence on the ground water aquifers. This is likely to require new ways of financing water supply investment, perhaps through green investment bonds or other measures as part of the green economic recovery.

¹² <https://www.anglianwater.co.uk/about-us/our-strategies-and-plans/water-resources-management-plan> and <https://www.cambridge-water.co.uk/about-us/our-strategies-and-plans/our-water-resources-management-plan>

Transport

Recommendations

1. Complete phase-out of the use of cars running on fossil fuels by 2050 within the CPCA area
 - The CPCA, and constituent authorities, should by 2022 develop a plan for the rollout of charging infrastructure, with an initial focus on bringing the lowest district levels of provision up towards those of the best, and providing a 'right to charge' to residents, workers and visitors
 - All new residential and non-residential developments with parking provision (and those undergoing extensive refurbishment) should be equipped with charging points.
2. All buses and taxis operated within the CPCA area, and Council owned and contracted vehicles, should be zero emissions by 2030. Each Council should make its own commitments, reflecting the make-up and age of existing vehicles, but we recommend the following dates:
 - The bus fleet on routes subsidised or franchised by the CPCA should be zero emission by 2025, and the authority should work to facilitate such a shift on all routes by 2030
 - Target 30% of taxis to be zero emission by 2025 and 100% by 2030, achieved through license conditions
 - Council fleet to be 100% zero emission by 2030; procurement rules used immediately promote EV uptake.
3. Reduction in car miles driven by 15% to 2030 relative to baseline
 - Major new developments (>1000 homes) should be connected to neighbouring towns and transport hubs through shared, public transport and/or safe cycling routes
 - 100% of homes and businesses to have access to superfast broadband by 2023
 - CPCA to undertake a trial of electric on-demand buses to increase accessibility and connectivity
 - Development and implementation of the Strategic Bus Review to prioritise affordability and reliability of services
 - CPCA to work with major employers, employment hubs and Liftshare to encourage car-sharing, public transport, walking and cycling for commuting, and Councils to take a lead in respect of their own employees
 - CPCA, with relevant authorities, to explore options to improve cycling infrastructure both within urban areas, and to encourage the use of e-bikes for longer trips to and from market towns and cities
 - Alternatives to road investment to be prioritised for appraisal and investment – from active travel and public transport options, to opportunities for light rail and bus rapid transit or options to enhance rail connections.

4. Diesel vans and trucks to be excluded from urban centres by 2030 and local zero emission options pursued:
 - At least 3 freight consolidation centres to be established outside of major urban areas with onward zero emission deliveries
 - Home deliveries should only be made by zero emission vehicles, including cargo bikes, by 2030
 - UK Power Networks to develop tools and fast-track services to assist companies wishing to convert fleets of vans and trucks to electric to rapidly ascertain grid connection upgrade requirements and costs for charging
 - CPCA to undertake a trial of electrification of short-haul freight from farm to warehouse.

Summary

- The CPCA area transport emissions were 2449ktCO₂e in 2018, 44% of all CO₂ emissions. This covers emissions from surface transport – cars, vans, HGV and rail. It is a significantly higher share than in the UK as a whole (37%).
- Emissions from surface transport in the CPCA area have been rising in recent years and in 2018 were 12% above their level in 2012. This is a greater level of increase than in the UK as a whole, where emissions rose 4% over the same period
- Reaching net-zero across the UK by 2050 requires that transport emissions are reduced close to zero. Options to deliver this have been identified. The Committee on Climate Change's Balanced Pathway¹ gets very close to zero emissions in 2050.
- Many of the levers to achieve this – such as vehicle emissions standards – are at national level. But there is much that the CPCA and local actors can do as well, particularly around development of the charging network for electric vehicles (EVs); improving public transport; active travel measures to reduce demand and switch to cleaner modes (public transport, walking and cycling); improving the ease of working from or near to home; and management of deliveries in urban areas.
- There are range of other benefits from taking these actions – Improved air quality and higher rates of walking and cycling (active travel) will be good for our health; better public transport can help meet transport needs and improve connectedness by linking people up to jobs, opportunities and services.

Transport in the Combined Authority Area

Overall transport emissions

Transport emissions across the Combined Authority were 2449 ktCO₂ in 2018, around 2.9tCO₂ per head of population. This is 50% higher than the average across the UK as a whole (1.9tCO₂ per head) and reflects relatively high level of traffic for each of cars, vans and HGVs:

- Car mileage in 2019 was around one-third higher than would be expected purely on the basis of population.

¹ CCC (2020), The Sixth Carbon Budget, The UK's path to Net Zero.

- Light van mileage in 2019 was 38% higher than expected based on population.
- HGV mileage in 2019 was more than double the level expected purely on population.

A small part of emissions, around 3%, are from rail. Given this small share, the main focus in this chapter will be on road emissions, though there are opportunities for light rail and enhanced rail connections which we consider.

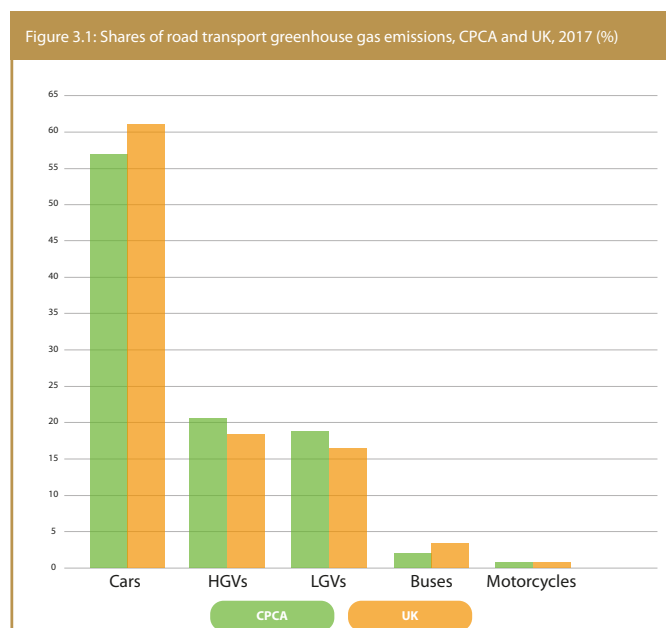
With economic growth and population growth, traffic is expected to rise further. Without policy intervention, the number of daily journeys in the region is projected to increase by around 20% from 2015 to 2031. Aside from carbon emissions, this has implications for a number of other concerns, including air quality and congestion:

- The area within the Cambridge ring road was designated an air quality management area in 2004, mainly reflecting high transport emissions. There have been some improvements in air quality since, but parts of the City continue to experience emissions above legal limits. Projected traffic growth, without actions to tackle this, will increase the need for actions to address poor air quality;
- Congestion is already a concern on specific routes.² Average speed on major roads entering Cambridge during the rush hour is less than 60% of the “free flow” speed. Car journey times in the afternoon peak could increase by up to 18% by 2041, particularly in Cambridge, East Cambridgeshire and South Cambridgeshire. Congestion will increase on the A47 between Peterborough and Wisbech, and in other urban areas, particularly Ely, Wisbech and Huntingdon.

Actions to reduce emissions are likely, therefore, to have considerably wider benefits. But this also emphasises the importance of understanding why emissions are high in the first place.

Why are transport emissions high in CPCA?

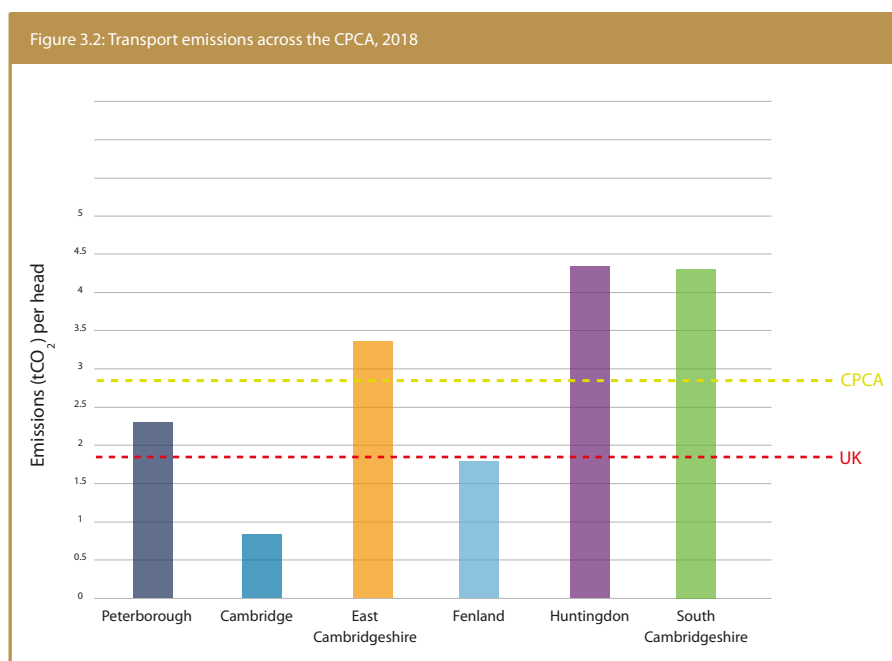
In line with the high level of HGV mileage, the share of road transport emissions from HGVs is a little higher in the CPCA area than the UK as a whole (Figures 3.1). In general, however, the shares by vehicle type are not very different, confirming that high emissions are a reflection of factors across both private car use and movement of freight.



Sources: CUSPE (2019), *Net Zero Cambridgeshire*; Final UK greenhouse gas emissions national statistics, 2017.

² The Cambridgeshire and Peterborough Local Transport Plan, Figures 1.3 and 1.4.

Relatively high emissions in Huntingdonshire and South Cambridgeshire (Figure 3.2) may be partially a reflection of traffic on major A-roads that pass through these districts and the region (some HGV emissions, in particular, will reflect strategic connectivity of the A14, A1(M) and M11, including freight to the ports of Harwich, Ipswich and Felixstowe on the East Coast). Through traffic cannot, however, fully explain the high transport emissions in these districts nor in CPCA as a whole:



- With the exception of Cambridge – which has particularly low emissions – CPCA districts rank badly for car emissions when compared with districts of similar characteristics (Box 3.1);
- Emissions on minor roads are relatively high in all CPCA districts, again with the exception of Cambridge (Table 3.1).

Table 3.1: Local authority rank for road transport emissions per head, UK, 2018 (383 authorities, 1=lowest; 383=highest)

	All road transport	A-roads and minor roads	Minor roads only
Peterborough	246	316	325
Cambridge	26	26	41
East Cambridgeshire	325	368	316
Fenland	174	257	324
Huntingdonshire	363	372	342
South Cambridgeshire	361	375	262

Box 3.1: Car emissions by LA district in England

Analysis by Walker (2020) uses 2011 MOT data to compare car emissions across LAs in England. Districts are classified by ONS indicators of prosperity/deprivation and rurality/urbanity, so that comparisons are made across groups of broadly similar characteristics. On this basis, South Cambridgeshire, East Cambridgeshire and Huntingdonshire are all found to have relatively high emissions within their group.

	Grouping	Ranking for car emissions per head
South Cambridgeshire	Affluent England	9th highest (of 51)
East Cambridgeshire	Town & Country Living	5th highest (of 64)
Huntingdonshire	Town & Country Living	12th highest (of 64)
Fenland	Town & Country Living	Mid-ranking, but noted to have high emissions relative to deprivation level
Cambridge	Business, Education and Heritage Centres	5th lowest (of 29)
Peterborough	Urban Settlements	Mid-ranking (of 54)

Source: Walker, R (2020), *Transport carbon emissions variation by LA districts in England: Analysis of MOT date, Decarbon8 working paper 2.1.*

Other factors, whether linked to need or affluence, must play a big part in the observed high level of emissions:

- Car ownership is high. The number of licensed cars was 620 per 1000 population across the CPCA at the end of 2019, compared with an average 495 for the UK as a whole;
- Emissions in Cambridge and Peterborough are relatively low. These urban areas benefit from better transport networks, with alternatives to the car. They also have more compact geography, with denser provision of services.
- There is variation across districts, but a substantial part of the population is rural, with 43% living in market towns and 20% in rural settlements and villages, where car dependency is
 - Relative to population, the number of licensed cars is low in Cambridge, but above the national average in the other 5 districts within the CPCA;
 - The data are somewhat old now (Census 2011) but the proportion of households with a car is low in the urban areas of Cambridge (66%) and Peterborough (75%), but higher than 80% across the rest of the CPCA;
 - 58% of the population of Cambridge and Peterborough are within 30 minutes of a major employment centre by public transport, but many in rural areas have longer journey times which makes access to jobs and services more difficult without a car;³

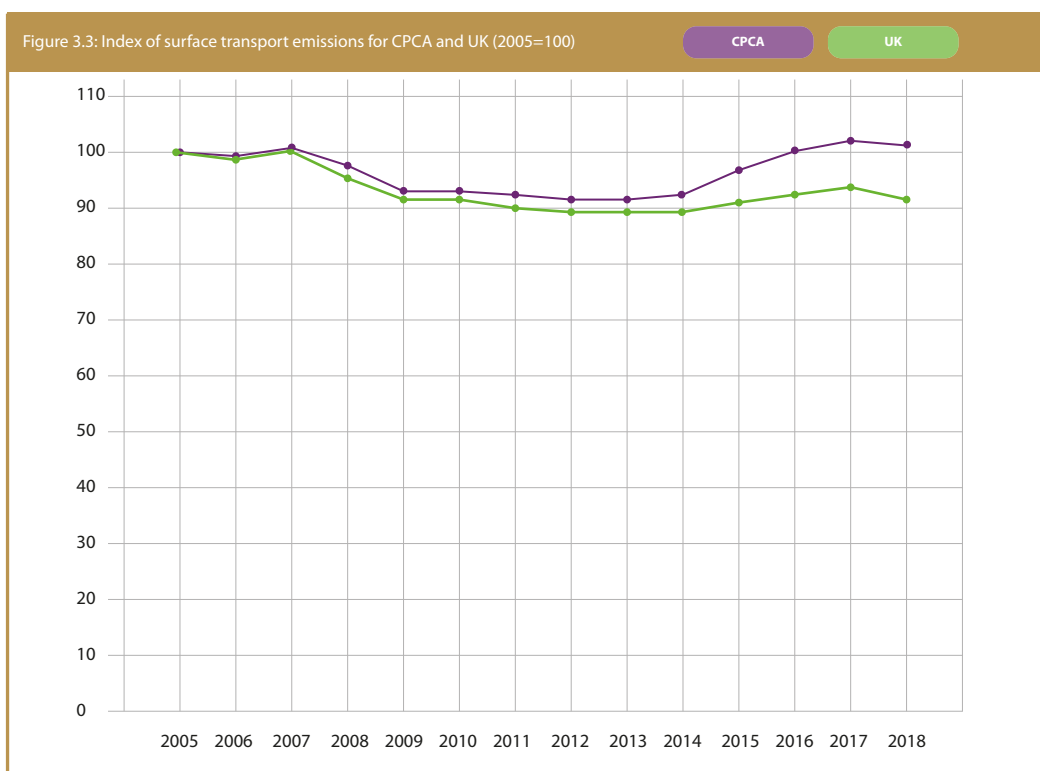
³ See, for example, Local Transport Plan, Figure 1.6, which illustrates accessibility across CPCA.

- Around 80% of employed residents of East Cambridgeshire and Fenland travel to work by car, van or motorcycle, possibly with relatively long journeys; as against below 40% in Cambridge.⁴

Recent trends

Emissions from surface transport in the CPCA area have been rising in recent years and in 2018 were 12% above their level in 2012. This is a greater level of increase than in the UK as a whole, where emissions rose 4% over the same period (Figure 3.3). Increases in vehicle-miles driven have outweighed the improved efficiency of vehicles, with uptake of ultra-low emission vehicles still low:

- Demand has increased steadily over the period. Since 2012 vehicle-miles driven have increased in CPCA area by 15% for cars, 34% for LGVs and 20% for HGVs (as compared with GB increases of 13%, 32% and 11% respectively).
- The efficiency and carbon-intensity of new cars and vans has improved under EU Directives. But petrol and diesel have remained the predominant source of fuel.
 - Across Cambridgeshire the number of Ultra-low emission vehicles (ULEVs)⁵ at the end of Q2 2020 is a similar proportion of the car stock as for the UK as a whole (just less than 1%);
 - This proportion is relatively high in Cambridge (1.3%) and South Cambridgeshire (1.2%), but low in Fenland (0.3%);
 - A high number of ULEVs are registered in Peterborough (7.4% of the car stock), but this number is dominated by vehicles owned by companies with a registered address in Peterborough – this does not necessarily reflect that the vehicle is used there.



⁴ Travel to Work dataset, 2011 Census.

⁵ ULEVs are vehicles emitting less than 75gCO₂/km.

The Cambridgeshire and Peterborough Local Transport Plan (LTP)⁶ records that public transport is good in urban areas, but acknowledges that wider links within and across the Combined Authority area can be poor (note that data are for periods before the COVID-19 pandemic):

- In common with trends across England as a whole, bus use has fallen significantly in recent years – relative to population, passenger journeys fell by 21% from 2009-10 to 2019-20 in Cambridgeshire and 28% in Peterborough (down 18% across England).
- A broadly similar proportion of bus mileage is on routes supported by the local authority as across England – 10% in Cambridgeshire and 12% in Peterborough, in 2019-20, as compared with 12% in England (outside London). Given the high rural population in CPCA a higher proportion of supported routes might have been expected.

The LTP vision is to “*deliver a world-class transport network for Cambridgeshire and Peterborough that supports sustainable growth and opportunity for all*”. In respect of the environment, it includes the goal to “*protect and enhance our environment and implement measures to achieve net zero carbon*”. There are supplementary documents in relation to delivery and policies which outline projects and measures on which progress will be important to review.

Whilst there are specific good examples, progress on emission reduction measures to date is limited and requires further development in order to become a coherent strategy across the area.

- Provision of an adequate charging infrastructure for electric vehicles (EVs) is key to providing confidence to incentivise their purchase. Across the CPCA as a whole, 172 standard public charging devices have been installed at October 2020, and 43 rapid charging devices. Relative to population, however, this is below the national average (Figures 3.4a and 3.4b). There is also big variation within CPCA. Provision in South Cambridgeshire is above national average; provision in Fenland is the lowest in the country. Funds have been available from the on-street residential charge-point scheme since 2018-19, but none of the districts within CPCA have received funding from this source up to 2020-21.
- Plans in Greater Cambridge are relatively ambitious (Box 3.2). A feasibility study for a Clean Air Zone has also been conducted, funded by the Greater Cambridge Partnership with the participation of Cambridgeshire County Council. Feedback was sought in 2019, but plans currently appear stalled, though the COVID-19 pandemic will undoubtedly have made consideration more difficult in 2020.
- The Local Transport Plan commits to the provision of Local Cycling and Walking Infrastructure Plans (LCWIPs) to provide evidence for infrastructure investment.
 - The level of cycling in Cambridge is very high. More than a quarter of journeys to work are undertaken by bike – the highest share in the country.
 - Peterborough has a good network of cycling lanes, and has plans for an expanded network. The City Council was successful in 2019 in securing technical support from the Department for Transport to produce a LCWIP, and this will be released for public consultation shortly. The City Council has also been taking schemes forward with local schools to encourage cycling and active travel (Box 3.3).

⁶ CPCA (2020), The Cambridgeshire & Peterborough Local Transport Plan.

- East Cambridgeshire has been developing a Strategic Cycle/Footpath Network, identifying gaps in the current network, and seeking funding opportunities for improvements.
- An e-scooter trial began in Cambridge in October 2020, with 50 e-scooters connecting the city centre, key transport hubs (train and bus stations) and shopping centres (Box 3.4).

Box 3.2: Cambridge transport decarbonisation

Measures implemented by Cambridge City Council (some in conjunction with South Cambridgeshire) include:

- *Provision of rapid charging points for taxis – including 8 installed in 2019-20*
- *Provision of charging points in car parks and at park and rides sites, with more planned*
- *Use of licensing requirements to shift towards electric taxis – the number of electric taxis has increased from 2 in 2017-18 to 35 now*
- *Use of planning policy to require installation of electric charging points in new developments with parking provision*
- *Pilot provision of an electric bus.*

Other plans include commitment to procure ULEVs when replacing Council vehicles; work with Cambridgeshire County Council to secure funding for 30 e-cargo bikes, and to secure OLEV funding for on-street residential charge points.

The Greater Cambridge Partnership (GCP) – the delivery body for the City Deal – has been looking at the potential for bus priority schemes and development of the evidence base to inform consideration of measures aimed at reducing freight deliveries from high-carbon vehicles.

A feasibility study for a Clean Air Zone was funded by the GCP, with the participation of Cambridgeshire County Council.

Sources: <http://www.cambridge.gov.uk>; Cambridge City Council (October 2020), Priorities for a new Climate Change Strategy 2021-26 and annual Climate Change Strategy Update Report.



Box 3.3: Working with schools in Peterborough

Peterborough City Council has been working with schools to provide a safer environment encouraging active travel and practical cycling skills:

- **School Streets:** Roads around schools are frequently dominated by cars at drop-off and pick-up times, contributing to congestion and pollution, and making the school journey feel unsafe. By providing a vehicle free space around school gates, School Streets create a safer space enabling more parents and children to switch to sustainable and active travel. Schemes have been implemented outside 10 schools and nurseries, with a significant increase in walking, scooting and cycling to and from school as a result. The City Council is looking to implement several new schemes in coming months.
- **Bike It:** The City Council and Sustrans have been delivering “Bike It” in schools since 2012. The project offers a range of activities, from curriculum-based lessons through to practical skills lessons that include balance bike training with early year’s children and school staff, learning to ride, cycle skills, scooter skills, bike mechanics and road safety assemblies. On average, the percentage of pupils reporting that they regularly cycle to school increases by over 8% after one year of engagement with Bike It. The 2019 Sustrans “Big Pedal” competition recorded over 81,000 active journeys from schools in Peterborough. St Thomas More finished 9th out of nearly 800 large primary schools with over 94% of pupils taking part. A further 7 Peterborough schools finished in the top 100.



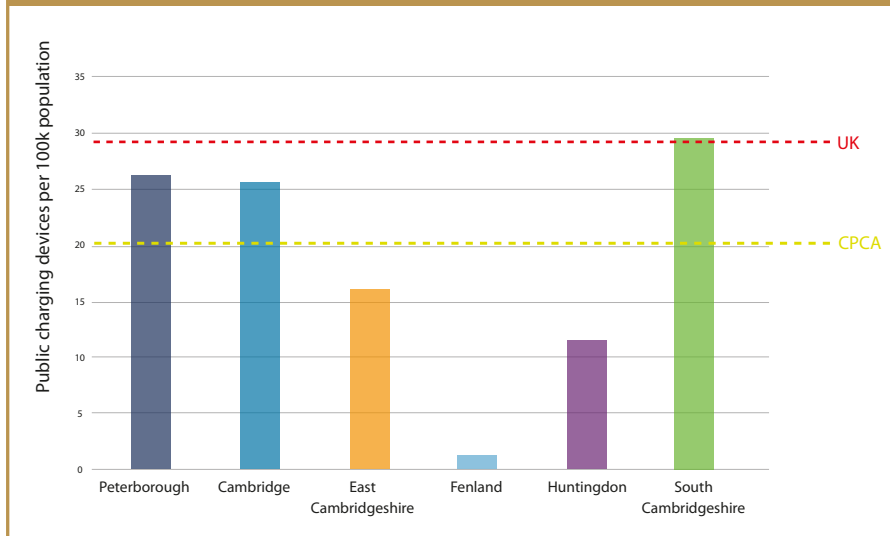
Box 3.4: E-scooter trial, Cambridge

An e-scooter trial began in Cambridge in October 2020, initially with 50 e-scooters, rising to 150, connecting the city centre, key transport hubs (train and bus stations) and shopping centres. More than 10,000 journeys were taken in the first month, with just over 6,000 users. Safety issues are being monitored, and research undertaken to understand the extent to which usage is replacing car use. It is planned to broaden the trial to introduce E-bikes, and E-bike use is also being considered for Peterborough.

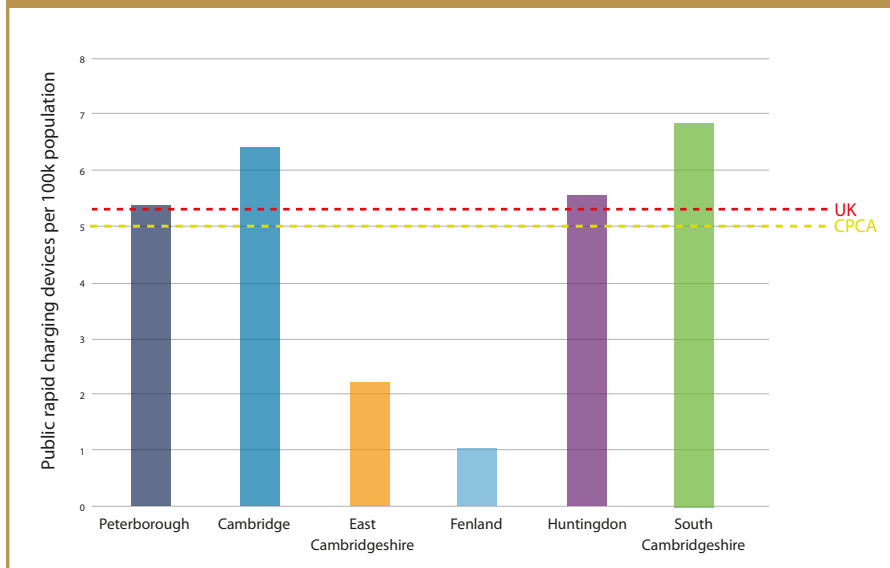
Traffic in 2020, with the COVID-19 pandemic, experienced similar impacts as in the UK more widely. Overall traffic levels fell by 50% or more in the first lock-down, but recovered by September towards or even above pre-lockdown levels. Park and ride usage has remained much reduced. Bus usage fell dramatically and remains considerably below pre-lockdown levels.

COVID-19 experience will undoubtedly have implications to be considered for future policy. But the clear message from climate policy measures to date is that they have been insufficient to reverse the increase in emissions, let alone begin to achieve the reductions that are required.

Figures 3.4a: EV infrastructure, Charging devices, October 2020



Figures 3.4b: EV infrastructure, Charging devices, October 2020



What has the Climate Change Committee recommended?

The national Climate Change Committee (CCC) has developed scenarios for sectoral emissions in 2050 consistent with achievement of net-zero emissions overall.⁷ More recently it has made recommendations for the pathway to net-zero.⁸ To be on track to net-zero emissions from surface transport its key recommendations include:

- Sales of new petrol and diesel cars, vans and motorbikes to end by 2030. Given the rate of stock turnover this would mean close to a petrol/diesel free fleet by 2050.
- The setting of regulations requiring a progressive increase in sales of zero emissions vehicles by vehicle manufacturers until the target of 100% sales of zero emission vehicles is reached in 2030.

⁷ CCC (2019), Net Zero - The UK's contribution to stopping global warming.

⁸ CCC (2020), The Sixth Carbon Budget – The UK's path to Net Zero.

- The development of charging infrastructure to allow the growth of EVs, consistent with the phase-out of petrol and diesel cars and vans. This should include infrastructure for those without individual off-street parking.
- Investment in walking and cycling infrastructure and strengthening of other schemes to support active travel modes.
- Investment in public transport and other measures to reduce car travel demand. These other measures could include incentives for car sharing and mobility as a service, and improved infrastructure connectivity to lock-in positive behaviours that reduce travel demand:
 - These demand reduction and public transport measures reduce car km driven, against baseline, by 7-16% by 2030;
 - The CCC notes that the Confederation of Passenger Transport has set a target for all new buses to be ultra-low or zero-emission by 2025; it assumes that all sales of new buses are zero-Carbon by 2035.
- In relation to freight the CCC proposes:
 - The development and implementation of a strategy to transition to zero-carbon freight, including stronger purchase incentives, infrastructure plans and clean air zones.
 - Schemes should be implemented and evaluated to reduce HGV and van use in urban areas (e.g. e-cargo bikes and use of urban consolidation centres), to reduce traffic and improve safety of active travel.
 - Zero-emission HGVs should be trialled to establish the most suitable and cost-effective technology for UK. Evaluate existing and increase support for HGV logistics improvement schemes. Incentives to buy more efficient and zero-carbon HGVs should be increased.

Government policy

The UK Government recognises that policies are not currently in place to deliver net-zero emissions, but has set out substantial ambition for transport within its recent 10-Point Plan:⁹

- Electric vehicles: an end to the sale of new petrol and diesel cars and vans by 2030, with all vehicles required to have significant zero-emission capability by 2030, and 100% zero-emissions from 2035.
 - Funding of £1.3bn to accelerate the roll-out of charging infrastructure – rapid charge points on motorways and major roads, and on-street charge points near homes and workplaces.
 - Continued funding to 2022-23 of purchase incentives through the Plug-in Car and Van grant.

⁹ HMG (2020), The Ten Point Plan for a Green Industrial Revolution, November 2020.

- A consultation on the phase out date for sales of new diesel HGVs, with £300m funding next year for trials of hydrogen and other zero-emission lorries.
- Increased funding for public transport and the provision of active travel infrastructure.
 - Integrated bus and train networks in more places, with smart ticketing, more frequent services and provision of bus lanes;
 - Funding for zero emission buses (£120m in 2021-22, sufficient to switch 12% of the local operator bus fleet in England);
 - More rural on-demand services and restoration of some rail links;
 - More segregated cycle lanes and low-traffic neighbourhoods, with a new body Active Travel England, to hold the budget and assess local authority performance.
 - Over 1,000 miles of cycling and walking networks to be delivered by 2025, with network plans developed and built out in every town and city in England.

Further elaboration of these commitments and development of policy will be required to deliver net zero ambition. Both a National Bus Strategy and a Transport Decarbonisation Plan are due to be published in 2021.

Evidence base for the emissions reduction requirement to 2050 and assessment of options

In assessing the scale of the challenge for CPCA in moving towards net-zero, and the available options, we have considered evidence from a range of sources. This section summarises some of the key sources.

CCC Net Zero Technical Report / CCC CB6 recommendation

The CCC's Net Zero Report and Net Zero Technical Report¹⁰, published in May 2019, provide an assessment of options to take the UK to net zero emissions by 2050. The Sixth Carbon Budget Report and Methodology Report¹¹ update this analysis, with a focus on the pathway for emissions through the 2020s and to the sixth carbon budget period (2033-37). This includes a pathway for emissions from surface transport – covering vehicle efficiency, zero-emission vehicles, demand reduction and modal shift.

Net Zero Cambridgeshire (CUSPE) report

The Net Zero Cambridgeshire (CUSPE) report¹² considers the make-up of emissions in the CPCA region and provides projections to 2050 for a number of possible scenarios. Reflecting an increasing population and employment growth, road traffic is projected – without policy interventions - to increase 30% by 2031. Nevertheless, allowing for the gradual electrification of the car and LGV fleets (in line with national measures), a baseline projection shows emissions falling by 43% between 2017 and 2050.

Applying assumptions consistent with the CCC's Further Ambition scenario, which informed the CCC's net-zero recommendation to the UK Government, CUSPE's assessment finds CPCA area transport emissions are reduced by 96% to 2050. Important to this reduction are provision of an

¹⁰ CCC (2019), Net Zero – Technical Report.

¹¹ CCC (2020), The Sixth Carbon Budget – Methodology Report.

¹² CUSPE (2019), Net Zero Cambridgeshire.

EV charging infrastructure, local incentives for EV purchase, and measures to reduce demand for car travel.

Local Transport Plan

The Cambridgeshire and Peterborough Local Transport Plan (LTP) reflects the role of the Combined Authority as Local Transport Authority and sets the policy framework for the development, design and implementation of transport interventions across the area. It provides a vision to “develop a world-class transport network for Cambridgeshire and Peterborough that supports sustainable growth and opportunity for all”.

Beneath this vision the plan includes goals for the economy, for society, and the environment – specifically, in the latter case, to “protect and enhance our environment and implement measures to achieve net zero carbon”.

The LTP draws on a wide evidence base and consultation with the public and wider stakeholders. It contains a mix of proposals for public transport, active travel and road improvements. In practice, however, it over-emphasises road building as a transport solution to increasing population and work commuting, with insufficient emphasis on measures to reduce demand. A considerable number of schemes are suggested, each to be subject to an individual business case if and when taken forward. The LTP does not quantify¹³ the overall impacts on traffic and emissions, and so does not include a pathway of how the net zero aspiration is to be met. An overarching transport model would enable this assessment to be undertaken – CPCA should consider investment and development of scenario planning in a refresh of the LTP and in assessing the results from scheme implementation.

Place Based Climate Action Network

We commissioned work on a net zero carbon roadmap for the region from the Place Based Climate Action Network (PCAN)¹⁴ (Chapter 2). This found that many emission reduction measures within the surface transport sector are cost-effective – they would more than pay for themselves through the energy cost reductions they would generate. Overall, these cost-effective measures could close the gap between projected transport emissions in 2050 and net zero by around 77%. This is a bigger reduction than in other sectors of the economy (housing, public and commercial buildings, industry).

Other measures are identified that could close a further 15% of the gap.

Amongst the cost-effective options are measures to achieve mode shift (from use of the car to public transport, walking and cycling), and the shift to electric vehicles.

COVID-19 impacts

Under a Restart monitoring programme, the CPCA has been monitoring traffic levels in response to the COVID-19 pandemic. Bus usage has been in decline for some years, but probably the most striking aspect of transport experience under the pandemic has been the decline in public transport use. In common with policy nationally, measures to restore public confidence in public transport are likely to be a priority area of focus as – with vaccines – we come out of the pandemic.

13: Risk appraisal of emissions impact can be found in the LTP Strategic Environmental Assessment - Environmental Report, May 2019

14 PCAN (2021), A Net-Zero Carbon Roadmap for Cambridgeshire and Peterborough, Sudmant, A., Duncan A., Gouldson, A., ESRC Place Based Climate Action Network, University of Leeds.

Public engagement

It is essential that emissions reductions are delivered in ways that work for people.

Evidence from public engagement activities suggests that, presented with evidence about the impacts of climate change and options to reduce emissions, people are very willing to engage and to consider, and support, a range of actions (Box 3.5). In relation to transport there is strong support for the switch to electric vehicles, for improved public transport and measures to support active travel. Our own survey results are consistent with this.

There were some differences between those who responded direct to our survey, and those recruited (“targeted”) through a survey company:

- Both groups tended to be positive about use of residential parking zones and zones used to limit vehicle access. But the targeted respondents were much less positive about tolls or other motoring charges;
- High numbers expected their next car to be an electric or low-carbon vehicle. But this was lower amongst the target respondents (41%) than the direct respondents (60%);
- Both groups were strongly in favour of measures to consolidate deliveries.

The differences are likely to reflect that those who responded directly to our survey are weighted towards those who are most committed to act. In general, however, responses to our survey provided strong support for action and indicate a willingness to consider a wide range of options, though there may still be more work to do to convince more people of the benefits of EVs and the need to switch (many respondents highlighted cost as an issue, so this may change as the EV market expands and costs become more competitive).



Box 3.5: Evidence from public engagement

The Climate Assembly UK was commissioned in 2020 to examine the question, “How should the UK meet its target of net zero greenhouse gas emissions by 2050?”. The Assembly did not consider freight, but key aspects of their advice in relation to surface transport included:

- *An emphasis on a shift to EVs and to improved public transport, rather than restrictions on travel and lifestyles (with large reductions in car use).*
- *Specific recommendations to ban the sale of new petrol, diesel and hybrid cars by 2030-35, and to reduce car use by an average 2-5% per decade.*
- *Broad desires to ensure solutions are accessible and affordable to all sections of society, and to help create significant change at the level of the individual, through education and appropriate incentives.*

A Greater Cambridge Citizen’s Assembly was convened in 2019, to develop recommendations on how to reduce congestion, improve air quality and provide better public transport. The Assembly was made up of 53 randomly selected residents from Greater Cambridge and the wider travel to work area.

Outcomes commanding the highest support from assembly members were to:

- *Provide affordable public transport*
- *Provide fast and reliable public transport*
- *Be environmental and zero carbon*
- *Restrict the city centre to only clean and electric vehicles*
- *Be people centred – prioritise pedestrians and cyclists*
- *Manage as one consolidated system*
- *Enable interconnection.*

Specific supporting measures attracting support included: franchising of buses; use of electric bikes; a lollipop bus service with low emission EVs; explore the viability of long-distance buses using the Park and Ride; establishment of a heavy-duty depot outside Cambridge, with last-mile delivery through electric van/pedal power.

Individual measures attracted a range of views, but there was in general a high level of support for action and ambition. Key messages developed by the assembly included recommendations for decision-makers to “be brave, be bold and take action” and that “improvements in public transport need to come first”.

The CPICC Survey included a number of transport-related questions. A high proportion of respondents (88% of direct respondents; 85% of targeted respondents) viewed transport as an important area for the Commission to focus on. Measures attracting most support were improved quality of public transport (43% of direct respondents; 51% of targeted respondents) and encouragement of active travel (34% of direct respondents; 28% of targeted respondents).

Specific measures attracted varying levels of support. The balance of respondents supporting or tending to support consideration of measures was as follows:

Measure	Balance supporting (+ve) or against (-ve) consideration	Balance supporting (+ve) or against (-ve) consideration
	Direct respondents	Targeted respondents
Road tolls	- 4%	- 36%
Charging to travel within a zone	+ 22%	- 8%
Limiting vehicle access to a zone	+ 53%	+32%
Increased parking costs	- 14%	-56%
Residential parking zones	+ 19%	+27%
Requiring deliveries to be gathered (thereby reducing van and lorry trips)	+ 67%	+54%

The targeted respondents were considerably less favourably inclined to measures including an element of financial charge than the direct respondents. They were more positive about residential parking zones. Both groups were very positive about measures requiring consolidation of deliveries.

Opinions were more favourable to options involving road user charging if the money raised would be invested back to improve public transport or cycling and walking infrastructure.

A high number of direct respondents (60%) were planning to switch to an EV or low-carbon vehicle on their next purchase (and 9% already owned an EV). Support was lower amongst the targeted respondents – 41% thought their next vehicle would be low-carbon and 4% already own an EV, leaving 55% not likely to switch at present. The biggest barrier to switching, for both groups, was cost. But almost one third of each group also felt that there was a lack of access to charging where they lived and park.

Sources: Climate Assembly UK – The Path to Net Zero (September 2020); Greater Cambridge Citizen's Assembly on Congestion, Air Quality and Public Transport, Report and Recommendations (November 2019), Greater Cambridge Partnership, Involve Foundation, Sortition Partnership; CPIC.

Key areas for action

Many of the actions required to deliver net zero transport are for national Government. But this still leaves the CPCA and local authorities with substantial powers and influence in many areas.

Electric vehicles

There is evidence that the provision of charging infrastructure has an impact in inducing EV demand.¹⁵ Clearly, to support the switch to electric vehicles envisaged by national policy, a substantial infrastructure will be required. The CUSPE report suggests the need, consistent with net zero, for 60 rapid chargers near main roads and 3500 public chargers in towns and cities in the region, a 20-fold increase on today.

¹⁵ Morton, C, Anable, J, Yeboah, G and Cottrill, C (2018), The Spatial Pattern of Demand in the Early Market for EVs: Evidence from the UK, Journal of Transport Geography.

Currently, the level of provision of electric vehicle charging points varies significantly within the CPCA area and overall is below national average. The CPCA has plans to develop an Electric Vehicle Strategy. Developing the public charging network should be core to this strategy – much of this will be on-street, but also at sites such as car parks and park and ride. The early ambition for this strategy should be to bring the areas in the CPCA region with below average provision, such as Fenland and Huntingdonshire, up to the levels of the best. We have written to the CPCA and constituent authorities to emphasise the importance of this charging network and seek commitments to extend provision.

Cambridge is currently trialling the provision of an electric bus. Switching to electric buses should be expected to become the norm. The Government has announced funding to accelerate the switch (£120m in 2021-22 to fund at least 4,000 zero emission buses nationally, around 12% of the local operator fleet in England). The authorities in CPCA should aim to be in the vanguard, and – in conjunction with the electricity network provider and Ofgem - develop plans and a timeline for this transition. We have, for example, seen proposals for Cambridge beginning with electrification of the buses from the park and ride sites (Box 3.6) – use of opportunity charging at the start and end of the route reducing the peak demand on the grid. It is not for us to specify details of how the transition is best achieved, but the end-point of a fully decarbonised bus fleet should now be the accepted goal.

The planning system can also prioritise provision of charging points. The Government has consulted on potential requirements for new-build, but not yet announced conclusions. In the meantime, planning authorities in the CPCA should not hold back - Cambridge City Council has introduced requirements for new residential and non-residential developments that should, at minimum, be replicated more widely. It will be lower cost to progress such measures now than have to retrofit later.

Box 3.6: An example scheme for park and ride bus electrification in Cambridge

A case study for bus and road freight electrification in Cambridge has been proposed by Nicolaides et al (2018).

Previous assessments of bus and freight electrification have assumed overnight charging at depots. This requires large, expensive on-board batteries, which run-down their charge over the course of the day. There are also implications for the electricity supply network, which may need upgrading to meet considerable charging demand.

Nicolaides et al provide cost estimates for an alternative “opportunity charging” option, starting with provision of charging infrastructure at either end of a Park and Ride bus route. With the bus topping up its battery at these points, a much smaller battery is required and peak demand on electricity supply much reduced. Overall costs are estimated much lower.

It is suggested that the principle of opportunity charging could be extended to freight deliveries, and to refuse vehicles, with top-up charging at key locations on routes (e.g. at depots, bus stops, or when unloading at major stores).

Source: Nicolaides, D, Cebon, D, Miles, J, An urban charging infrastructure for electric and freight operations: A case study for Cambridge, UK, IEEE System Journal, August 2018.

In relation to purchase incentives for EVs, the Government has committed to continuation of the Plug-in Car and Van grants for at least another couple of years. Whilst the up-front cost of an EV is likely to remain above that of the conventional alternative for some time,¹⁶ we can soon expect to see the lifetime costs of EVs approach parity with that of conventional fossil-fuelled vehicles. Local measures to help incentivise EV purchase and use could supplement national measures:

- Cambridge has been developing understanding of the case for a Clean Air Zone, primarily aimed at meeting targets for Air Quality and reductions in traffic. As it returns to consider such plans, design measures which would incentivise the use of electric vehicles should be examined – such as higher levels of access. There is supporting evidence from experience with the London congestion charge that exemption for EVs increased levels of adoption;
- The CPCA and local business organisations should promote the use of the salary sacrifice scheme for EV purchase (Box 3.7). Cambridge Ahead is known to have brought the scheme to the attention of its members. The tax relief provided through this scheme makes a significant difference to purchase costs (a 32% saving for a basic rate taxpayer).

Box 3.7: EV Salary Sacrifice Scheme

The salary sacrifice scheme allows the cost of a qualifying EV to be met from salary before tax, thereby providing a considerable saving to the employee (32% for a basic rate taxpayer and 42% for a higher rate taxpayer).

The employer has to be willing to set up the scheme – in effect, the employer leases the car from a supplier, and the employee leases it from the employer. The monthly payment made by the employee covers road tax, insurance, breakdown cover and servicing costs as well as the lease.

Prior to April 2020 the EV would have been taxed as a benefit on kind, removing much of the financial gain. Under the current scheme, from April 2020, the benefit in kind tax has been reduced to zero (and will be only 1% in 2021-22 and 2% in 2022-23).

The financial gain is therefore very considerable.

We do not rule out that hydrogen may provide an option for decarbonisation of some vehicles, particularly buses on longer routes and long-haul lorries. But what hydrogen is available is likely to be costly and have limited availability locally, and should therefore be reserved for uses which are otherwise the most difficult to decarbonise. Electrification must currently be regarded as the priority.

Public transport

As well as use of electric cars and buses, it is important to increase the capacity for 'modal shift' – where less people are using their cars and public transport is an affordable, reliable and feasible option for many of our citizens. In order to do this, the public transport available must be green, but also affordable, reliable and meet peoples' needs.

The strengths and weakness of public transport provision in the area are widely recognised. In the major cities of Cambridge and Peterborough, the bus networks are relatively good, and extend to direct links with neighbouring towns. Outside these cities, however, the network is weak with poor access to key services and amenities.

¹⁶ The CCC expects price parity by 2030.

From the perspective of the user, the key to transforming public transport for the better lies in cost competitiveness with use of the car, but also in making the service more convenient – a reliable service; knowing where the vehicle is and when it can be expected; being able to book and pay for a service easily (for most, this is likely to mean with a hand-held device). It will also, post-COVID-19, have to feel safe again.

An improved public transport network has the potential to induce mode shift away from cars, with benefits in reduced greenhouse gas emissions. If the public transport provision shifts further away from fossil fuelled vehicles towards low-carbon vehicles, this benefit can be further increased. The case for public transport investment, however, rests on wider arguments than mode shift: accessibility/opportunities; air quality improvement; congestion reduction; and economic growth. It is particularly important that public transport plans ensure affordability, and that more deprived communities are thereby able to access services and opportunities.

The Strategic Bus Review will need to take a holistic view of these benefits. Part of this consideration, however, should be to look at the opportunities for an expansion of on-demand provision. Many rural routes are currently subsidised. There is potential to shift this subsidy towards provision of on-demand services, with benefits in terms of convenience and service quality to users, and emissions savings from the use of electric vehicles. Provided average vehicle occupancy can be maintained at reasonable levels there is potential for savings in subsidy payments once services become established.

One option that could be actively considered is an on-demand service connecting isolated locations with traditional bus services operating along the main roads connecting major towns. This could be complemented by secure bicycle parking at bus stops on linking routes, to enable people to use bikes or e-bikes to connect with bus services. Making buses more accessible will make bus services more attractive and could also induce some mode shift away from cars (and cost savings for the user).

The CPCA is currently exploring the possibility of a pilot on-demand service in Huntingdonshire, to run on top of existing services. This seems an appropriate next step.

Other options for autonomous public transport systems are being developed. The most significant of these currently is the proposed Cambridgeshire Autonomous Metro (CAM),¹⁷ connecting St Neots, Alconbury, Mildenhall and Haverhill with Cambridge, and including tunnels beneath Cambridge city centre. This aims to deliver high quality public transport with electric vehicles, and active travel links to feed the wider area into the service. It would also connect through the major new developments already allocated in Local Plans, supporting economic growth and the delivery of future new jobs, with connections to new homes and to key railway stations.

In the long-term, it has been suggested that the CAM network could be expanded beyond the current proposal. The wider use of autonomous mass transit systems has been explored in a paper for the Greater Cambridge Partnership.¹⁸ This suggests that such systems have potential to be significantly lower cost than rail, and that the Cambridge guided busway (north and south sections) could be the starting point for further demonstrations and development.

¹⁷ <https://cam-metro.co.uk/>

¹⁸ CAPIER (2018), Cambridgeshire & Peterborough Independent Economic Review, Final Report.

Schemes like the CAM could play a role in improving connectivity and encouraging the shift away from car use, providing they are part of a holistic approach to encouraging the use of public transport and active travel through the location of essential services and the location and layout of new development. A substantial part of the case for such schemes is around the contribution to the economy of the region. If they go forward then construction should aim to minimise impacts on emissions, and the operations must be designed to be zero carbon.

Active travel and reducing the demand for travel

The area is a growth location. The LTP sets out infrastructure improvements that are underway, focused on road, rail and other public transport projects. It has a heavy reliance on additional road building to meet projected future demand and it is important that there is a change of emphasis to reducing the demand for travel - to minimise the need for further infrastructure.

The Cambridge and Peterborough Independent Economic Review (CPIER) identified a package of infrastructure projects, including for transport, as the single most important priority to alleviate what it called “the growing pains of the Greater Cambridge area”. There is a welcome commitment in the LTP that all new public transport and highway infrastructure should be designed to include parallel walking and cycling corridors. However, in assessing needs to cope with a growing population, it is important to recognise that physical infrastructure (roads) may not always be the answer. It is proven that road-building programmes, in the long-run, attract more traffic, adding to the congestion and other costs they were designed to alleviate. All proposed road projects should consider if the objectives, particularly where proposed to meet rising demands, could be met in other ways – through measures to reduce demand, such as broadband, or to meet demand in other ways, such as public transport and active travel. There is a need to reallocate road space to bus and cycle lanes to encourage more use of these modes.

The Government’s 10-Point Plan includes provision for expanded infrastructure related to cycling and walking. It envisages increased provision of segregated cycle lanes and low-traffic neighbourhoods. A new body, Active Travel England, will hold the budget and assess local authority performance.

Our survey responses indicate strong support for active travel measures. There is a need to build on the existing and planned cycling infrastructure in Cambridge and Peterborough, and consider how this can usefully be extended. Linking up other areas, towns and villages has potential for significant community and health benefits, but requires investment to ensure safe routes, segregated from motor vehicles, whilst able to cope safely with electric bikes and potentially electric scooters as well.

We have also seen over the past year, in the response to COVID-19, the high value that people put on nature and green spaces for their well-being, and the benefits that can come from increased home-working:

- Home working is not suitable for all jobs, but increased priority should now be given to measures that will help maintain and encourage this shift, where it is wanted by employees, through improved broadband coverage for example.
- Digital and mobile connectivity, as well as green space and public transport links, should be key priorities in considering the siting and design of new developments.

Freight

It is clear from the traffic and emissions data for CPCA that the area has a strong interest in freight decarbonisation. Indeed, the logistics and distribution industries are important within the local economy:

- wholesale and retail distribution are substantial contributors to output in Fenland and South Cambridgeshire;
- with connections to ports on the east coast and to the A1, Peterborough is close to the location of substantial distribution centres.

The greatest contribution to decarbonisation will be through the decarbonisation of the vehicles themselves, HGVs and LGVs. In relation to this, it is significant that the Government recently announced, as part of its 10-Point Plan, that it would consult on a phase-out date for the sale of new diesel HGVs. This adds to the existing commitment, now brought forward to 2030, to end the sale of new fossil-fuelled vans.

The scale of emissions attached to the movement of freight in the CPCA area gives the area an interest in moving faster. There are also a number of wider benefits to such actions, from improved air quality and health, and reduced congestion. The presence of the logistics and distribution industries may also give CPCA an influence and leverage in encouraging actions by others.

We have therefore been keen to look at potential for measures that could be taken locally.

There is potential for development of consolidation centres, to receive goods brought in by heavy vehicles, and transferring these to electric vehicles – or even cargo bikes - for the final few miles to the purchaser. An important element in their success is likely to be an understanding amongst their users of how their costs and benefits will be shared (for example, the opportunity to combine loads of different carriers for final delivery can lead to better utilised trucks). Experience is limited, but trials reported by the Transport System Catapult¹⁹ have suggested cost-effective reduction in vehicle movements of 50-85%. Cambridge and Peterborough could be useful locations for wider trials.

Use of electric vans for last mile delivery will be dependent on the provision of convenient fast charging facilities in urban areas, allowing vans to charge quickly and conveniently during the day. It will also require charging for vans at night, so affordable grid connections for depots or the provision of kerbside charging for vans located at drivers home overnight will be important. The use of electric HGVs will also necessitate charging at depots and distribution centres. The costs of grid connections for this infrastructure can be prohibitively expensive and solutions need to be developed at a national government level (Chapter 2). It would be helpful for the local Distribution Network Operator (DNO – UK Power Networks) to develop tools to assist charge point operators identify where there is capacity in the local electricity grid to which new charging can be connected (and thereby minimise these costs).

¹⁹ Transport Systems Catapult (2018), Consolidating public sector logistics operations.

The region should explore opportunities in relation to short-haul freight, such as the movement of agricultural products from farm to warehouse or distribution centre. Opportunity charging of the kind proposed for electric buses, with charging at the warehouse, could be a suitable option for electric lorries making trips of up to 100 miles.

What does it mean if we take these actions?

There will be an upfront cost to the switch towards electric vehicles, reflecting the higher initial cost of the vehicles and the development of electric charging infrastructure. This will, however, produce cost savings in future years, as EV purchase costs move towards parity with conventionally fuelled vehicles and lower running costs then dominate the comparison. Longer-term this is a switch that will both reduce emissions and reduce costs.

This is an assessment that is shared by the PCAN analysis that suggests an investment requirement, across the region, of £1.4 billion over the next couple of decades, but indicates that much of this is cost-effective and will pay for itself in energy savings (even before allowing for the emission reduction and other benefits).

To the extent that there is an initial cost, much of this will be met by the private sector, with Government contributions towards the cost of infrastructure. In making the transition, however, it is important that different areas are treated fairly and not left behind. There is an argument, inevitably, for infrastructure development to be concentrated initially in more affluent and denser urban areas, where EV demand may begin higher. Government policy, however, is for the sale of new petrol and diesel car and vans to end by 2030. The required infrastructure needs to be in place across the entire region, and the levelling up agenda also calls for towns and villages in rural areas to be part of this network as soon as possible. An initial focus on bringing areas with lower levels of provision up towards the levels of the best is justified.

Beyond these economic impacts there are a range of synergies with other issues such that actions to reduce our emissions should have substantial co-benefits:

- development of the public transport network, and extension into schemes such as on-demand buses, will help connect people, so our communities are more inclusive, with enhanced links to jobs, training opportunities and services, such as hospitals;
- transport as a service model, such as car sharing, can be lower cost;
- switching away from fossil fuels will produce physical and mental health benefits from improved air quality in our urban areas and from greater active travel;
- there is potential to direct new investment into walking and cycling to more deprived areas, where existing air quality may be worse and health benefits highest;
- measures to expand public transport and to consolidate deliveries will reduce congestion;
- the planning of new developments to link into public transport and incentivise active travel, alongside access to nature and greenspace, will improve health and increase inclusion.



Buildings

Recommendations

Our assessment leads us to make the following recommendations. We recognise that these will have financing and equity implications, which we begin consideration of in Chapter 2, but require further consideration in working up implementation plans.

1. The CPCA and constituent authorities should support local area energy planning that identifies heat zones for buildings (e.g. suitability for heat pumps or district heating) and retrofit priorities.
 - Develop local energy plans, working with stakeholders, to have a key role in preparing for the decarbonisation of heat in buildings: identify which heat and energy efficiency options and national policies are particularly suitable in different areas; consider zoning areas for specific heating solutions; throughout the process, engage and communicate with the local communities to develop a good understanding of issues and foster awareness and willingness to take action
2. All new buildings should be net zero ready by 2023 at the latest and designed for a changing climate.
 - Adopt a net zero ready standard for new homes (requiring “world-leading” energy efficiency and low-carbon heating in new homes) by 2023, and adopt a similar standard for non-domestic buildings;
 - All new residential and non-residential developments with parking provision should be equipped with charging points;
 - All planning applications to require overheating calculations and mitigation measures, and testing against climate projections to 2050;
 - New buildings should meet tighter water efficiency standards of 110l/person/day, and below this when building regulations allow;
 - All new build must have effective ventilation in use and safeguard indoor air quality;
 - All new build to incorporate sustainable urban drainage systems;
 - Where appropriate, new build to incorporate property level resilience measures;
 - The CPCA and constituent authorities should consider developing new build guidance to address embodied emissions (for example, a template for embodied emissions similar to the GLA), with targets strengthening over time.
3. New developments must be considered within a spatial strategy that prioritises sustainable development, low emissions and low risks from climate change.
 - New developments to be sited to minimise emissions implications, including through making them attractive for walking and cycling, and access to wider transport infrastructure;
 - All new build must have access to green space and nature;
 - Developers must identify biodiversity assets and potential to enhance these as part of the development and future management of the site.

Recommendations

4. All existing buildings achieve high energy efficiency standards, and are heated from low-carbon sources
 - Every building should, starting by 2025 with those below EPC "C", have a renovation plan (digital green passport, extended to include water efficiency, incorporating passive cooling measures and property level flood resilience measures where appropriate), setting out a clear pathway to full decarbonisation;
 - Home retrofit will need to be rolled out across the building stock, incorporating cooling measures as well as energy efficiency, water efficiency and heat decarbonisation. The CPCA should take a lead in encouraging home-owners to move towards net zero, including by finding innovative ways to encourage behaviour change and support financing;
 - The CPCA and constituent authorities should prioritise achievement of net zero emissions for social housing. Digital green passports could be piloted in social housing first;
 - Electric charging points required for buildings with parking provision undergoing extensive renovation
 - Make full use, in the short-term to 2021-22, of Green Homes Grant funding, especially in relation to "no regrets" energy efficiency improvements, and in the medium-term of successor funding schemes available from central Government;
5. Performance is actively monitored and standards fully enforced
 - Performance measurement must reflect real-world energy use;
 - Resources for enforcement of new build standards and minimum private rented standards must be prioritised.
6. CPCA and local authority own estate is net zero by 2030 at the latest.
 - Public sector estate should by 2025 have a plan to achieve best practice energy use
 - Energy use and emissions on public sector estate should be monitored and reported.

Summary

- CPCA emissions from energy use in domestic buildings were 1193ktCO₂ in 2018, 21.6% of all CO₂ emissions. This is a lower share than across the UK (28.0%). This covers emissions for space heating and for hot water, as well as emissions attached to the generation of electricity for heating and appliances.
- There are also emissions associated with use of buildings in the commercial, industry and public sectors. These are smaller than emissions from domestic buildings, but must also be addressed.
- Around 73% of CO₂ emissions from domestic buildings are direct emissions attached to the use of gas, principally, and oil; 27% are indirect emissions attached to the generation of electricity used in buildings. Our main focus is on these direct emissions. These were 14% lower in 2018 than 2005, but not falling at a rate consistent with meeting future targets.
- Reaching net-zero across the UK by 2050 requires buildings emissions reduced very close to zero. Options to deliver this have been identified. The Climate Change Committee's latest scenarios are based on pathways to zero emissions from buildings in 2050.
- Many of the levers to achieve this – such as buildings standards – are at national level. But within a national framework for emissions reduction, there is likely to be significant variation in the balance of solutions across regions. There remains much that the CPCA and constituent authorities can do to identify and apply appropriate options.

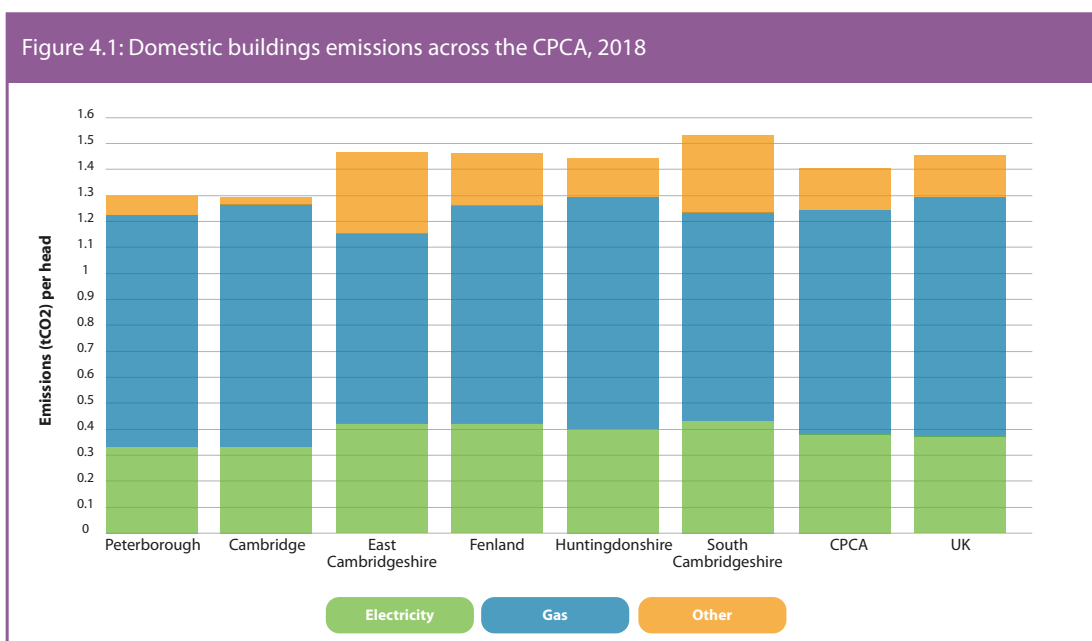


- There is a range of other benefits from taking these actions – reduced energy bills; enhanced protection from the risks of climate change, including flooding and over-heating; more comfortable homes and buildings to live and work in; health benefits, especially in winter from living in better heated buildings; biodiversity gains; physical and mental health benefits from improved access to green spaces and nature.

Buildings in the Combined Authority Area

Domestic buildings

Direct and indirect emissions¹ from domestic buildings across the Combined Authority were 1193ktCO₂ in 2018, around 1.4tCO₂ per head of population. This is similar to the average across the UK as a whole (1.45tCO₂ per head). The split across fuels is also similar to the national average. There are, however, significant differences within the region (Figure 4.1). Relative to population, emissions are relatively low in Cambridge and Peterborough. This is likely to reflect higher numbers of households off the gas grid outside the main urban areas, and greater use of oil for heating.

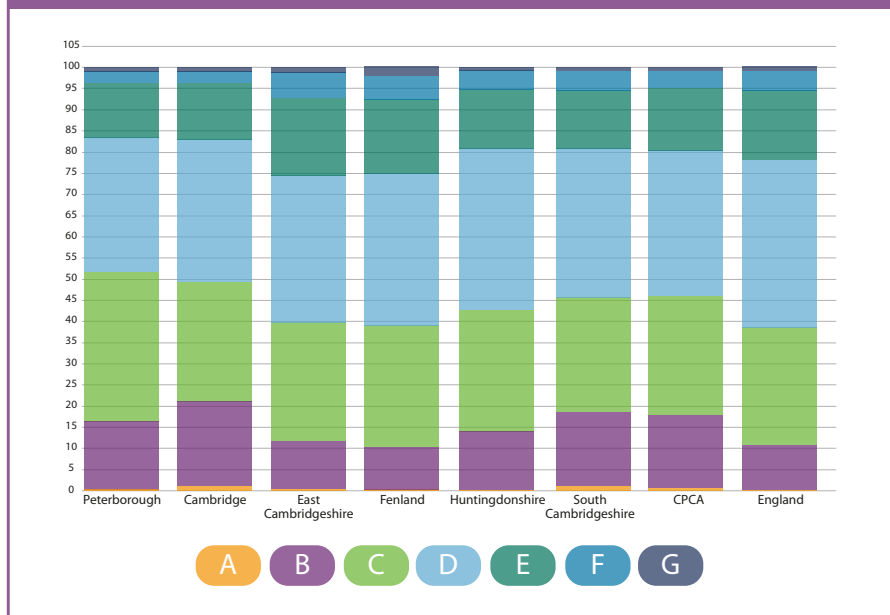


The quality of the building stock is also likely to be a factor. In terms of Energy Performance Certificate (EPC) energy efficiency rating², a higher proportion of dwellings in CPCA are rated C or above (46%) than in England (40%). There is significant variation within the authority area, however, with 52% C or above in Peterborough, but only 40% in East Cambridgeshire and 38% in Fenland (Figure 4.2).

¹ Direct emissions are from the burning of fossil fuels, principally gas, and indirect emissions are emissions from the generation of electricity which is then used in buildings.

² Energy Performance Certificates rate the energy efficiency of a building from a rating of A (very efficient) to G (inefficient) They are not available for all buildings – they are required when a property is built, sold or rented.

Figure 4.2: EPCs by energy efficiency rating across the CPCA (% of EPCs issued 2008Q4 – 2020Q2)



Information on the breakdown of ownership or tenancy type is quite dated, but appears very similar as for England as a whole (Figure 4.3), though the social rented stock rented direct from local authorities is relatively low.

Figure 4.3: Ownership and tenancy across the CPCA and England, 2011, %



Indirect emissions from electricity use in CPCA have fallen in line with the decarbonisation of power generation across the UK and the greater efficiency of appliances. Direct emissions from burning fossil fuels were 14% lower in the CPCA area in 2018 than in 2005, but there is year to year variation in emissions depending on temperatures. The reduction over that period was a little below that for England as a whole (-20%), which may partly reflect relatively higher population growth in CPCA.

Progress in moving towards low/zero carbon options has been slow:

- There has been an increase in the proportion of buildings rated at EPC C or above, but not at a rate to achieve Government targets for 2030 or 2035;
- Around 4,000 new homes are being built annually in the CPCA area. These are not net-zero emission homes, but will tend to have better energy performance than the existing stock. Indeed, EPC ratings for new dwellings (new build and conversions) are relatively good for CPCA. For new dwellings in 2019, 92% were rated A or B, as against 83% across England;
- Relative to population, the number of installations under the Renewable Heat Incentive (1,613 since April 2014³) is a little above the national average. Nevertheless, this amounts to only around ½ % of the housing stock.

There are some good examples of new developments or schemes, for example at Marmalade Lane, Cambridge (Box 4.1) The Combined Authority has also recently announced the provision of start-up grants to support community-led housing projects. But the underlying picture remains that considerable further actions will be needed to reduce emissions consistent with net zero.

Box 4.1: Recent developments

Marmalade Lane, Cambridge is an award-winning sustainable neighbourhood of 42 newly built homes, built to close-to-Passivhaus standards, with community facilities and shared gardens:

It is a cohousing development where residents have a stake in common areas – including a “common house” with kitchen, areas to socialise in, meeting rooms, and a separate small gym – and contribute to their management;

The homes, built to the Trivselhus Climate Shield building system, are highly energy efficient. They are precision made in wood from sustainably managed forests and have a small environmental footprint;

All properties have mechanical ventilation and heat recovery (MVHR) to deliver clean air whilst reducing heat loss, and renewable energy from air source heat pumps;

The Lane is a child-friendly, car-free street running through the development. Car parking is kept to the periphery. The location is close to the Cambridgeshire Guided Busway and cycle ways. All residents have access to secure cycle parking.

Source: Marmalade Lane – Cambridge’s first cohousing community, <https://marmaladelane.co.uk>

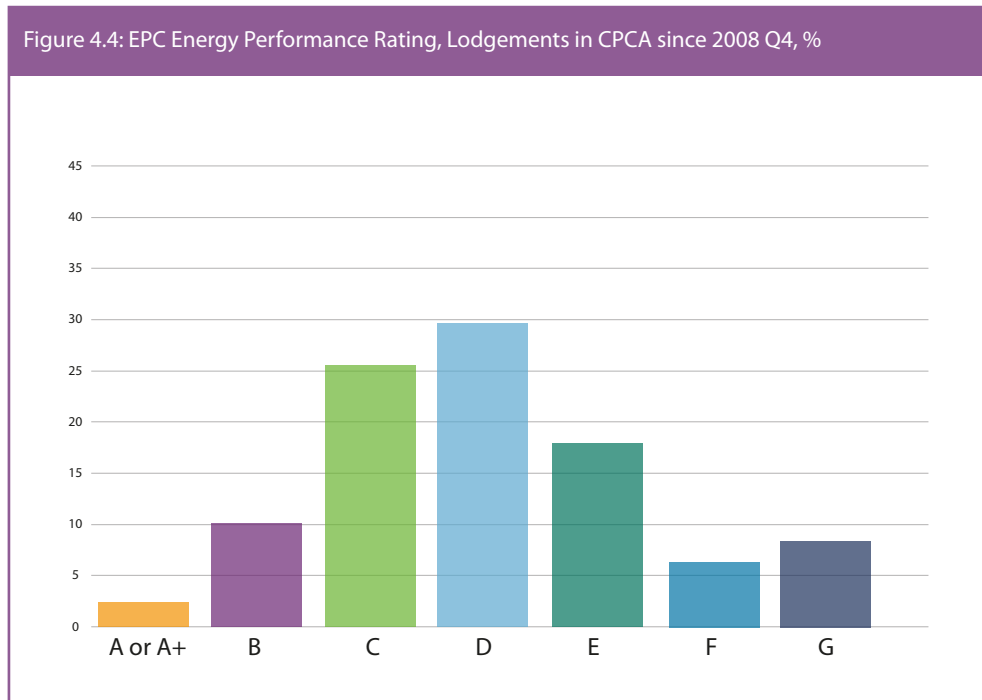
Non-residential buildings

We do not have good data on emissions from non-residential buildings. At local authority level, these are included within national statistics in the wider category of the industry and commercial sector, which includes industrial processes.

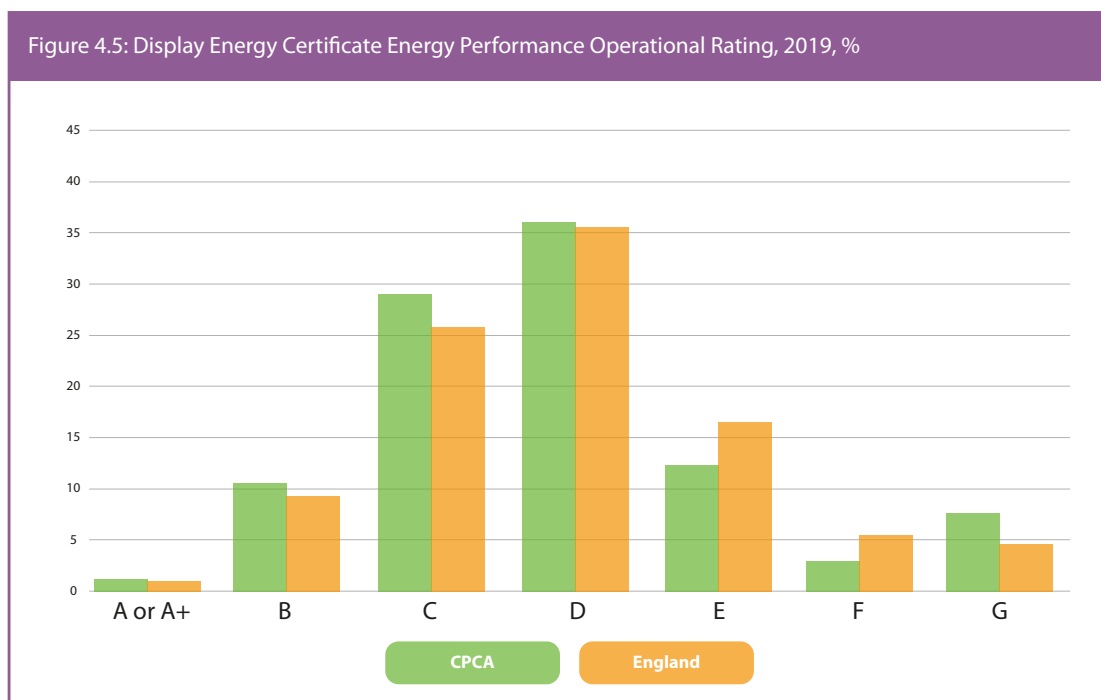
The scale of emissions is not so large as for domestic buildings. For the UK, direct emissions from energy use in commercial buildings are around 18% and in public buildings around 12% of domestic buildings.

There are a total of 13,701 non-residential buildings with EPCs across CPCA. The distribution of these by Energy Performance Rating (Figure 4.4) is very similar to that across England as a whole – over 60% are below EPC C.

³ Data as at end September 2020.



We can see from Display Energy Certificate (DEC)⁴ data that performance is similar to England as a whole. For DEC's issued in 2019 (Figure 4.5), 39.9% were rated C or above (36.7% in England). A higher proportion attracted the worst (G) rating.



⁴ DEC's are required for buildings with useful floor area over 250m² that are occupied in whole or in part by public authorities and frequently visited by the public. The operational rating reflects actual energy consumption over the last 12 months within the validity period of the DEC.

Adaptation

Work commissioned for this report⁵ has examined the key climate change risks facing the region:

- **Flood risk:** large parts of the area are vulnerable to flooding – nearly 40% of the land is below sea level and much of the Fens is in flood zone 3.⁶ Changes in seasonal and annual precipitation mean that without further measures to address these risks:
 - Nearly 1 in 10 homes and nearly 1 in 4 agricultural and industrial production facilities may face flooding risk from rivers by the end of the century;
 - The region may face tidal flooding from storm surges, particularly at high tide if the Ouse and/or Nene rivers are already in flood.
- **Water supply:** the East of England is a water-stressed region, with growing water demand. With changes in the character of summer precipitation and increased summer temperatures, the region may experience seasonally lower river and aquifer levels than in past years.
- **Overheating:** the region will face increased overheating issues, particularly in the summer months, likely to be associated with health issues, higher excess deaths, and reduced productivity. Even under a stringent mitigation scenario⁷ maximum summer air temperatures across the region are likely to exceed an average 36°C in 1 year out of 20 by the middle of the century. Temperatures in some locations will be higher than the average across the region.

Current actions to address these risks include:

- Building of new homes is generally steered away from the highest flood risk zones. Nationally there is low uptake of low-regret actions to reduce flooding impacts, such as property and flood resilience measures.
- Water: Guidance in Greater Cambridge (Cambridge City Council and South Cambridgeshire) stipulates a minimum water efficiency standard for new residential developments of 110l/per person/per day, and registers a desire for developments to go further. Non-residential developments are expected to show improvements of 55% over baseline water consumption (Cambridge) or 25% (South Cambridgeshire). The latter can probably be met by efficiency measures; the former is likely also to require water harvesting or recycling.
- Overheating: nationally, evidence suggests that around 20% of homes experience overheating in the current climate. The issue is not addressed in current building standards, nationally though there are plans to do so. Guidance in Greater Cambridge recommends that thermal modelling be undertaken to understand the performance of proposed new developments, with buildings designed and built to meet CIBSE's latest overheating standards, and consideration given to future climate scenarios. References to further guidance include that provided by the Good Homes Alliance.⁸

5 CZ (2021), Aines, E.D., Simpson, C., Munro-Faure, A., Shuckburgh, E., Preliminary report on climate risk in the Cambridgeshire & Peterborough region, 2020-2099, Cambridge Zero: University of Cambridge.

6 Flood zone definitions are set out in National Planning Policy Guidance. Land in flood zone 3 has a 1 in 100 or greater annual probability of river flooding, or 1 in 200 or greater annual probability of flooding from the sea.

7 RCP2.6: an emissions pathway likely to keep global temperature rise below 2 degrees C by 2100.

8 Good Homes Alliance (2019), Tool and guidance for identifying and mitigating early stage overheating risks in new homes.

- Green Spaces: the Future Parks Accelerator Project (Box 4.2) is a good example of a collaborative project with potential gains for public amenity and health, biodiversity and reduced overheating.

Box 4.2: Cambridgeshire and Peterborough Future Parks Accelerator

The Future Parks Accelerator (FPA) project is a collaboration between the 7 local authorities of Cambridgeshire and Peterborough and the Local Nature Partnership, including Natural Cambridgeshire.

Scheme objectives include to map existing open space, develop long-term plans for its management, and identify sustainable long-term funding and governance models for new and existing parks. The scheme emphasises community engagement, and will look to provide skills and training to develop our green spaces.

The project has £700,000 funding from MHCLG, the National Lottery Heritage Fund and the National Trust. The Cambridgeshire and Peterborough project was chosen for funding in 2019 from more than 80 projects submitted by councils and communities across the UK.

What has the Climate Change Committee recommended?

The national Climate Change Committee (CCC) has developed scenarios for sectoral emissions in 2050 consistent with achievement of net zero emissions overall.⁹ More recently it has made recommendations for the pathway to net zero.¹⁰

To be on track to near zero emissions from buildings by 2050, the CCC's balanced pathway has 4 priorities over the next decade or so:

- Deliver on the Government's energy efficiency plans to upgrade all buildings to EPC C over the next 10-15 years;
- Scale up the market for heat pumps, as a critical technology for decarbonising space heating;
- Expand the roll-out of low-carbon heat networks in heat dense areas like cities, using anchor loads such as hospitals and schools;
- Prepare, through a set of trials, for a potential role of hydrogen in heat.

In delivery terms, this means:

- Efficiency of existing buildings:
 - By 2028, rented homes achieve EPC C, such that all practicable lofts and cavities are insulated, alongside other low-regret measures, with solid wall insulation deployed where this supports low-carbon heat and wider (social) benefits.
 - Homes with mortgages (a little under half of all owner occupied homes) achieve EPC C by 2033, such that all practicable lofts and cavities are insulated, alongside other low-regret measures, with solid wall insulation deployed where this supports low-carbon heat and wider (social) benefits. This is achieved through standards for lenders.
 - By 2028, no dwellings can be sold unless they meet a minimum EPC C standard.

⁹ CCC (2019), Net Zero – The UK's contribution to stopping global warming.

¹⁰ CCC (2020), The Sixth Carbon Budget – The UK's path to net zero.

- For non-residential buildings, energy efficiency improvements in the commercial sector are made by 2030 to meet the Government's target of reducing business and industrial energy consumption by 20%, and by 2032 in the public sector, to meet the target to reduce public sector energy consumption by 50% (against levels in 2017).
- Heating for existing buildings:
 - By 2028, all heating system sales off the gas grid are low-carbon (with exemptions for any buildings in zones designated for low-carbon district heat).
 - By 2033 (or earlier, 2030, for public buildings) all heating system sales are low-carbon (with exemptions for any buildings in zones designated for low-carbon district heat or hydrogen).
- New build:
 - By 2025, at the latest, all buildings are built with ultra-high levels of energy efficiency and low-carbon heating (e.g. heat pumps or low-carbon heat networks).

In policy terms, this leads CCC to recommend:

- Heat and Buildings Strategy (due from the Government soon): an ambitious heat strategy which sets the direction for the next decade, with clear signals of the phase out date of fossil heating and commitment to funding. This must include a clear set of standards; plans to introduce green building passports; and a role for area-based energy plans.
- Standards for existing buildings:
 - Bring forward the date to reach EPC C in social homes to 2028, in line with the Private Rented Sector (PRS) proposals, and finalise the delivery mechanism.
 - Implement PRS proposals.
 - Implement improvements to the EPC framework, including ensuring they drive the energy efficiency measures that are needed.
 - Develop options to cover the regulatory policy gap for owner-occupied homes, looking at trigger points at the point of sale and through mortgages.
 - Publish proposals for standards to phase out fossil fuels, and in-use standards in commercial buildings.
- New build standards:
 - Implement a strong set of standards – with robust enforcement – that ensure buildings are designed for a changing climate and deliver high levels of energy efficiency, alongside low carbon heat.
 - Publish a robust definition of the Future Homes Standard and legislate in advance of 2023, for implementation by 2025 at the latest.

In relation to adaptation, the CCC has also recommended:

- Introduction of a new standard or regulation to ensure that overheating risk is assessed at the design stage of new-build homes or renovations. This should ensure that passive cooling measures are prioritised over active cooling
- A national target for increasing the area of urban greenspace
- Review new build regulation standards to allow local authorities to set more ambitious standards for water consumption, especially in current and future water-stressed areas
- Resources and support for local authorities to ensure measures are being put in place to increase the area of greenspace and the area of permeable surfacing in all urban areas
- A statutory consultee be put in place for assessing new developments in areas of surface water flood risk.

What is Government policy?

The UK Government recognises that policies are not currently in place to deliver net-zero emissions, but has set out some policies, is consulting on others and has set out strengthened ambition within its 10-Point Plan:

- The Government aims to improve EPCs in private rented homes to a rating of C by 2028, in fuel poor homes by 2030, and in other (owner occupied) homes by 2035
- The Minimum Energy Efficiency Standard (MEES) took effect in April 2018 and sets a minimum energy efficiency standard of Band E for properties let out by residential and commercial landlords, to be met - subject to cost limits - by April 2023.
- The Green Homes Grant scheme has been extended for a further year (to end-March 2022). This provides grants for householders to cover up to two-thirds of the cost of insulation or low carbon heating improvements (maximum value £5000) or 100% of cost for those in receipt of a qualifying means-tested benefit. An element of funding is also available to local authorities to support low-income households through the Green Homes Grant Local Authority Delivery Scheme – a second round of this scheme closed for applications in December 2020, but a further £300m is to be allocated through Local Energy Hubs in 2021.
- The Government has recently announced its response to consultation on a Future Homes Standard, with CO₂ emissions 75-80% lower than current standards.
 - It has committed to set a level of performance standard meaning that new homes will not be built with fossil fuel heating, and that homes built to the standard will be “zero-carbon ready” – with high energy efficiency such that further energy efficiency retrofit will not be required for them to be zero-carbon as electricity decarbonises.
 - To meet the “zero-carbon ready” pledge it is widely believed that the standard will have to go further than levels previously suggested by the Government, but consultation on the technical standard will not begin until 2023.

- Performance-based ventilation standards are to be implemented.
 - Implementation in new build will be from 2025.
 - Local authorities will retain, in the short-term at least, powers to set local energy efficiency standards for new homes that go beyond the national level.
- It is proposed, following consultation, to introduce a Future Buildings Standard for new non-residential buildings from 2025;
 - It is proposed that all non-residential private-rented buildings should, where cost-effective, meet EPC B by April 2030.
 - The Renewable Heat Incentive (RHI) is to be replaced from April 2022 with a Clean Heat Grant for households and small non-domestic buildings. Subject to the budget and time-limited nature of the proposal (so far), this would enable the installation the installation of heat pumps and in limited circumstances biomass.
 - A Renewable Heat Strategy is to be published. In the meantime, the 10-Point Plan has indicated a target for 600,000 heat pump installations by 2028, and there is a commitment to phase-out installation of high-carbon fossil fuel heating (coal and oil) in homes off the gas grid in the 2020s.
 - An over-heating mitigation requirement in Building Regulations is to be introduced for new homes.

The main regulatory policy gaps relate to efficiency standards for 15.5m owner occupiers (of which over 65% are below EPC C), owner occupied commercial buildings, and plans for phasing out natural gas heating.

The role of local and combined authorities

Emissions reductions in the UK to date have been mainly driven by reductions in emissions from the power sector. Much of that has happened without the need for significant public engagement – a supportive policy framework has allowed generation companies to make the low-carbon investments in renewables and switch away from coal and gas.

Improving the efficiency of our building stock and switching to zero-carbon heating presents a substantial and different challenge. Millions of households will need to make decisions to allow changes within their own homes, whether investments in energy efficiency or to change to low-carbon heating. Co-ordination of actions will help to bring down costs and will be required to take forward some of those measures (such as district heating). Public engagement and support will be essential to making progress.

A national policy framework to support decarbonisation of buildings is required, and provide resources where required to supplement private funding. But policy will need to be flexible to allow different choices according to local circumstances. Local authorities are well-placed to help drive the changes that are required:¹¹

- Facilitation – convenor to bring people and groups together to help develop and implement retrofit programmes and local energy planning;

¹¹ These bullets draw on the UK Green Building Council Retrofit Playbook, but there are many similar assessments.

- Understanding – local authorities have and can further develop understanding of the quality of the building stock in their area, the social and economic characteristics of the occupiers, and viability of different options in different areas;
- Communication – provision of information to residents and business on the benefits of efficiency improvements, on low-carbon heating options, and use of accredited installers and suppliers;
- Coordination – local authorities can take a central role in coordinating action. They can set up or support “one stop shops” to support residents on their retrofit journey. They can liaise with finance providers and look to pilot new financing mechanisms;
- Being a “trusted partner” – research shows that local authorities are consistently more “trusted” than national government and other stakeholders. They can use this status to help build community consensus, particularly where that is needed on plans for heat decarbonisation;
- Supporting the growth of local skills and supply chain. Local authorities can take a leading role in supporting skills providers to ensure that local supply chains gear up to deliver. They can work with the supply chain to promote accreditation.
- As developers and in delivering retrofit on social housing. Local authorities can take a lead on delivery for their own social housing and own estate more widely, and working with other social housing providers.

The evidence base for emission reduction requirements to 2050 and assessment of options

In assessing the scale of the challenge for CPCA in moving towards net zero, and the available options, we have considered evidence from a range of sources. This section summarises some of the key sources¹².

CCC Net Zero Technical Report / CCC CB6 recommendation

The CCC’s Net Zero Report and Net Zero Technical report¹³ provide an assessment of options to take the UK to net zero emissions by 2050. The Sixth Carbon Budget Report and Methodology Report¹⁴ update this analysis, with a focus on the pathway for emissions through the 2020s and to the sixth carbon budget period (2033-37). This includes a pathway for emissions from buildings – covering energy efficiency and low-carbon options for heat.

Net Zero Cambridgeshire (CUSPE) report

The Net Zero Cambridgeshire (CUSPE) report considers the make-up of emissions in the CPCA region and provides projections to 2050 for a number of possible scenarios. Reflecting an increasing population, significant new build is projected.

In a scenario where all new homes are built to the highest energy efficiency standards from 2020 and existing homes are retrofitted to EPC “C” over the 10 years to 2030, emissions are reduced by around 50% by 2050.

¹² This is necessarily selective. Some of the evidence is locally focused; some is national with potential application locally.

¹³ CCC (2019), Net Zero – Technical Report.

¹⁴ CCC (2020), The Sixth Carbon Budget – Methodology Report.

¹⁵ CUSPE (2019), Net Zero Cambridgeshire, October 2019.

This illustrates the critical need for appropriate energy efficiency measures to be deployed in existing buildings, in conjunction with efficient non-fossil heating technologies. Applying assumptions consistent with the CCC's Further Ambition scenario, which informed the CCC's net zero recommendation to the UK Government, CUSPE's assessment – including that all but 10% of homes move off the gas grid - finds CPCA emissions from the domestic building stock fall around 92% by 2050.

Place Based Climate Action Network

We commissioned work on a net zero carbon roadmap for the region from the Place Based Climate Action Network (PCAN)¹⁶ (Chapter 2). This found that many emission reduction measures within the buildings sectors are cost-effective – they would more than pay for themselves through the energy cost reductions they would generate.

Overall, for housing these cost-effective measures could close the gap between projected emissions in 2050 and net zero by around 53%. For public and commercial buildings, they could close the gap by around 39%. Other measures are identified that could close the gap for housing by a further 25% and for public and commercial buildings, also by a further 25%. These measures would have higher up-front costs, not fully paid back in energy savings, but would have emission reduction and other benefits.

Amongst the cost-effective options are insulation, draught-proofing and (some) heat pump installations in domestic buildings; and fabric, lighting and heating improvement measures in public and retail buildings. The highest emission savings come from improved insulation and installation of heat pumps in domestic buildings. The report provides indicators for the rates of installation needed over time to meet the estimated emission reductions – ranging in homes, for example, from 3,000 cavity wall insulations to 15,000 heat pump installations a year.

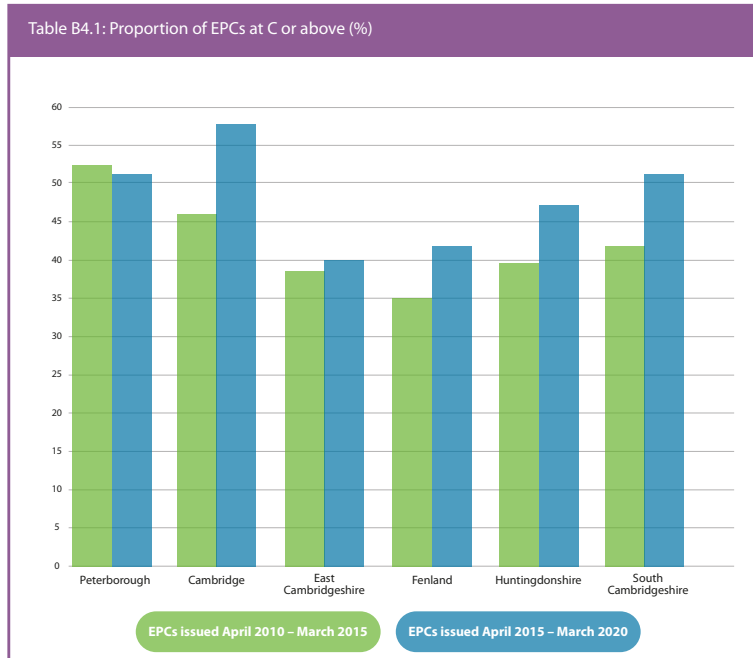
Carbon Neutral Cambridge

Recent analysis by Carbon Neutral Cambridge (Box 4.3) suggests significant numbers of homes across CPCA would benefit from basic energy efficiency measures – 31,000 homes with roof insulation below 20% of recommended levels; 31,000 homes with uninsulated or partially insulated cavity walls.

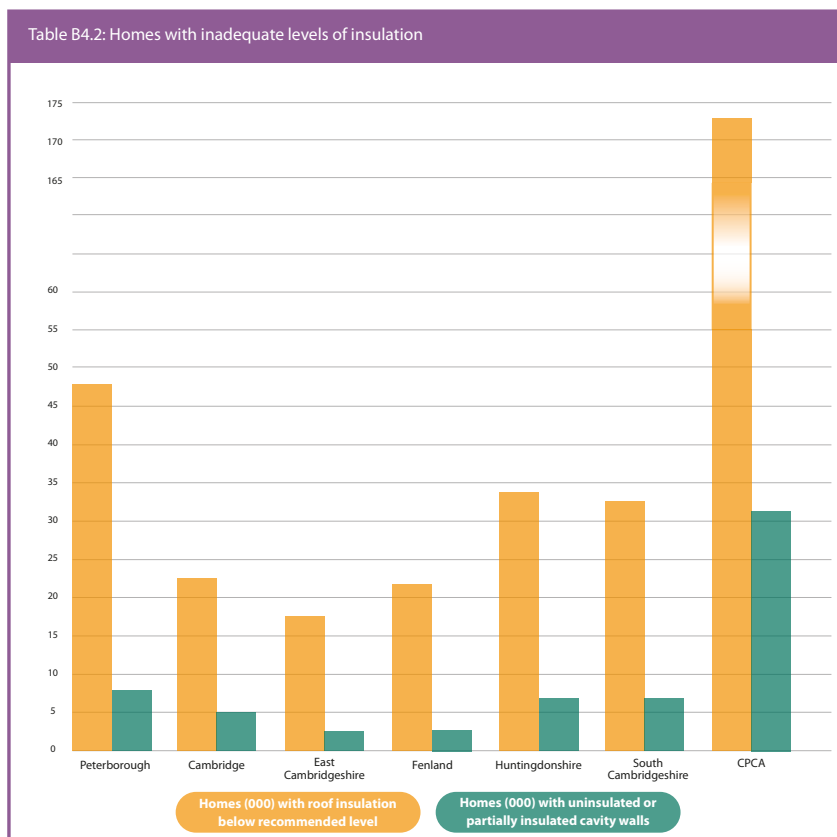
¹⁶ PCAN (2021), A Net-Zero Carbon Roadmap for Cambridgeshire and Peterborough, Sudmant, A., Duncan A., Gouldson, A., ESRC Place Based Climate Action Network, University of Leeds.

Box 4.3: Hot Numbers – energy upgrade opportunities in the CPCA

The “Hot Numbers” report by Carbon Neutral Cambridge (CNC) uses EPC data to quantify the scale of improvement needed to meet EPC C by 2035. It shows an increase in the proportion of EPCs at C or above over the last decade, but that there remain around 130,000 homes across CPCA that need improvement to reach EPC C.



The report identifies around 175,000 homes with roof insulation below recommended levels (of which 31,000 are below 20% of the recommended level) and 31,000 homes with uninsulated or only partially insulated cavity walls.



Source: CNC (2020), Hot Numbers: an overview of home energy upgrade opportunities in the CPCA.

Adaptation

We draw on work by Cambridge Zero, published with this report.¹⁷ This examines climate change risks facing the region (summarised above).

Public engagement

Evidence suggests that relatively small numbers of people identify heating their homes as a major contributor to emissions, and few are familiar with low-Carbon options as a means of moving away from fossil fuels for home heating.¹⁸ Faced with information about options, however, they are very willing to engage (Box 4.4).

Box 4.4: Public engagement – buildings

The Climate Assembly UK has shed light on public support for different heating solutions and priorities:

In relation to low-Carbon heating, Assembly Members supported the use of hydrogen, heat pumps and district heating. They stressed the importance of local areas being able to choose the options best suited to their needs. Most supported a ban on new gas boilers coming in around 2030 to 2035;

For home retrofits, they emphasised the need to minimise disruption to the home, put in place support for costs, and offer flexibility and choice to householders.

A high proportion of respondents to the CPIC Survey (76% of direct respondents; 58% of targeted respondents) viewed buildings as an important area for the Commission to focus on. A high proportion (71% of direct respondents; 64% targeted) said that they would be prepared to change how they heat their home.

More than half of the direct respondents (53%) agreed that they were currently considering a switch to a low-Carbon energy system. They were clearly a group with high motivation to consider change.

The proportion amongst the targeted respondents was considerably lower (26%). Many, however, said they would be encouraged to switch by grant funding towards the cost (70% of direct respondents and 79% of targeted respondents). Others might be motivated as part of a community scheme (35% and 24% respectively), or clear online advice (23% and 33% respectively).

Respondents were keen to see new homes located on public transport routes.

Our own survey provides support for this conclusion as well, though there were differences between those who responded direct to our survey and those recruited (“targeted”) through a survey company:

- both groups regarded buildings as an important area of focus, but more of the direct respondents (76%) than the targeted (58%);
- high numbers said they would be prepared to change how they heat their homes (71% of the direct respondents; 64% of the targeted). This still leaves a significant minority who need to be reached;

¹⁷ CZ (2021).

¹⁸ e.g. Eftec (2020), Heating our homes in a Net Zero Future: Understanding what matters to consumers, Eftec, ICS, for National Grid.

- fairly high numbers, particularly in the direct group, were actively considering switching to low-carbon heating. Amongst those who were not, particularly in the targeted group, many said that they could be motivated to do so by financial support. Others might be encouraged by community schemes or online advice.

These results suggest that well designed policies, including those that can reduce the potential hassle of arranging installation, have the potential to motivate householders towards consideration of low-carbon heating options.

We had a range of discussions with others, including UK Power Networks (UKPN), the local electricity network operator, who are working to understand implications for the grid of rising power demand attached to the growth in EV ownership and use of heat pumps.

Key areas for action

There is a growing consensus on the actions that need to be taken to shift buildings towards net zero (Box 4.5).

For retrofit of existing buildings the essential elements of the approach (developed further for CPCA in the section below) are to:

- Adopt a whole house approach: understand that a package of measures will be necessary and this package – covering improved energy efficiency and heat decarbonisation - must be appropriate for the individual building. Whilst a piecemeal approach to application of measures is likely to be inadequate, there are some low-regret or known cost-effective measures, to include cavity wall insulation and loft insulation, which should be implemented immediately.
- Develop the evidence base to provide in-depth understanding of the nature and quality of the building stock. In considering adoption of measures, it is useful to link this with understanding of the socio-economic characteristics of the residents (in terms, for example, of fuel poverty and ability to pay for measures). This can then inform understanding of the whole house measures that are needed and the potential for zoning areas for particular solutions.
- Provide advice in the form of a digital Green Building Passport, which covers the measures required for the building, how quality assurance on measures and installation can be achieved, (e.g. accredited installers), and potentially information on funding sources. This passport rests with the building, transferable with changes in owner. It can be updated as specific measures are implemented, and record impacts, such as on energy bills.
- Encourage householders and landlords to take action, through policy at key trigger points (such as when buildings are renovated or sold) and a rising trajectory of standards. Depending on how the policy framework develops, a time could be reached when actions become mandatory, but progress in advance of that will help to build supply chains.
- Consider the need for development of skills in relation to assessment of need for and delivery of energy efficiency measures and installation, maintenance and control of new heating systems.

Box 4.5: Components of an approach to decarbonising homes

Heat and energy-efficiency zoning

The Association of Decentralised Energy (ADE) has set out the case to adopt a “zoning” approach to specify a local area for active deployment of particular solutions. The method has also been developed in advice to Ofgem by the Centre for Sustainable Energy (CSE) and Energy Systems Catapult (ESC).

The case for “zoning” rests on there being no single solution for heat decarbonisation, but that specific options (including heat networks from a low-carbon source, heat pumps, biomass, hydrogen) may be more economic and work better at scale in specific areas.

The key elements of a zoning approach are to consider the circumstances and opportunities specific to the area – to include quality of the building stock and heat density; local resources, such as waste heat; wider energy demands such as electricity for electric vehicles; what these system issues mean for the practicality of different options; feedback from local stakeholders based on provision of information and consultation (to ensure resulting plans are seen as informed and legitimate). Having gone through this process, the aim would be to designate an area for active deployment of an appropriate solution.

Deployment of that option could then be progressed through national and local policy – which might extend to deadlines for ending installations of fossil fuel options, use of planning and building regulations, funding. Domestic consumers might not be required to take up a particular solution, but the barriers to the preferred zonal solution would be removed so that it becomes the easy way forward.

Association for Decentralised Energy: Getting (retro) fit for net zero: an approach for existing homes

This ADE paper emphasises the need for a whole-house approach, and a move away from piecemeal measures of the past. It suggests that:

- Retrofit targets must reflect the diversity of the stock, through scaling up local area energy planning and the use of green building passports
- Whole house strategies and deep retrofit are needed. This does not mean all the work must be undertaken in one step, but the building assessment should set out a long-term plan
- There are low regret actions (such as improved insulation) which make sense to get on with. Some zones might also be prioritised for action – for example, where electricity network issues have been identified, so it will be useful to reduce peak demands, or to help tackle fuel poverty.
- A zoning and whole house approach is likely to encourage the development of new more attractive finance options.

Construction Leadership Council (CLC)

The CLC has launched a consultation document for a national retrofit strategy. This calls for an integrated approach to transforming the energy and water needs of our homes – through design, installation and customer care:

- Building renovation plans (passports) for each house
- Skills training
- Area-based delivery programmes to build capacity, with QA and evaluation to ensure standards, grow consumer confidence and open up financing opportunities.

Sources: ADE (2020), *Heat and Energy Efficiency Zoning: A framework for net zero for new and existing buildings*; CSE/ESC (2020), *Local Area Energy Planning: The Method, Final Review Draft, For Ofgem, July 2020*; ADE (2020), *Getting (retro)fit for net zero: An approach for existing homes*; CLC (2020), *Greening Our Existing Homes, National retrofit strategy, A consultative document, Construction Leadership Council*.

For new build, it makes no sense to construct buildings now to standards that are inconsistent with net zero or the impacts of a changing climate, and will require retrofit later. New developments should also be planned to link into low-carbon district heating where available.

It is also widely recognised that there is a need to move towards standards based on measured energy use or emissions. Flaws in the EPC regime are widely recognised. Verification and enforcement processes will also need to be strengthened:

- The Green Construction Board,¹⁹ amongst others, has recommended that buildings design should move towards predicted performance of energy use, and that contracted energy performance targets must aim at the delivery of real (i.e. in-use) performance, covering regulated (e.g. heating and hot water) and unregulated (electric appliance) use.
- The Better Buildings Partnership has similarly called for “Design for Performance”, based on operational performance and reporting, moving away from a current “design for compliance” culture based on theoretical norms.

The importance of engagement

It is important to recognise that progress will depend on the decisions and concomitant behaviour of a large number of householders and property owners. Their willingness to act will depend on a range of factors: understanding of the need for change; availability of information on options to improve energy efficiency and change heating systems; availability of funding; confidence in the market and easy access to skilled assessors and installers to undertake the work. Unless these factors are addressed the perceived “hassle” of making change will act as a barrier to the necessary actions. To a significant extent, therefore, retrofitting and heat decarbonisation are behavioural policy problems, and lessons from behavioural science as well as traditional policy levers need to be explored and developed.

In looking to deliver retrofit and heat decarbonisation, it will be very important to design programmes that address these behavioural barriers. This suggests approaches that:

- Are as far as possible “whole house” and consider energy efficiency, low-Carbon heating, ventilation and cooling in an integrated way, and focus on real-world performance. This is where measures like the digital Green Passport have attractions, possibly extended from the current focus on mitigation measures to include adaptation and water use (water meters, for example). This does not mean that all measures have to be taken at the same time; they can be staged, but in a way that progresses towards a specified outcome;
- Simple but highly visible information must be provided to decision-makers. The need for change – the need for and benefits from decarbonisation – must be communicated widely. This should not simply focus on environmental gains, but on the other benefits that are salient when people make choices. Information on specific options and applicability to the specific circumstances of the householder or property owner must be clear. Installers must be trusted, potentially aided by certification schemes. Guidance could be provided on the available schemes and funding routes.

¹⁹ GCB (2019), Buildings Mission 2030.

- Offers should be made at timely moments that are likely to have most impact in encouraging take-up. In many cases this means alignment with “trigger points” such as when houses are being sold, or renovated for other reasons. But there is also evidence that area-wide programmes can be effective – street-by-street programmes where people see their neighbours taking action could improve sign-up by creating a sense of a social norm;
- Local leadership from local authorities in relation to their own buildings, and from high-profile businesses. The many individuals who need to take action are much less likely to engage if they do not see their “leaders” walking the talk.

More generally, Central Government and local authorities need to be consistent in their approach. This points to the need for a stable policy approach, with incentives, messages and direction of travel sustained over time.

Putting this into practice

A number of authorities are pressing ahead with decarbonisation plans (Box 4.6). There will be opportunities to learn from these kind of examples.

What does this mean for the CPCA?

From the available evidence, the quality of the building stock in CPCA is, in relation to energy efficiency, marginally better than across England as a whole. But there remains substantial scope and need for improvement, even in relation to standard measures including cavity wall and loft insulation. These measures are generally cost-effective, with a payback within a few years, and should be taken forward as soon as is practical.

Whilst we strongly favour the “whole house” approach, looking for a joined-up approach consistent with the circumstances of the specific building, options for heat decarbonisation such as heat pumps will work effectively and at reasonable cost in an energy-efficient building. Where there are basic measures outstanding which can improve energy efficiency (and reduce energy bills), it makes sense to get on with them.

In relation to heat decarbonisation, in common with the country as a whole, most houses are on the gas grid. Where they are not, many – particularly in more rural areas – make use of oil for heating. Switching to low-carbon heating will be a huge challenge.

Box 4.6: Example building decarbonisation programmes

Bristol City LEAP

A prospectus issued by the City Council is seeking partners to deliver up to £1 billion investment in low-Carbon and smart energy over the next decade. Building on supportive local policies, such as through planning, partners would be expected to progress:

Revolving loans funds for domestic and commercial sector energy efficiency, with programmes to build consumer confidence and provide advice for SMEs. Some areas are prioritised for deep energy-efficiency measures in preparation for installation of heat pumps.

Heat networks. A number of potential schemes have been identified. Planning policy could require new developments to connect in “heat priority areas”, with others signed up through connection agreements, contracts and provision of funding support.

A smart grid and demand-side response.

Low-carbon transport, including rapid mass transit and electric charging infrastructure.

Greater London

In Greater London, the Retrofit Accelerator for Homes programme works with social housing providers to provide a “whole house” offer – covering building fabric and the heating system. Competitive finance is offered through the Mayor’s Energy Efficiency Fund.

The Retrofit Accelerator – Workplaces offers support for non-domestic public buildings. A central delivery unit provides expert support, covering project development, capacity building, advice on accessing finance and funding, and appointment of contractors. A contracting framework has been developed, with 16 service providers pre-qualified. The initiating public body retains the value of energy savings, guaranteed under energy performance contracts. So far more than 700 buildings have been supported, with investments of £126m and annual savings of £8m

A net zero carbon target has been applied to all major residential developments since 2016. Under Energy Assessment Guidance issued in draft in April 2020 (applying to strategic planning assessments, but promulgated for wider use by London boroughs), developments should:

Demonstrate consistency with the net zero target, with at least a 35% on-site reduction beyond

Part L 2013 and proposals to meet any shortfall beyond that;

Prioritise connection to existing or planned district heating networks;

Demonstrate that risks of overheating are mitigated through passive design measures.

Energy performance post-construction must be monitored and reported.

Sources: BCC (2018), Bristol City LEAP; GLA (2020), Energy Assessment Guidance, draft.

There is likely to be some potential for district heating from low-carbon sources:

- Generally potential will be concentrated in heat dense areas, more likely in bigger towns and cities.
 - Some potential has been previously identified,²⁰ linked to Anglia Ruskin campus and to Cambridge University buildings, but the historic city centre makes development difficult. There is now a district heating spine for new development in north west Cambridge, linked to Cambridge University, with 700 homes connected initially and potential for more to be added. Where schemes like this are gas-based, a pathway will be needed to switch them to zero-carbon sources;
 - Peterborough is looking to a new smart energy hub as a means of meeting rising energy demand. An existing energy from waste plant could supply a heat network. The Peterborough Integrated Renewables Infrastructure (PIRI) project, led by the City Council, is currently developing options, encompassing the electricity network and potential for electric vehicle charging as well. It aims to deliver a significant reduction in emissions as well as cutting energy bills. This is potentially a major scheme, with lessons for other cities too.
- The development at Swaffham Prior (Box 4.7) suggests there is potential for community schemes. A majority of the householders in Swaffham Prior have signed up for the project, which offers potential reduction in energy bills, and significant emissions savings in moving away from oil-fired heating. The scheme has taken more than 3 years to develop, but demonstrates the role that local actors can have in galvanizing action, and progress that can be made with local Council support.

District heating potential should be explored further, but the main decarbonisation option is likely to be electrification through the adoption of heat pumps:

- Installation of heat pumps may be initially prioritised off the gas grid and in new-build, where they are most cost-effective. This will also help to build supply-chains for wider adoption in later years in buildings currently on the gas grid;
- Installation of hybrid heat pumps²¹ on the gas grid is an option. These are not zero-carbon. Unless hydrogen is available to replace natural gas, they are not the long-term answer (and, as indicated below, we think hydrogen for heating should not be planned for as an appropriate long-term option for CPCA). But hybrid heat pump use as a transitional option should produce significant emissions savings, and help build supply-chains for a full heat pump transition.
- More energy efficient buildings, required for heat pumps, could also help to support load 'spreading' to avoid excessive peak load scenarios for a future grid.

²⁰ AECOM (2011), Cambridge City Centre District Heating. The potential identified was for a gas CHP scheme; viability would need to be considered for a low-Carbon option.

²¹ In a hybrid heat pump, the heat pump meets the bulk of heat demand, but the gas boiler is retained and is there to provide heat on the coldest winter days.

Box 4.7: Swaffham Prior Community Heat Scheme

Currently 70% of homes in Swaffham Prior are heated by oil.

The Swaffham Prior Community Land Trust, working with Cambridgeshire County Council, has developed a scheme for a community heating network, supplied from a shared energy centre. Heat pumps collect heat from the ground and this is pumped through a 7km network of pipes to homes and other community buildings.

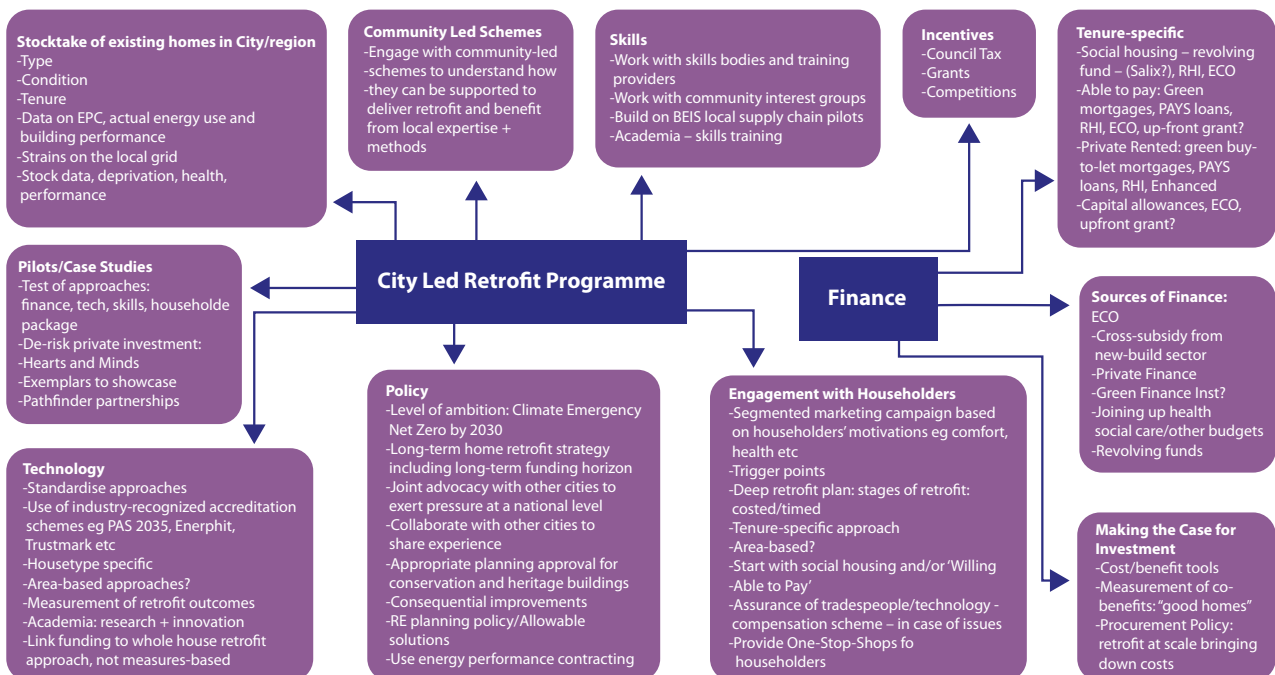
Some homes will require upgrades to their heating systems and energy efficiency.

More than half the 300 homes in Swaffham Prior have expressed interest.

When the scheme is delivered, heating bills paid by residents will contribute to the ongoing operational costs and pay-back of loans to get the scheme up and running. Over the life time of the project the scheme is expected to save around 47,000 tonnes Carbon.

Planning permission was granted in November 2020 and an investment decision has recently been made. This is more than 3 years since work began with a feasibility study in December 2017.

Figure 4.6: Example process for establishing an area-based retrofit programme



Source: Green Buildings Council Accelerator Cities Retrofit Playbook.

The switch over of the gas grid to hydrogen has been identified as an option. Full hydrogen conversion would be a substantial supply-side challenge given the cost and energy requirement to produce hydrogen. It is possible that hydrogen might be an option in some places in the longer-term. We agree with the CCC recommendation that BEIS and Ofgem should undertake work to identify priority candidate areas for hydrogen, and areas unlikely to be suitable. This will help to inform development and network investments. But we currently see no reason to think CPCA would be a priority for limited supplies (the CCC only has limited use of hydrogen for heating in its scenarios, and this is after 2030 and near to industrial clusters). To the extent that hydrogen is available it may be better prioritised for other uses than heating our homes. Our conclusion is that we need to make progress with other options.

Against this background, important next steps for CPCA are to:

- Develop local energy plans and understanding of the stock. The need is to move beyond a project-by-project approach to systematic area-based programmes for retrofit and delivery of low-carbon energy.
 - These plans need to be developed with the engagement of others with strong interests, such as UKPN, flood authorities and water companies.
 - Marrying up housing stock data with information on the income/deprivation levels will help inform roll out and financing plans.
 - Plans will need to develop consistent with developments in the national policy framework. But identification of areas for low-carbon district heating would enable buildings in these areas to be exempted from any national ban on fossil fuel boilers, so that they only need to transition once. In areas not designated for hydrogen (which is likely to have a limited role in CPCA) or heat networks, future standards phasing out the installation of gas appliances will allow low-carbon heating, primarily through heat pumps, to become widespread.
- Develop a financing plan (as covered in Chapter 2). There is no single pot for funding. A substantial element of finance will come through the private sector (householders, landlords and owners of non-residential buildings). Some funding will be available from central Government. In the short-term this includes the Green Homes Grant. The CPCA and other authorities should aim to make full use of the local authority element of this funding and encourage its use by householders for basic measures. Beyond this there is funding from the RHI and likely funding from successor schemes. The scale of any gap needs to be identified, and potential funding routes explored.
- Develop plans for public engagement. Local energy plans will provide a focus for meaningful engagement.
- Develop an enhanced central level of expertise with skills to help constituent authorities deliver investment and finance and support procurement strategies. There may be lessons to learn from strategies used elsewhere, including:
 - “Solar Together”, used by Cambridgeshire County Council, offering solar panels to householders with purchasing savings achieved through bulk purchase.
 - Appointment of partners to take forward energy efficiency and renewable energy schemes. Bouygues, for example, have been appointed by Cambridge City Council and Cambridgeshire County Council, and will guarantee energy savings (subject to new equipment being managed within defined limits).

- Lead by example – the CPCA and local authority own estate and social housing should be priorities for action.
- Develop verification and enforcement plans, based on performance

The overall process is well illustrated in an organogram (Figure 4.6) sourced from the Green Buildings Council Accelerator Cities Retrofit Playbook.

The high level of new build expected and being planned for within CPCA makes strong standards for new build even more important. If new homes are built at the rate currently in local plans then they could make up as approaching 40% of the stock in 2050. Development of the Oxford-Cambridge Arc will be a significant contributor to this growth. The Government has committed to set high standards for this development, including for carbon emissions, water management and green space - these will need to be delivered.

Homes built with gas boilers in advance of the Future Homes Standard coming in will have to replace that boiler at a future date. There are examples of authorities within CPCA adopting planning standards higher than national requirements (Greater Cambridge). Pending adoption nationally of a standard unequivocally consistent with net zero it will be useful if that potential is retained, and CPCA should adopt more widely the highest possible standards or future-proofing requirements as soon as possible. London Energy Transformation Initiative (LETI) or RIBA 2030 Climate Challenge standards provide suitable models.

Adaptation

Key to progress will be to ensure that, in relation to retrofit, adaptation measures are considered as part of the whole house package:

- requirements for energy and ventilation need to be co-ordinated. If this is not done, homes with airtight fabric but poor ventilation could be at risk of over-heating and poor indoor air quality. Home upgrade measures might include shading measures, such as high specification blinds or external shading; and ventilation measures such as extractor fans, mechanical extract ventilation (MEV) and mechanical extract ventilation and heat recovery (MVHR).
- Retrofit programmes should include water efficiency measures (e.g. low-flow showers, low-flow taps).

In relation to new developments:

- Assessment of overheating risk should be included within the planning process. Developers should be required to assess factors such as site location, hard surface adjacency, building layout and green space availability, and mitigate as appropriate. This could include passive and active cooling measures. Provision of urban greenspace, as well as having amenity and health benefits, can also help mitigate the urban heat island effect, reduce overheating risk and has potential for biodiversity net gain.
- SuDS should be required in all developments. Where they are currently built in this is frequently through “grey” measures (e.g. underground retention systems), and not “green” SuDS (e.g. rain gardens, grassed areas, swales, and ponds). Green SuDS have substantially higher benefits (for water quality, biodiversity, amenity and health) and should be strongly preferred in guidance (for new build and retrofit).

- Consideration should be given to setting more ambitious standards for water consumption in new build regulations.

What does it mean if we take these actions?

Delivery on these recommendations should help put CPCA on track to net-zero, with substantial reductions in emissions.

There will be some up-front costs.

The PCAN analysis for this report suggests an investment requirement, across the region, of £5.4 billion over the next couple of decades for all the housing measures it has assessed, of which £2.3 billion would more than pay back in reduced energy costs. For public and commercial buildings, the overall investment requirement is around £3 billion, of which approaching £2 billion would be cost-effective in reduced energy bills.

Mechanisms to provide and incentivise provision of this funding require further consideration. Some of the cost will fall to the public sector, and some to households and business. The PCAN work suggests that substantial progress is possible through a package of measures that overall is cost neutral in impact.

Aside from emissions reduction, this investment will also then provide substantial wider benefits:

- Our homes and buildings should be safer and more comfortable to live and work in. They should be better for our health and more affordable to run:
 - Health. Close to one-third of excess winter deaths are currently attributable to living in a cold home. Respiratory infections and circulatory disease are also associated with poorly heated homes.
 - Energy efficiency measures should mean lower energy bills. There should be particular benefits to lower income households and those in fuel poverty, who spend more on heating relative to income than higher income households, mainly because of more energy-inefficient homes
 - Overheating risks can be reduced and indoor air quality improved.
 - Improved water efficiency should reduce bills (with some impact in reducing energy usage as well).
 - Improved flood resilience from property level measures and SuDS.
- Increased green spaces and green SuDS have a range of benefits: helping to maintain water quality and supply; helping to reduce surface water flooding; supporting biodiversity; having amenity value; health benefits; providing space for walking and cycling. Those living in deprived areas tend to have amongst the lowest access to good quality green spaces, so there is potential through appropriate targeting to address this inequality.
- New developments planned for good bus provision, and active travel, can help people feel connected to their community.
- Requirements to retrofit our buildings and switch to low-carbon heating should provide many new training and job opportunities in the local area.

Energy

Recommendations

We make the following recommendations.

For CPCA and constituent authorities:

1. Develop a local area energy plan, in close collaboration with interested stakeholders, including distribution companies, consumers and large energy users.
2. To the extent that there is interest in options for hydrogen production within CPCA, prioritise consideration of potential for hydrogen production from surplus generation for uses without more suitable and cost-effective low-carbon energy sources

For Ofgem:

3. Urgently develop and make proposals on distribution network investment ahead of need
4. Urgently provide clarity on revised arrangements for network access (connection charges) to facilitate local decarbonisation projects.

For Government:

5. Advise areas on where hydrogen is likely to be available in the gas grid as soon as possible.
6. Look to streamline, simplify and provide longer-term horizons for schemes funding local energy projects.

Introduction

One of the keys to meeting net zero across the UK will be the expansion and decarbonisation of the power sector. The CCC's balanced pathway has electricity generation expanding from 300TWh today to 460TWh in 2035 and 610TWh in 2050. The near-zero electricity system to achieve this has small additional costs for consumers in 2035 and savings by 2050, reflecting the addition of low-cost renewables.

The policy framework to allow for this expansion is largely set at national level. There will be scope for expanded renewable generation in the CPCA area, through additional solar and onshore wind, but this is not a topic we have explored in detail for this report.

There are however a number of linked issues.

Network infrastructure

The electricity distribution network in CPCA is close to capacity in some areas, particularly around Cambridge. This is already a constraint on growth of low-carbon generation (ranging from solar farms to installation of solar panels on school roofs).¹ The need for network upgrades will rise further as take-up of electric vehicles and heat pumps increases.

There is uncertainty about the scale of this additional demand. UKPN is currently developing projections for the CPCA area, expected around summer 2021. These projections, linking in to the locations of rising demand, will then feed into consideration of investment needs for the network.

¹ CPIER (2018).

It is important that a range of projections are considered, and that these are reviewed with a range of stakeholders, including CPCA and constituent councils. Ideally they should form part of an agreed regional energy strategy.

Linked to this, the next electricity distribution price controls (RIIO-ED2) starts in April 2023. Ofgem has announced that updated business plan guidance will be issued, setting out net zero pathways that Distribution Network Operators (DNOs) should take into account in developing their investment plans. It is considering an approach whereby:

- DNOs should first consider the extent to which flexibility measures (including energy efficiency and demand-side response) can provide a more economic outcome than network reinforcement;
- A baseline allowance would provide for strategic investment to take place, where identified and agreed to go ahead;
- Uncertainty mechanisms could allow for investment plans to flex above that strategic level, to meet “a level of reasonably anticipated demand”. This would recognise that uncertainties in demand are substantial, and provide a route – provided impacts on costs to consumers can be controlled – to further spend.

The earlier these plans can be finalised, the easier it will be to develop investment plans. Mechanisms to allow flexibility in investment could be particularly important in the CPCA region, where uncertain population projections add to the uncertainties over the growth in electricity demand attached to the low carbon transition.

We recognise the need to protect the consumer, who ultimately pays for network enhancement. But it is essential that investment plans take a long-term view. Over-sizing the network, “future proofing” for uncertain long-term projections, is likely to be low-regret and considerably lower cost than an outcome requiring two rounds of reinforcement.

We encourage **Ofgem to make progress in developing its proposals on distribution network investment as soon as possible.**

Connecting to the grid

When new customers require connection to the grid, they are currently required to pay for the costs of their connection and for network reinforcement costs where these are required.² An economic logic for this approach can be adduced – it protects other consumers from having to cross-subsidise the cost of assets for which they are not a user; it encourages new users to locate where there is available capacity, and to consider smart measures to minimise their demands.

However, it can place a very substantial cost on the marginal user (especially where other new users might come on in future), and it might encourage them to develop alternative plans with lower social benefits.

There is a particular issue here with community investments. Energy schemes for local communities are by their nature location-specific – moving somewhere else, to a less constrained area, is not an option. Such schemes may also be established with strong social objectives in mind (helping to tackle fuel poverty and deprivation; bringing communities together), and are unlikely to have easy access to substantial finance to cover upfront costs (even if the project can in theory repay them over the lifetime of the project).

² a share of network reinforcement costs below £200/kW and all costs above £200/kW.

We heard about some of these issues in relation to development of the district heating project at Swaffham Prior (Chapter 4, Box 4.7). In this case, establishing a connection cost with UKPN has been problematic. In the end, an option for a private wire from a solar farm to provide power for community heat pumps has been developed. This has also helped the business case for the project in establishing a firm price for the electricity to be supplied, rather than facing uncertainty over the price available from the Grid.

Whether the private wire is the most efficient solution for the scheme is not clear. It also does not remove potential future liability for UKPN (and the wider community) for the development. Were the private wire or the heat network to fail, for example, it seems likely that the connected households would revert to electricity use for heating, a potential spike in demand with issues for the local network as to how it would cope.

Greater clarity on connection costs, and how they should be met, is urgently required. This is important for the development of community schemes, like that at Swaffham Prior, but upgrade costs could be a barrier for low-carbon schemes more widely, such as provision of EV charging points.

In relation to electricity transmission, Ofgem has recently recommended the creation of an independent body to help lead the transition to net zero at lowest cost to consumers.³ It has recommended that this independent system operator should be fully independent from the network owner, in order to avoid potential ownership conflicts of interest and to meet the regulatory challenge that would otherwise exist from attempting to align the commercial interests of shareholders with consumer interests. There are similar potential conflicts in relation to the distribution network that need to be resolved.

Ofgem is conducting a Significant Code Review (SCR) of network access and forward-looking charge arrangements. A “minded-to” decision on what can be done to help (ranging from, for example, socialising connection costs to allowing investment ahead of need in the price control) is expected later in 2021. Again, we urge Ofgem to provide clarity as soon as possible.

Funding from Central Government

A further issue raised in connection with the development at Swaffham Prior relates to the difficulty of raising finance to develop the proposal. In the end, funding has been secured from a variety of “pots” – the Rural Community Energy Fund, the BEIS Heat Network Investment Project Fund, provision of land and match funding from the Council, and the CPCA. Each of these is welcome. But the process from initial feasibility study in 2017 to an approved investment decision has been lengthy, with many steps in achieving each element of funding along the way. This links to issues identified in Chapter 2. Funding for local energy projects - whether energy efficiency, district heating or other heat decarbonisation - needs to be provided on timetables long enough to support the development of supply chains and confidence in delivery. There is a need for central Government to provide for more stream-lined and facilitative processes.

Hydrogen

CCC scenarios for net zero have significant use of hydrogen in 2050. They show growth in hydrogen demand over the period 2030-2045, principally for use in manufacturing, shipping and back-up power generation. These roles reflect an emphasis on using hydrogen where it has highest value and where electrification is not a feasible option.

³ Ofgem (2021), Review of GB energy system operation.

There is limited use of hydrogen, in these scenarios, in buildings and surface transport. This reflects that use of electricity or gas to produce hydrogen is a relatively inefficient use of power, particularly when that electricity can be used directly for decarbonisation of these sectors.

To the extent that hydrogen is used in some areas in the gas grid to replace natural gas for heating in buildings, it is unlikely that CPCA would be a priority for this use. This is likely to be more suited to areas closer to industrial clusters, for the production of hydrogen from methane reformation with carbon capture and storage (CCS), or from electrolysis associated with addressing curtailment of generation from offshore wind farms. Further clarification on this issue is needed, however, to feed into local planning. We have already noted (Chapter 4) that it would be helpful for BEIS and Ofgem to consider this further and issue guidance on the areas most (and least) likely to be suitable for hydrogen use.

We do not rule out that there could be potential for some production of hydrogen from electricity within CPCA. In general, this is likely to be quite costly, but it may be economic where electrolyzers can be located where they can help to manage variable supply (from wind or solar) on the electricity distribution system:

- Using power that would otherwise be surplus;
- Providing frequency management services.

This may also point to locations in areas where grid constraints limit the amount of power that can be transferred from one part of the system to another.

Where there is generation that would otherwise be curtailed, cost projections by CCC suggest that hydrogen from a PEM electrolyser would move closer to cost competitiveness with hydrogen from gas reformation plus CCS. Such production is unlikely to lend itself to use for heat in buildings – without storage – since winter heat demand does not align with solar generation. But hydrogen production for use in surface transport – buses or HGVs – might be more practical.

Cambridgeshire County Council is alive to the possibility of hydrogen production from surplus electricity. Indeed, more generally it has formed an Energy Investment Unit to explore options to maximise the use of its own assets to produce low-carbon energy for local use, with a number of projects (principally solar with electricity sold back to the grid) already developed. We do not think the economic potential will be large, but the considerations above suggest that options for production of hydrogen from electricity are worth exploring for the specific circumstances where they might be economic. Such opportunities may arise in future as more renewables generation comes onto the system – the low cost of variable renewables make it attractive to “over build” capacity, which may then produce surplus generation at certain points of the year.

Local Area Energy Planning

We have covered the need for local area energy planning in Chapters 2 and 4, with recommendations to CPCA and constituent authorities to expand the system-wide consideration of options.

To ensure that this is taken forward effectively, it is essential that this happens with the active involvement of network operators, for gas, electricity and heat. Planning needs to reflect agreed sets of projections and understanding of priorities for network investment. UKPN will have a good view of where constraints currently exist and how these will be impacted by growing demand. CPCA and local authorities will have good sight of local requirements for net zero, and the national and local policy measures to be adopted in the transition, thereby impacting on demand.



Peat

Recommendations

1. The CPCA should establish and provide funding, estimated of the order of £50,000 a year, to support the operation of a CPICC Fenland Peat Committee, initially for a period of 5 years, with a remit to inform and develop 'whole farm' land use policies aimed at achieving climate change mitigation, adaptation and biodiversity enhancement in the Fens, and to help establish an agreed set of numbers for GHG emissions for deep, shallow and wasted peat soils.
2. Up-front funding should come from CPCA, and also be sought from Defra, NERC and other sources, to support the work of the Fenland Peat Committee but also more widely, for:
 - On the ground research to fill in the current gaps in the scientific evidence
 - Development of best practice guidance
 - Provision of farming advisers to support farmers in the transition.
3. Cambridgeshire County Council and Peterborough City Council should work to develop the role of County farms as leaders and exemplars in the transition.
4. The CPCA should establish a process to consult on and develop a vision and strategy which takes account of economic impact and goes beyond the single issue of peat emissions, taking a leadership role at the forefront of national action. This will need strong engagement with local communities, particularly farming.

Summary

- Emissions from peatland are currently largely excluded from the emissions inventory. There is substantial uncertainty in estimates, but inclusion could add a further 45% to overall CPCA area estimated emissions.
- Sustainable agriculture practices and restoration are needed to tackle this.
- For the UK as a whole, the CCC central scenario consistent with net zero includes the sustainable management and re-wetting of 60% of lowland peat by 2050.
- It is unclear where the Fenlands fit within this, and there has likely been some previous over-estimation of emissions and peatland extent in the Fens. However, the Fens includes almost a quarter of the lowland peat area in England and Wales. Choice of appropriate options is dependent on the nature and extent of peatland soil, which is currently not well understood. Work is underway, nationally, which should help improve our understanding of the level of emissions and the costs and benefits of alternative practices.
- Climate change is likely to lead to higher summer temperatures and greater periods of drought. Without actions to address these impacts, they are likely to lead to increased loss of peat and higher emissions.
- Key requirements locally are to:
 - Develop a "whole system" vision and action plan for the future of the Fens, looking for wide buy-in of the many actors and stakeholders with an interest.

- Build the evidence base by improving the mapping of Fenland peat by soil type (peat depth, amount of mineral content) and increase the accuracy of emissions measurements from differing soil types and crop rotations.
- Establish a Cambridgeshire Fenlands Peat Committee to begin the work needed to deliver objectives and to support the work of Defra's Lowland Peat Taskforce and Lowland Peat Strategy.
- Develop best practice guidance for regenerative farming and peat restoration.
- The issue, given the scale, is an acute one for the region. Leadership in the area has potential to be nationally significant.

Introduction

The current UK emissions inventory includes 1.5MtCO₂e annual emissions from peatlands. Within the next couple of years, however, the coverage of the inventory is likely to be extended, possibly raising recorded peatland emissions by 17-21MtCO₂e¹, though there are large margins of error around this estimate². This would add around 4% to overall reported UK emissions.

Whether or not within the inventory, these emissions are of great significance for CPCA since the Fens contains around 23% of the area of lowland peat in England and Wales.³ This does not distinguish between true peat (deep and shallow) and wasted peat. However, the CPCA share of lowland peat emissions will be relatively high – the historical drainage of lowland soils in the Fens, for agricultural use, is associated with emissions as the drying out of peatland has resulted in the release of previously stored carbon to the atmosphere, and the loss of dissolved organic carbon to streams and other water bodies. Whether the CPCA share of overall emissions is higher or lower than its share of peatland area is uncertain. There are differences in emissions as between deep, shallow and wasted peat which are still poorly understood. Current rates of loss of peat and levels of emissions are uncertain.

Based on the emissions factors and peat areas used in Evans et al (2017)⁴ a best estimate of emissions from cropland on peat in the CPCA area, subject to considerable uncertainty, is around 2.6MtCO₂e/year.⁵ That would add around 45% to emissions from all sources. Measures to reduce these emissions are critical to success in reaching net zero overall.

Although comprising less than 4% of England's farmed area, the Fens contributes more than 7% of UK agricultural production (worth £1.23bn), and a third of vegetable production. CPIER data showed the Fens as contributing 8% of the CPCA economy. Across the farming food chain it provides employment in CPCA to nearly 44,000 staff, of whom over 17,000 work in agriculture and its input suppliers, and 26,000 in food processing and distribution.

CPIER data also show Fenland communities have markedly worse levels of educational and health outcomes, which may make them poorly-equipped to deal with the impacts of rapid economic change.⁶

1 CCC (2020), The Sixth Carbon Budget – The UK's path to Net Zero

2 The Climate Change Committee quotes a confidence interval for overall UK peatland emissions from less than 10MtCO₂e to more than 40MtCO₂e annually. Burton and Hodgson (1987), Lowland Peat Survey of England and Wales

4 Evans et al (2017), Implementation of an Emissions Inventory for UK Peatlands, A Report to the Department for Business, Energy and Industrial Strategy.

5 The Net Zero Cambridgeshire (CUSPE) report estimated CPCA emissions from peatland at around 4-5.5 MtCO₂e annually, but this estimate is based on a mis-estimation of the peatland area.

6 CPIER (2018) and NFU (2019), Delivering for Britain – Food and Farming in the Fens.

So measures must be considered carefully, both in terms of cost-effectiveness and their social, and cultural impacts.

It is also critical that the underlying data on emissions are better understood. There are a number of significant uncertainties and complexities around the current data:

- The estimates of emissions are based on limited recent studies on emissions, applied to underlying mapping data collected thirty to forty years ago;
- There are important distinctions to be made between emissions from different peats (Box 6.1), which will in turn impact on mitigation options.
 - The extent of shallow and wasted shallow peat in the Fens is now very much greater than the area of deep peat. A very high share of wasted peatland in England is in the CPCA area (approaching 40%), but less than 5% of the deep peat area.
 - In the absence of good data, emissions estimates tend to be based on a combined estimate for cropland farming on peatland – across wasted and deep peat – of around 37tCO₂e/year/ha. But there are reasons – and emerging flux tower data - to suggest that, per hectare, wasted peat emissions might be lower than from deep peat
 - It is clear that the emission rate, per hectare, is complex, impacted by factors including water levels and land use. Attempts at accurate measurement are only now underway.
- This means that peatland restoration has a role in areas of remaining deep peat, and to preserve carbon stocks. But in terms of scale, reduction (and potentially even reversal) of emissions through regenerative farming measures on areas of wasted peat are likely to be a priority, with restoration of these soils, in practical terms, unrealisable.
- We do not have an up-to-date detailed map of the location of these different peats. Individual farms may have pockets of deep peat and of wasted peat. Each farm will have to identify the solutions best for them, but understanding the practicality and overall cost of restoration and different management practices is made more complex by these variations in conditions.

There are emissions attached to farming wherever it is carried out. Actions are needed to minimise these emissions in all areas, taking account of the conditions in each area. But if food production shifts from the Fens, there will be emissions attached to that food production elsewhere. So whilst peat emissions are of great significance, the relative efficiency of production in the Fens, lower use of artificial nitrogen fertilisers, and differences in water use and leaching must also be taken into account.

Nevertheless, these Fenland emissions are substantial. While work continues to improve understanding of scale, and of different land management practices, we must not allow existing uncertainties to be an excuse for inaction. There are good practice examples (covered below) and we know enough to progress a number of actions that make sense now. We will be able to build on those actions as improved information and the Defra peat strategy (due later in 2021) emerge.

Indeed, there is potential for emerging evidence from the Fens area to influence that national strategy and its implementation. It should also support the NFU commitment for UK agriculture to achieve net zero by 2040.⁷

Box 6.1: Definitions

- *Deep peat: peat depth of 40cm and over*
- *Shallow peat: peat depth of 10-40cm*
- *Wasted peat: deep peat that has been substantially degraded following years of drainage and cultivation, so that the peat is more dominated by underlying mineral materials. The soil organic matter could be as low as a healthy mineral soil outside of the Fens.*
- *Active peatlands: areas where peat is currently forming and accumulating; likely to be areas with vegetation cover and largely unmodified hydrology. With favourable management, where near-surface water levels have been restored, degraded areas may be returned to an active state.*

Based on soil survey data from 1987 the area of peat soils in the Fens exceeding 40cm depth - some of this outside the CPCA area - was an estimated 158,700 ha. A large part of this deep peat soil, an estimated 107,000 ha, is likely to be wasted peat, leaving 51,700 non-wasted deep peat. Later estimates (Cranfield University (2013)) put this area of deep peat at 33,500 ha.

Estimates by Evans suggest around 14,500 ha of deep peat area within CPCA, and 69,700 ha wasted peat, not all of this in agricultural use.

It is estimated that the amount of carbon stored in the peats in the East Anglian fens is around 37Mt of Carbon, declining owing to wasting, and down from around 53Mt at the time of the Lowland Peat Survey.

Sources: Natural England; Cranfield University (2013), Restoration of Fen Peatland under Climate Change, report to Committee on Climate Change; Scottish Natural Heritage (2014), Scotland's peatland – definitions and information resources, report 701.

What is happening locally?

There is growing farming awareness of the scale of the issue attached to peat emissions and degradation of farmland, and the need to address this. Some are beginning to take action:

- Regenerative farming techniques are being used by an increasing number of Fenland farmers, such as Hannah Darby at Sawtry Fen and G's. At G's, for example, husbandry techniques include cover crops, grazing livestock, managing water levels and application of liquid digestate from an anaerobic plant back onto the land. Less productive areas of farmland have been taken out of production in favour of permanent woodland, hedgerows and wetlands. Levelling of deep peat land has allowed a sub-irrigation system to accurately control the level of the water table, reducing peat oxidation in the summer months.
- The Great Fen Paludiculture (wet-farming) Trial (Box 6.2) is trialling the growth of wetland crops. Initial results from elsewhere suggest good economic potential for growth of sphagnum.
- Peatland restoration, mainly small-scale, has been undertaken by conservation partners at a number of sites. Approaches have varied from detailed intervention at RSPB sites to a rewilding approach at Wicken Fen (Box 6.3).

⁷ though for this commitment to support net zero across the UK, it will be essential that there is robust accounting for measures such as use of bioenergy with CCS.

- Cambridgeshire County Council owns around 200 tenanted farms and Peterborough City Council also has 2 farms, covering a combined area over 14,000ha, of which a significant proportion are on peat and wasted peat soils. A Monitor Farm to test and share best practice is being developed. The Cambridgeshire Council has committed to updating tenants with information as understanding of good practice and wetland farming develops.
- Fens for the Future Partnership is a group of public, private and voluntary sector organisations with a broad aim to develop a partnership approach to landscape-scale conservation in the Fens. The vision is to see sustainable wetland restored, re-created and reconnected for the benefit of people, wildlife, natural and historic heritage and the rural economy. Membership has broadened from environmental organisations to include strengthened links to the agricultural and business communities. Partners currently include the Environment Agency, Natural England, Peterborough City Council, Cambridgeshire County Council, the National Trust, RSPB, Anglia Ruskin University, the UK Centre for Ecology and Hydrology and the NFU.
- The National Institute of Agricultural Botany (NIAB), which researches plant genetics and disease, has headquarters in Cambridge, a research station at Park Farm, near Histon, and an Innovation Hub near Soham. Applied research at NIAB could have a direct bearing on Fenland farming in relation to sustainability, productivity, the development of paludiculture crops and responses to the impacts of climate change.

Overall, however, the response remains patchy. At this stage, without significant efforts to extend best practice, the scale of actions undertaken is unlikely to be sufficient to avoid significant further loss of peat and substantial further emissions.

Climate Change Committee (CCC) recommendations

In its recent report on the UK pathway to net zero emissions⁸, the CCC sets out its expectation that at the current rate of degradation (10mm/p.a. or more) most remaining peats will be wasted over the next 30-100 years. It sets out the benefits of well-functioning peatlands for the accumulation of carbon, provision of cultural services (such as recreation) and provision of wildlife habitats supporting diversity.

Further, the CCC notes that warmer and drier conditions in future are likely to increase the rate of carbon loss from degraded peatlands, suggesting that delaying action to reverse degradation will lead to increased costs when actions are taken. The CCC is currently developing an evidence report, due to be published in summer 2021, on the risks from climate change.⁹ One of the assessments feeding into this work¹⁰ indicates that higher summer temperatures can lead to drying and desiccation of peat, leading to increased decomposition, damage to vegetation such as sphagnum cover, damage to soil structure and exposure of bare peat and erosion. In turn this may lead to increased emissions. Degraded peatlands (e.g. with lowered water tables that retain some sphagnum cover) may be most at risk and therefore a high priority for adaptation measures.

⁸ CCC (2020), The Sixth Carbon Budget – The UK's path to Net Zero

⁹ To inform the Government's third Climate Change Risk Assessment.

¹⁰ UKCEP (2020), Climate driven threshold effects in the natural environment, Report to the Climate Change Committee, May 2020.

Box 6.2: The Great Fen Paludiculture Trial

The Great Fen paludiculture trial is a 2-year project (initially running from April 2019 to March 2021) trialling the growth of selected wetland crops (including bulrush (typha), reed (phragmites), a cereal crop (glyceria), watercress and sphagnum). As well as food and flavouring, the different crops have potential applications in industry and medicine.

The site of the trial, on the Great Fen between Peterborough and Huntingdon, is only 4ha and limited to testing the growth of crops to harvesting. To be considered a viable option for farming, substantial further work will be required in field-scale trials, to consider harvesting and processing practicalities and to grow markets.

Box 6.3: The Wicken Fen Vision

Wicken Fen is a National Trust nature reserve near Cambridge. Based on rewilding principles, the Wicken Fen Vision is a 100-year plan, through the progressive rewetting of land and restoration of natural processes (such as wild grazing), to create a diverse landscape with habitats for a variety of wildlife and access and recreation opportunities for people.

Work for our report similarly records that lowland peat may degrade more quickly with warmer summers.¹¹

The CCC includes scenarios for lowland peatland to 2050 consistent with achievement of net zero across the UK as a whole. Its balanced pathway scenario includes the re-wetting and sustainable management of 60% of lowland peat by 2050:

- 40% of lowland cropland is re-wetted (25% to near natural condition; 15% to paludiculture)
- 35% of lowland cropland is sustainably managed (i.e. water table management)
- 50% of lowland grassland is re-wetted.

Government position

The intention under the Environmental Land Management (ELM) scheme is to pay farmers for the provision of public goods. The Government's 10-Point Plan has reiterated that funding for peatland restoration will be included within this. The scheme is also likely to support the adoption of a greater range of regenerative agriculture techniques.

The Government's Green Recovery Challenge Fund, aiming to help recovery from the COVID-19 pandemic, has also provided funding for nature conservation and restoration projects across England. A first round of this scheme closed for applications in October 2020, but a second £40m round has been announced and is due to open early in 2021.

A policy discussion document on a potential England Peat Strategy was published in June 2020. This included a commitment to restore 35,000 ha of peatland where economic to do so, and proposed wider aims to bring all peatland into good condition, restoration management or more sustainable management by 2040, and to secure peatlands' carbon store. A comprehensive England Peat Strategy is due to be published soon.

¹¹ CZ (2021), Aines, E.D., Simpson, C., Munro-Faure, A., Shuckburgh, E., 2021, Preliminary report on climate risk in the Cambridgeshire & Peterborough region, 2020-2099, Cambridge Zero: University of Cambridge.

A Lowland Agricultural Peat Task Force has also been established, to examine how lowland agricultural peatland can be better managed to safeguard productive agriculture as well as contribute to the net zero target. This task force, bringing together farmers, water management stakeholders, academics and conservationists, will be supported by 4 regional sub-groups, including one for the East of England. It is to report to the Government in 2022.

Barriers to action

There are a number of barriers to action:

- Status quo. The skills and knowledge to manage land differently (whether through regenerative techniques, paludiculture or seasonal re-wetting) are growing, but still in short supply. Whilst land remains productive in current use, and faced with uncertain implications of change - uncertain markets, lack of information and advice, potential investment requirements – action is easy to postpone. The fact there is no single answer makes the decision-making process substantially more complex:
 - Restoration of peatlands, through frequent, possibly long-duration flooding, is relevant to remaining areas of deep peat. It has a high cost in lost agricultural production. Variability in conditions also means that costs of restoration are hard to estimate;
 - In other cases, managerial options, such as managing water tables or seasonal re-wetting in the winter months, could reduce emissions from peatland remaining in production.
 - Grassland, coping better with summer flooding events (summer storms), may play a role in some places.
 - The resilience of peat soils to erosion and to climate change when managed appropriately is not widely understood.
 - Uptake of more carbon friendly regenerative techniques requires challenging conventional commercial norms.
- The cost of carbon, because it is not borne by the operator, is not factored into decisions. This needs to be addressed by a national policy framework. A Cranfield University study¹² has found, once carbon costs are included, there are significant net benefits for restoration and conservation over continuing with practices unchanged (and other environmental and ecosystem benefits are likely to add further to that). But so long as carbon costs are not included, the economics of different options do not reflect the real costs.
- Farmers' business models and farming practices are likely to need to change. But tenancy agreements may constrain what is possible in the short-and medium-term.
- In relation to water resources, spatial policies are developing through Water Resources East (WRE). But the hydrology of the area is not necessarily well understood in detail, favouring continuation of the status quo:

¹² Cranfield University (2013), Restoration of Fen Peatland under Climate Change, report to Adaptation Sub-Committee of CCC.

- Within an Internal Drainage Board (IDB) district, the water level cannot be changed to allow change in farming practice for one farmer if that is to the detriment of another. It may then be necessary (but hard) to show no-detriment, or farmers will need to move together.
- The impact of re-wetting on water availability and how this ties in with the impacts of climate change need to be better understood. Seasonal re-wetting may also be constrained by the need to keep land permanently drained for continued flood management and for mitigation against summer thunderstorms which could become more prevalent as a result of climate change.
- Whilst there is an increasing focus on water supply issues (the East of England is classed as a water-stressed region), there is currently only one reservoir in the Combined Authority area (Grafham Water), with all other supplies from groundwater sources. Construction of more farm reservoirs may well be an economic proposition and help provide rewetting solutions in suitable areas.

A particular focus for action must be the relatively small number of IDBs which hold a large proportion of the remaining carbon store. Estimates by Cranfield University¹³ suggest that more than half of the remaining peatland Carbon store is located in just 5 IDBs (Southery and District (14%); Whittlesey (13%); Holmewood and District (13%); Hundred Foot Washes (7.5%); Middle Fen and Mere (5%), much of which is in the CPCA area.

What is needed

There is an urgent need for action to address peatland emissions in the CPCA area and to engage with the Lowland Agricultural Peat Task Force on behalf of the Fenland farming and conservation communities. Where restoration and regenerative farming practices can be adopted, we are keen that these go ahead. Farmers will learn from examples and best practice elsewhere. At the same time, if widespread adoption of new practices is to happen, the complexities of emissions from different peatland soils and the appropriateness and practicalities of different options need to be better understood. The actions needed are therefore not simple. We group them in 3 categories: improving the evidence base; identifying best practice; local leadership – though we believe that our recommendation for the establishment of a Fenland Peat Committee can have a role on each.

Improving the evidence base

Continued work is needed to gain a better understanding of the nature and quantity of peat emissions; to identify the areas most vulnerable to peat loss; to identify peat soils suitable for wet farming; to further research and demonstrate wetland crops; to understand the role of grass, wetland crops and to develop markets.

In relation to emissions, the CCC has set out estimates of emissions for areas of lowland peat remaining in agricultural use (Box 6.4) and estimates for the costs of restoration (Box 6.5). The CCC highlights the considerable uncertainties in peatland emissions, reflecting a lack of robust data relating to the condition, location and extent of peatland under different land use types. There is a need to confirm the appropriateness of these values for the Fenlands and to understand better how these vary according to local conditions. It would also be helpful to establish the difference in emissions, taking a whole farm systems approach, between farming on peat and wasted peat soils as against true mineral soils, taking into account emissions from all activities and inputs (e.g. nitrates, water use and nutrient leaching).

13 Cranfield University (2011), Holman, IP, Kechavarzi, C, A revised estimate of peat reserves and loss in the East Anglian Fens, report commissioned by the RSPB.

Box 6.4: Climate Change Committee estimates of peatland emission rates

The CCC's sixth carbon budget report includes estimates for emission from lowland cropland peat:

- *Current lowland cropland: around 39.5tCO₂e/ha*
- *Sustainable management, lowland cropland peat under dynamic water-table management (seasonal re-wetting): the water-table is raised to 10cm below the peat surface in winter when no crops are in the ground, and drained to 40-100cm below the surface in the growing season. Assuming an average water table depth of 50cm across the year, emissions fall by around a half, to around 18tCO₂e/ha*
- *Sustainable management, lowland cropland under a permanently raised water table: to an average 40cm below the peat surface. Emissions fall to around 16tCO₂e/ha*
- *Paludiculture: emissions could fall by as much as 90% to 3.6tCO₂e/ha.*

Source: CCC(2020), *The Sixth Carbon Budget – The UK's path to Net Zero.*

Box 6.5: Costs of restoring lowland peat

There is relatively little data on the upfront costs of restoration. The CCC uses data from a wetland conservation centre in Norfolk and a water and land management company that carries out restoration works:

- *An indicative central cost estimate is £2,500/ha, but this is within a wide range of £800 to £5,500/ha.*
 - *Low end figures are indicative of light intervention such as the reseeded of arable land to allow for low levels of grazing*
 - *Median cost figures could involve the use of machinery such as bulldozers to move soil and re-landscape, clearing of ditches and planting of sphagnum*
 - *High end figures could include additional costs of woodland and scrub removal, and submersible electric pumps to keep the water table high*
- *There are also ongoing maintenance costs that can include water pumping, ecological surveys and the cutting of grass for silage if the land is not grazed.*
- *Any compensation for previous use is not in these figures.*

Source: CCC (2020), *The Sixth Carbon Budget – Methodology Report.*

Work is underway, or planned, which should improve our understanding:

- A BEIS commissioned project is underway to improve quantification of the area of wasted peat in England. This is led by Chris Evans from CEH and Bangor University. Field measurements will inform the derivation of new emission factors. The project is due to run until 2023, but preliminary estimates are expected later in 2021;

- A Defra-funded sustainable lowland peat project is developing evidence on a range of options that allow for continuing crop production;
- Defra plan to commission work, coordinated by Natural England and starting in 2021, to develop an updated national peatland map (location, depth and condition);
- NIAB is intending to carry out a literature review of Fenland crops considering how they might be developed to grow successfully in wetter soils.

More, however, is required to complement this nationally commissioned work.

Particularly important is to improve the mapping of Fenland peat, identifying depths of peat and organic matter content of wasted peats. Initial funding has been provided to establish a Fenland Peat Committee (Box 6.6), drawn from leading academics and stakeholders in the area (currently with support for the proposal from NIAB, the Cambridge Conservation Initiative, Ely Drainage Board, WRE and the NFU). The immediate aim will be to pump prime and lead initial work building up a map of the soils across the region, based on the knowledge of a network of farmers. This will feed into a project led from Bangor University, dependent on funding being secured from NERC. Improved understanding of the Fenland soils, with differing characteristics and emissions, can then be matched up with potential mitigation practices.

Continuing and developing the paludiculture trial at Great Fen there will be a need for farm-scale trials, and to begin the development of new markets and supply chains. Early adopters are a means to build understanding and foster wider take-up. Plant breeding programmes also need to develop new crops suitable for paludiculture, as well as wheat varieties suitable for wetter conditions.



Box 6.6: The CPICC Fenland Peat Committee – proposed Terms of Reference

The Committee aims to inform and develop ‘whole farm’ land use policies aimed at achieving climate change mitigation and biodiversity enhancement in the Fens, and to help establish an agreed set of numbers for GHG emissions for deep, shallow and wasted peat soils.

The Committee will:

- 1. Coordinate and provide expert “on the ground” farming engagement with hydrological and other scientific advisers in the Eastern Region to interact with Defra’s LAPTF and Defra’s and BEIS’s Lowland Peat 2 research programme (LLP2)*
- 2. Undertake surveys and mapping of the location by types of peat soils to better define the areas where greenhouse gas emissions are occurring at elevated levels and establish best practice for how these emissions are accurately measured*
- 3. Evaluate locally the farming practice mitigations being proposed by the LLP2 programme, and in particular the opportunities and/or constraints for:

 - i. regenerative agriculture across the fens; and*
 - ii. raising water tables within and across the seasons in areas of remaining deep peat**
- 4. Work with local scientific and crop development resources to review opportunities in paludiculture and other plant adaptations*
- 5. Consider, at farm level, the contributions that regenerative and nature friendly farming techniques and, at a landscape level, the contribution a Nature Recovery Network and the Doubling Nature ambition could make to emissions mitigation*
- 6. Work to improve the clarity of what ELMS will fund – aiming to ensure that specific actions for sequestering carbon and for farming on peat and regenerative farming are incorporated – and to explore the potential for other funding mechanisms such as development of a robust system for carbon credits*
- 7. Establish methods of monitoring the economic and social impacts of the proposed changes on Fenland farming, the wider Fenland economy, and Fenland communities*

Identifying best practice and policy support

Building on the successful adoption of regenerative farming practices at specific locations and emerging evidence from paludiculture trials, there is a need to develop understanding of best practice and to communicate this information more widely to farmers.

Restoration may be effective in some settings, but will not be practical and economic everywhere. In other situations, we need to embed changes to management practices which reduce damage to peat and reduce emissions. We can outline the kind of practices that make sense (Box 6.7). This should be developed more fully, drawing on inputs from interested stakeholders, to include the NFU, Natural England, conservation groups and water companies. It can also be informed by work currently underway, through Defra, which is seeking the views of farmers on the practicality of around 30 mitigation actions, results from which should be emerging in the next few weeks.

A process for funding and taking this work forward needs to be established. We consider that this should be a priority for Defra funding. It links to work that Defra is already undertaking to consider best practice, as part of developing the lowland part of the England Peat Strategy. The

point here is not to replicate that work, but to work with the Lowland Agricultural Peat Task Force to develop practical solutions that reduce emissions, are economically feasible, support the required agricultural transition, and link with the future ELM system.¹⁴

Box 6.7: Stabilisation practices

Regenerative Farming – Some examples appropriate for shallow and wasted peats

A. Living root policy – the land constantly has a crop in it; whether it is a cover crop or a key commercial crop. This significantly reduces the threat of soil erosion. Similarly, the cover crops sequester carbon and develop a mycorrhizal fungi network at the roots. This fungi network plays an important part in maintaining the carbon pool. Instead of harvesting the cover crop, it is grazed which generates natural manure that enriches the soil and encourages the crop to regenerate or it is mulched and ploughed into the soil profile.

B. Diversification of crops – the cover crop can be made up of a 5-way mix (mustard, vetch, black oat, phacelia and tillage radish) within the rotation of the principal crops

C. No or reduced tilling – Reducing ploughing leads to the ground being less damaged and for the natural soil ecosystems to develop. This also ensures that the fungi networks are able to remain intact throughout the cropping cycles. Additionally, the reduction in tilling increases soil aggregate stability and promotes the formation of recalcitrant soil organic matter fractions within stabilized micro- and macroaggregate structures so protecting the soil organic matter (SOM) and as a result the soil organic carbon (SOC).

D. No artificial inputs – By removing the use of nitrogen, the oxidisation process slows down considerably. Option to add organic by-products from an anaerobic digester plant as potential alternative.

E. Precision farming – Introduction of variable rate application of nutrient and water, and use of drip irrigation so controlling the amount of water used and targeting its application

F. Fallow years – Resting fields in production for a year and putting it down to grass. This holds the carbon in the ground and allows for more carbon to be captured each time the fields are mown or grazed. These activities also allow for the regrowth of the grass; in so doing improving the efficiency of water and nutrient use by the grass, increasing the carbon capture into the soil and reducing, potentially reversing, the organic matter decomposition rate.

G. Livestock – Incorporating grazing of livestock into the rotation. This adds nutrients to the soil

Deep peats

A. High value agricultural land

a. Practice water table control techniques that reduce CO₂ output, conserve the remaining peat, conserve water and eliminate the CO₂ output associated with conventional irrigation methods.

b. Incorporate regenerative farming practices listed above

B. Low value agricultural land

a. Potential to cultivate sphagnum moss, alternative fodder crops, bioenergy crops or construction materials suited to higher water tables

b. Return to native wetland vegetation.

c. Incorporate solar panels into a wetland habitat.

¹⁴ LAPTf objectives announced in December 2020.

Local leadership

There are pockets of good practice, but nothing like an agreed vision and strategy for lowland peat in the Fens. Where major projects are taken forward this is currently almost always dependent on specific individuals or organisations taking a lead – sometimes coming together with others, but on an ad hoc basis for that particular project. This needs to change.

With appropriate funding the Fenland Peat Committee we have proposed could have an immediate role, helping to marry up scientific knowledge with the practicalities of farming, conservation and maintenance of Fen landscapes:

- Provision of expert advice, alongside farmer-to-farmer engagement. The Fenland Peat Committee can use its multiple stakeholders to map out knowledge exchange programmes. These can build on the work that the Cambridge science community has already contributed via NIAB, Agri-Tech East and Government programmes such as Catchment Sensitive Farming and facilitation funds for Nature Friendly Farming. They will also help to inform recommendations for the structure of the new ELMS, designed to support carbon-friendly farming.
- Engagement with County farms. With the support of Cambridgeshire County Council and Peterborough City Council, the County farms could be a good place to start in terms of developing good practice, information gathering and sharing, and working in clusters to address water management issues. County farms could also, as opportunities allow, shift selection of tenants towards those more open to adoption of new sustainable farming practices.
- Engagement with the Internal Drainage Boards (IDBs) and water companies. The role of IDBs needs to shift towards holding water within the system, pumping water to where it is needed for irrigation, to keep wetlands wet and for public usage. They must work to develop understanding of the feasibility of rewetting different areas:
 - Opportunities for raising summer water tables in areas of remaining deep peat.
 - Given the catchment focus of IDBs, clusters of interested farmers will need to be encouraged to work together on new proposals for water level management.
 - Rising water demand attached to growth in Cambridge may further improve the case for investment in water management in the Fens, where the infrastructure is ageing.

There is also a need for development of a higher-level strategy. The vision for the area needs to recognise the livelihoods that are currently dependent on agriculture in the Fens, and the high level of outputs from that production. It needs to recognise that continuing as at present is not sustainable, and that without change in the long-term local livelihoods will be at risk. The challenge is to develop the vision for a new economic identity for the area, consistent with environmental sustainability and reduced emissions.

The Independent Climate Commission recommends that the CPCA establishes a process to consult

and develop such a strategy. Properly constituted, with broad farming, conservation and scientific membership, the Fenland Peat Committee could help to develop a wider “whole system” vision and strategy, which goes beyond the single issue of farming’s peat emissions. The Fens Biosphere proposal (Box 6.8) and a Nature Recovery Network could be a part of this. Whatever approach is adopted, to be effective and influential in tackling peatland emissions it will need to have a strong focus on engagement with farming in relation to sustainable farming practices and build on the work of conservation groups.

If these proposals are taken forward, the CPCA area can be at the forefront of national action. Indeed, there is potential for this to be internationally significant.

Box 6.8: Fens UNESCO Biosphere proposal

A number of partners (including Natural Cambridgeshire, Fens for the Future), are developing a proposal to UNESCO, to be made in 2021, to designate the Fens as a Biosphere Zone. This would aim to build on the identity of the Fens as a unique area with a strong natural and cultural heritage linked to its rich peaty soils, waterways and wetlands, and network of historic cities, market towns and villages. Such a designation would recognise this value and an area of excellence in approaches to conservation and sustainable development.

In practical terms, the intention would be to use the Biosphere “brand” to develop a shared vision for the future of the Fens:

- *to attract new investment to grow and diversify the economy;*
- *to benefit local communities and reduce social inequalities;*
- *to protect and invest in natural and cultural capital.*

Within this, the intention is that the Biosphere would help develop understanding of how issues such as loss of peat and carbon emissions can be addressed, support community programmes to use resources wisely and reduce emissions, and showcase best practice in sustainable farming.

Source: Fens Biosphere: Big Skies, Big Vision, a brief for local authorities (www.fensbiosphere.org.uk)

What can I do?

Introduction

The chapter is a bit of change from the earlier chapters. Rather than focus on a theme, with an analysis of the challenges and a set of recommendations to organisations, this chapter focuses on what we as individuals and families can do right now. Our survey highlighted a strong desire amongst residents to get involved in responding to climate change, and wanting guidance on what they might do. This chapter will hopefully give you some immediate suggestions, and we have put in links to sources of further information.

Tackling the climate crisis requires large changes across our societies and economies, from the local to the national to the global, and concrete actions from governments and businesses, in particular. However, there are ways in which individuals, families and communities can contribute positively to this change.

This chapter aims to give you some immediate suggestions, and we have put in links to sources of further information. The suggestions below are some of the key actions we can all take at a personal level to reduce the local emissions within Cambridgeshire and Peterborough, and to help to mitigate the impact of the climate changes already happening. There are other topics the Climate Change Commission will continue to explore (including waste, food supply, water) and make recommendations on, and future changes to technologies and policies.

Quick tips – think TWICE to reduce your impact on the environment

Travel -	Travel sustainably by walking or cycling or using public transport
Water -	Use less water where possible
Informed -	Stay informed on climate change and inform other people
Change -	Make changes to your home to make it energy efficient through insulation and non-fossil fuel heating sources
Energy –	Turn down your heating where possible

Actions for your home

Improve home heating and energy efficiency

As a resident of Cambridgeshire and Peterborough these are some of the things that you can do now to help reduce the effects of climate change and adjust to its impacts. One of the simplest you can try straight away is to turn your home heating down – try adjusting your room thermostat down by 1°C. If you don't notice much of a difference then try another 1°C and so on. Its surprising how much this can save you in heating bills over a year (as much as 10% for 1°C change), and if everyone does it then that is a lot of emissions saved from gas and oil. Why not give it a try?

Heating your home is one of the big impacts you have on emissions of greenhouse gases (as most homes current rely on fossil fuels -gas, oil or solid fuels - for their heating). How much electricity you use is another impact, especially if your energy supplier hasn't gone 100% renewable.

The national Climate Change Committee recommends more insulation, draught-proofing, low-energy light bulbs and use of smart meters. Our work has shown that lots of older homes in our area don't have enough loft insulation, as building standards have changed over the years. You can find some great advice on energy saving measures from the Energy Saving Trust here: [*Measures to help reduce home heat loss - Energy Saving Trust*](#). Not everything needs major investment – changing to low energy lighting for example. All our local councils have advice pages on energy efficiency, and links to grants and special schemes. For example, if you are suffering from ill health or receiving certain benefits then Peterborough City Council has arranged free home assessments that will help you find funding and even put in some simple energy saving measures when they visit: [*Local Energy Advice Partnership - Peterborough City Council*](#).

Many homes have Energy Performance Certificates that assess how good your home is and suggest potential improvements. You can search for your certificate here. [*Find an energy certificate \(www.gov.uk\)*](#)

If you don't have an EPC for you home, you could have an assessment done, and get advice on improving the insulation in your home to reduce your energy costs and carbon emissions. If possible, don't wait until your current boiler fails before you think about how you would replace it. Heat pumps are very efficient and increasingly low carbon as the national electricity system decarbonises. They work well in well-insulated homes, so insulation is the first thing to think about.

Where bigger changes are needed the government is currently supporting home energy improvements with grants of up to £5000. If you are a homeowner or landlord, you can apply for vouchers worth up to two thirds of the cost of upgrading the energy efficiency of your home under the Green Home Grants scheme. Households on low income will be eligible for up to 100% funding, up to a maximum of £10,000. The scheme currently ends in March 2022. You can check if the scheme is suitable for you here: [*Green Homes Grant \(www.gov.uk\)*](#)

There is also a separate scheme to pay back the cost of a proportion of heat generated from new biomass boilers, ground source and air source heat pumps, and solar thermal panels. More details here: [Applicants | Ofgem](#).

The chapter on Buildings highlighted the case study of a village community collectively working to address their heating needs. Why not see if your community might be interested in a similar approach? Guidance can be found here <https://www.mlei.co.uk/>

It's not just about making physical improvements though, sometimes we need to pay attention to our everyday habits. Turning off lights and other electricals when we are not using them for example, turning the heating down in rooms you are not using, or making use of the timer function on washing machines to avoid peak demand in the evenings.

Dealing with overheating

All the evidence suggests that there will be wetter winters and hotter summers, with more chance of some extremely hot/dry summers in Cambridgeshire and Peterborough. Having well insulated homes not only helps in the winter but can also act to keep them cool in summer, alongside some simple measures like having thick curtains or blinds drawn to keep the sunlight out. Trees can provide shading, although make sure that they are in the right place and won't affect ground conditions. Some of the energy efficiency measures highlighted through the links in the previous section, like insulating hot water tanks, can also help reduce internal temperatures. More information can be found here:

[Overheating in homes – practical advice – ARCC \(arcc-network.org.uk\)](#).

Water usage

It takes a lot of energy to get fresh, clean drinkable water to homes, and to deal with all the waste water afterwards. Help reduce that energy use by being water aware. If you have a water meter you will also save money on your bills by cutting water use. For example, if you leave a tap running when you brush your teeth that wastes over six litres per minute!

About 20% of a typical gas heated home's heating bill is from heating the water for showers, baths and the hot water tap. Using less means you will still be saving money on your energy bill, even if you don't have a water meter.

Saving water isn't just about saving energy. We live in one of the most water stressed areas of the country, and this is getting more severe with climate change. In order to make sure there is enough water for people, nature, growing crops and for businesses in our region, we all need to use it as sparingly as possible, especially in the summer. Anglian Water, which supplies much of the water across the area, has a page of tips here (and it has a quiz too):

[Water saving tips \(anglianwater.co.uk\)](#). More suggestions to cut your water use can be found on the Waterwise.org website here: [Save Water – Waterwise](#)

Gardens and greenspaces

Greenspaces, whether local parks, gardens, nature reserves or wild areas, can provide an important role in cooling, as well as filtering air. They also provide porous surfaces where water can soak away and help avoid flooding, including surface water flooding in our towns and cities, as we face wetter winters and more frequent short periods of very intense rainfall. Greenspace also provides many benefits outside of climate change such as providing a great place to exercise and promoting mental wellbeing. Why not support existing facilities through volunteering or visits – and don't forget exploring your local area by bike or on foot.

More information on plans to increase greenspaces and how you can support nature can be found here: (www.naturalcambridgeshire.org.uk).

If you are lucky enough to have a garden think about making it 'climate friendly'. Many people in our survey told us that they saw nature as a really important aspect of their life. Trees can provide a shading and cooling effect (and capture carbon as they grow!), drought resistant planting reduces the need for watering, and water butts save rainwater for when you need it. Introducing a more natural approach has a bonus for wildlife too. Don't forget the climate impact of using fresh drinking water on gardens - a hose pipe left running can use up to 1000 litres of water an hour! Peat is a great natural store of carbon when it is kept in good condition. However, when it is cut for horticultural use, significant emissions result. Avoid buying peat for your garden or for repotting plants, there are peat-free alternatives available which are much better for climate change and the environment. Advice on gardens can be found here:

RHS Gardening in a Changing Climate (www.rhs.org.uk)

How you travel

How we travel around is another major factor in climate change emissions, as the transport sector is the biggest source of local emissions in Cambridgeshire and Peterborough. Throughout the covid-19 pandemic many of our usual movements have been disrupted, high street stores have closed and the use of internet shopping has grown. Outside of the lockdown periods walking, cycling and the use of local greenspace and parks have all increased. No one is sure what things will look like after the pandemic restrictions are lifted, but there are opportunities to support those modes of travel that have the least impact. Why not try and replace your shortest journeys with walking or cycling (or even longer ones if you can!). The majority of all journeys are less than 5 miles, yet most of trips over 1 mile are by car or van. If its on one of your journeys then you could hire an e-bike or e-scooter (currently there are trials underway in Peterborough and Cambridge). Its more difficult to avoid using cars in rural areas, but there are still opportunities such as car-sharing when public transport options aren't available. More information on climate-friendly ways to travel in your area can be found here: *Travelchoice About Us* for Peterborough, and here: *Travel Roads And Parking - Cambridgeshire County Council*.

Understandably there has been a big drop in public transport use during the Covid-19 pandemic, influenced by lockdown/tier guidance, changes to schooling, more remote working and workers on furlough. Essential services are still running throughout the pandemic, with social distancing and additional safety measures. It is important to follow the guidance. Once it is safe to lift the current restrictions public transport will once again provide a great opportunity for us to reduce our emissions impact.

When using cars, think about the way you drive: switch off the engine when you park up; make sure the tyres are correctly pumped as this can improve the car's fuel mileage by up to 3%; take off roof racks unless you are using them; don't leave heavy things in the boot and drive around with them when you don't need to; and try to drive smoothly.

Government has signalled the date for the end of the sale of new petrol and diesel engine cars, so its worth considering an electric vehicle as your next car if you are a car user. Government currently subsidises the cost of buying a new electric vehicle by up to £3000 (through a discount arranged with dealerships). Electric vehicle owners can also apply for up to £350 off the cost of installing a charge point at home, see here: *Electric Vehicle Homecharge Scheme: guidance for customers* - (www.gov.uk).

Your employer may be participating in the scheme that lets you lease an electric car out of income before tax, if you are thinking of getting a new car, this is well worth finding out about.

Flood risk

It is an unfortunate fact but the climate changes already happening will increase chance of flooding in Cambridgeshire and Peterborough. It is important that you check if you are in a flood risk area. You can check here: [Find out if you're at risk of flooding in England \(www.gov.uk\)](https://www.gov.uk). If you are in a flood risk area make sure to sign up to flood warnings and devise your own household plan to prepare for possible floods. Both the County Council and Peterborough City Council have more information on how flood risk will be managed in the area.

If your property is one that has flooded in the past and remains at risk you might need to consider further property-level flood resilience measures such as removable air brick covers, treated floors raised electrical sockets or even relocating appliances upstairs. More guidance is available here: [Protecting your property from flooding - Met Office](#)

What you buy

The suggestions in this and previous chapters focus on activities that can reduce greenhouse gas emissions or use less energy particularly within the Cambridgeshire and Peterborough area, with other areas taking similar action. However, there are ways to reduce your impact and help other areas to reach their carbon reduction targets. Thinking about what you eat (more seasonal produce and reducing food miles by buying or growing locally), how you travel elsewhere (offsetting any airplane journeys for example) and the type of things you buy (reducing, reusing, repairing and recycling) can make a real difference.

Food and household waste are also important things to think about. Food production and transport is very carbon intensive, especially meat and dairy - perhaps you could have a meat free day every week. Even if you aren't ready to think about eating less meat, reducing food waste has a big impact on emissions, and saves money. Remember to put any food or organic waste out for a special collection or on your compost heap, if this goes to landfill it decomposes and emits methane, and methane, like carbon dioxide, is a gas which causes climate change. We will talk more about waste in our final report, but how we deal with our recycling and food waste are an important part of reaching Net Zero emissions.

Being informed and taking part

Tackling climate change in our region requires informed participation and engagement across society, beyond the powers of a local authority or a national government. We need communities, businesses, universities, schools and everyone else to understand the risks of climate change, what we can do about them, and how they can be part of the progress.

We are all part of our wider community through different ways – you may run a business that operates in the area, work at a local hospital, be part of a school committee and more. It is important to look at the organisations and communities that you are part of and consider how they might play their part in tackling climate change. Is your school thinking about how it can become carbon neutral? Does your university teach its students about how climate change will impact their area of interest? Is your business investing sustainably? Does your organisation support any local nature-based charities? You may find that your local community already has a local group mobilised to do their bit, or you may want to start your own initiative.

As we have found from our public engagement, opinions, research and recommendations from residents are invaluable to the work of local and regional government. We therefore also encourage residents to engage with their elected representatives, be that at the city, council, regional or national level, to help inform and encourage effective climate change policies.

Our final thought on what you can do is to encourage you to stay informed about climate change and possible actions that you can take. We have given some useful websites links in this chapter. The Combined Authority, your local council, and parish councils will also be a source of information on their strategies and new actions

The implementation and success of our recommendations will in a large part be down to the participation and engagement from residents across the region. We therefore hope that all residents will join us in making Cambridgeshire and Peterborough a leader on climate action and sustainability, and we all can contribute to ensuring that our children and future generations have a world that is fit to live in.